

The Next Truth

Where Science and Myth Meet[©]

Volume 2 Issue 3

December 2019



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a Real Time Machine?
Time Travel Specialist
Prof. Ronald L. Mallett
Weighs In

Prof. Lihong Wang
The Astounding
Science of Light and
it is No Science Fiction

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The Next Truth

Where Science and Myth Meet

WAS THERE MORE BEFORE THE BIG BANG?

Walking up to the globe of the CERN (European Organization for Nuclear Research) in July 2017, set a crazy quest for me in any understanding within the origin of evolution and with that the Universe ... with tense curiosity... I went back and the story began...

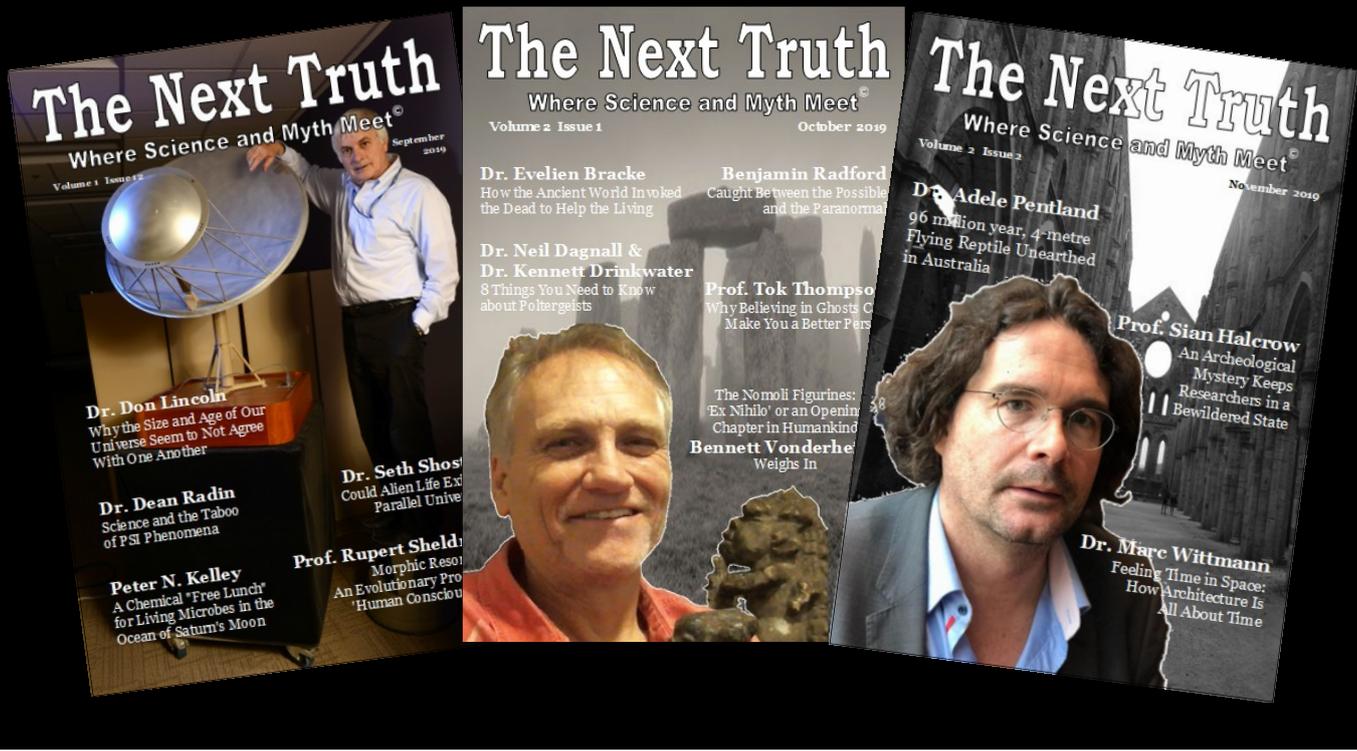
Once upon a time ... a little spot, smaller than the dot at the end of a sentence, was hovering through the universe.

This charged particle could have sparked the production of every other particle it encountered, not to mention every galaxy, solar system, planet, and ... our species.

That tiny spot exploded in a place being pitch black.

It exploded into an almost inaudible illuminating flash of everything!

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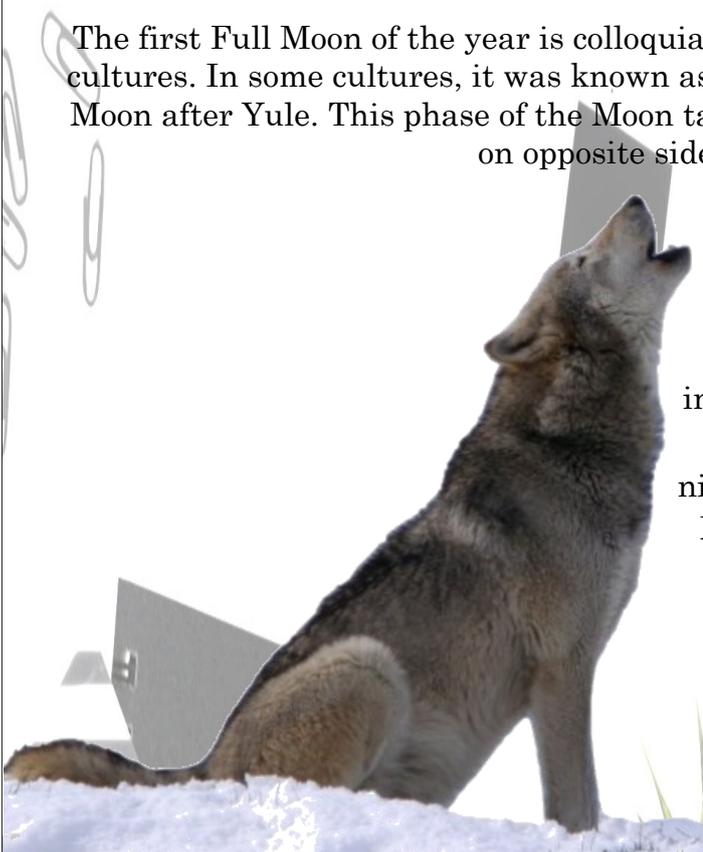
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Jan 10, 2020: Wolf Moon



The first Full Moon of the year is colloquially known as Wolf Moon in many northern cultures. In some cultures, it was known as Old Moon, Ice Moon, Snow Moon, and the Moon after Yule. This phase of the Moon takes place when the Sun and the Moon are on opposite sides of the Earth.

Do Wolves Howl at the Moon?

The scientific community has no indication that the Moon phase plays any particular part in the calls of the wolf, but wolves are nocturnal animals, so they are in general more active at night. And wolves do howl in the *direction* of the Moon; they point their faces toward the sky for better acoustics, because projecting their howl upward carries the sound farther.

www.timeanddate.com

The Future was Yesterday

Since the dawn of civilization humanity pondered over the question of where we, as a species, will go and what will happen when we get there. But it was not until the 19th century that we realized that we had the technology to do great things and to expand beyond the limits of our own imagination.

The history of science fiction (SF) is vast and complicated. Many old texts depict advanced technologies and scenarios where man traverses beyond the limits of the world, and dives into space and the cosmos beyond. The mathematician and engineer Heron of Alexandria invented the first known automatic door in the first century AD in the region of Roman Egypt. The Greek writer Lucian of Samosata wrote "True History", which depicts a man who travels beyond the heavens to witness a battle between the People of the Moon and the People of the Sun. The story "The Ebony Horse" depicts a man-made horse that, with the turn of a key, can carry a cart beyond the atmosphere into the outer reaches of space. And the story, "The City of Brass," depicts an ancient city, comprised of abandoned technology, filled with living puppets without puppeteers and other constructed men.

Even in early SF space was described as being full of aether or air, which, to a modern perspective, comes across as a little bizarre, this appealing genre continued to evolve. One of the most notable works that shaped the modern SF genre was Mary Wollstonecraft Shelley's 1818 novel "*The Prometheus*" aka "*Frankenstein*". Associated with horror literature, many historians do believe that it is the first real SF work in where Victor Frankenstein's science experiments created 'something' that contains life.

In the decades following many believed that they had transcended to a new level of human understanding, and, for the first time, were capable of addressing issues of science. Galileo Galilei and Nicolaus Copernicus were publishing their theories about the nature of the cosmos, and Leonardo Da Vinci had already designed a clockwork designs of the helicopter.

Even SF had become in vogue this genre is still inundated with dark dystopias nowadays. We just cannot seem to look away from ideas about how society is going to go down. What we don't often see are ideas about humanity prospering. And so, we immediately think of the Jules Verne, H. G. Wells, and Edgar Allan Poe type of stories when hearing or reading the word 'Science Fiction'.

This 'speculative' fiction, also known as 'soft' SF, deals with imaginative and includes a wide range of futuristic concepts and themes such as advanced science and technology, space exploration, time travel, parallel universes, and extraterrestrial life. But these 'new' technologies pictured for us in SF novels and movies are not at all impossible of realization tomorrow.

There exists a common misconception that all SF is fantastical and always has to take place in a remote universe where civilizations have overcome the energy barrier what makes space-ships travel faster than the speed of light. While many beautiful entries in the SF universe do bend the rules about what is or is not possible in our physical universe, much SF is actually based in science. This is known as 'hard' SF.

Some of the tropes in hard SF are truly fascinating like plausible interstellar travel, advancements in technology, artificial intelligence, communication with light, 3D printers, smart-phones, among others.

SF has evolved from the ancient era up to the present and, believe it or not, past ideas that were mere SF 200 years ago are a reality today. While we may not be teleporting people from starships to a planet's surface anytime soon, many of the devices from science fiction movies and series are slowly becoming a reality. Scientists are getting closer and closer in developing other tools essential for, for instance, future space travel endeavours.

So, if you think technologies from the series Star Trek or Star Wars seem far-fetched, think again.

Contributors

Ronald L. Mallett (Pennsylvania, USA)



Ronald Lawrence Mallett, Ph.D. is a professor of theoretical physics and the author of the book “Time Traveler”. He received his B.S. in 1969, M.S. in 1970, and Ph.D. in 1973, all from Pennsylvania State University. In 1975 Prof. Mallett joined the faculty at the University of Connecticut. In 1987 he was promoted to the rank of full professor. His research interests include black holes, general relativity, quantum cosmology, relativistic astrophysics and time travel. As of 2018, he is a Professor Emeritus of physics at the University of Connecticut. www.phys.uconn.edu

Tony Damian (Central Florida)



As e.g. a Master/Teacher of Usui Shiki Ryoho Traditional and Angelic Reiki, Tony has experience in Ancient Tribal and Indigenous healing practices since 1985. His career history spans many different fields until that came to abrupt end in 1982 with a freak, near fatal accident what forced Tony to become his own health-care provider. www.thepowerofweee.com

Andreea Font (Liverpool, UK)



Dr. Andreea Font is a senior lecturer in astrophysics and computational cosmologist at the Astrophysics Research Institute (ARI), Liverpool John Moores University. In 2005 she received her PhD in Astronomy from the University of Victoria, Canada. Her research interests are focused on the formation and evolution of galaxies, in particular on the formation of our own galaxy, the Milky Way. In particular, Dr. Font is interested in the composition of the stellar halo, the distribution of stellar streams and the nature of dark matter. www.andreeafont.wixsite.com

Lihong Wang (California, USA)



Lihong Wang is the Bren Professor of Medical Engineering and Electrical Engineering at the California Institute of Technology (Caltech). He was the editor-in-chief of the SPIE Journal of Biomedical Optics. Prof. Wang earned BS and MS degrees at Huazhong University of Science and Technology (1984, 1987); and a PhD at Rice University (1992). His book entitled Biomedical Optics: Principles and Imaging, received the Joseph W. Goodman Book Writing Award. He was inducted into the National Academy of Engineering. www.caltech.edu

DESY (Hamburg, Germany)



The Deutsches Elektronen-Synchrotron is one of the world’s leading accelerator centres. Researchers use the large-scale facilities at DESY to explore the microcosm in all its variety. The facilities generate the world’s most intense X-ray light, accelerate particles to record energies and open completely new windows onto the universe. DESY is a magnet for more than 3000 guest researchers from over 40 countries every year and a coveted partner for national and international cooperation’s. www.desy.de

Nick Howe (UK)



Nick's involvement with the paranormal developed through an interest in religion, although of no faith it became apparent that the paranormal was a common theme of belief. Coupling this with personal experiences he was staggered by the number of events family, friends and acquaintances also experienced. On retirement he felt it was time to devote more time to studying this which culminated in the formation of PRI UK and became a member of The Society for Psychological Research and the Association for the Scientific Study of Anomalous Phenomena. www.paranormalresearchinvestigators.co.uk

Andy Wilson (UK)



Andy's interest in the paranormal started early in his childhood after some personal experiences which could not be explained rationally. Since the 1980s Andy has been researching the paranormal and is involved in regular investigations. He is a member of The Society for Psychological Research and the Association for the Scientific Study of Anomalous Phenomena and the pioneering Ghost Club established in 1862. Andy values his contact with clients while respecting their paranormal experiences.

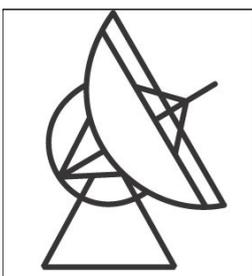
www.paranormalresearchinvestigators.co.uk

Harry Hoster (Lancaster, UK)



Harry Hoster is Professor of Physical Chemistry and Director of Energy Lancaster at Lancaster University. After receiving a degree in physics from Bonn University (1996), he was awarded a fellowship by the German "Fonds der Chemischen Industrie" for full-time doctoral study on anode materials for methanol fuel cells. In 2011 Prof. Hoster became Scientific Director of TUM CREATE (Singapore) and in 2013 was awarded a position as Visiting Professor at the Nanyang Technological University (Singapore). His personal research explores the physical and chemical properties of surfaces and solids.

www.lancasterisc.com



MPI for Radio Astronomy (Bonn, Germany)

The activities of MPI encompass the whole area of astronomical observations throughout the EM spectrum. Theoretical Astrophysics is an additional research field. To research the physics of stars, galaxies and the universe, RA looks into subjects like e.g. stellar evolution, young stellar objects, pulsars, magnetic fields in the universe, radio galaxies, quasars, galaxies at early stages of the evolution of the universe, cosmic ray(s), high-energy particle physics as well as the theory of stellar evolution and active galactic nuclei. www.mpifr-bonn.mpg.de

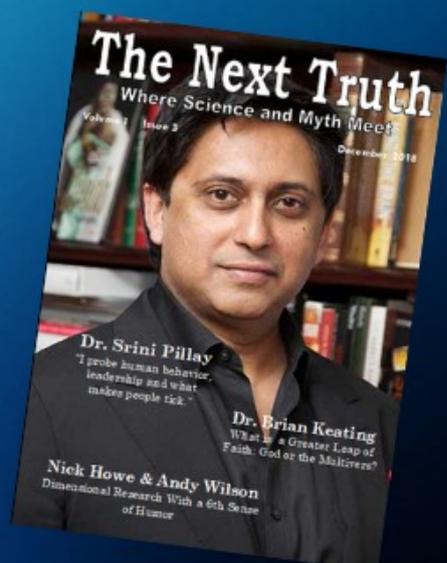
Max-Planck-Institut
für Radioastronomie

Ellie Maybanks (Londen, UK)



Ellie Maybanks is a paranormal medium and a member of the PRI-UK team. Currently she is working for the Ambulance Service in Essex (South-East England). From a very young age Ellie experienced many different types of "hauntings". Before she even knew what a "ghost" was she had things happen to her that just couldn't be explained. That was just the start of it. "There is no way that we live and die and that's the end of the road. I believe there is life after death but what it is, I want to know." www.confessionsofaparormaladdict.wordpress.com

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Reflections of the Soul Through Past-Life Regressions

How our former selves from the past can reunite us in this lifetime (Part II)

By Tony Damian, RMT, CMT, www.thepowerofweee.com

I had so much going on in my head the whole trip that I didn't stop for a second to just relax, and thought how wonderful this could all be. When I walked through the last doorway and into the roped off pathway of the lobby area, I started to scan through the little crowds of people everywhere to try and find Nellie.

I felt butterflies in my stomach, not jitters, but a feeling of a new beginning, something wonderful. I could see up ahead of me a woman, a little bit smaller than the average person, having a glow around her, an aura of gold, white and lavender. I seemed to be star struck.

The 10 hours of flight time had taken its toll a bit what made my vision very blurry. As I approached this woman, even though I could not see her face yet, I knew this was my Nellie.

When we came face to face it was as if the entire world around us just froze in time. It blazed into the background. I dropped my bags and we hugged for the first time. The energy was incredible, the happiness and peace that I could feel while holding this lady close and tight was like nothing I have ever felt.

We remained in the airport for quite some time. We had a cup of coffee together and just seemed to sit and stare and smile at each other for what seemed hours. As I looked into her eyes for the first time, I could see an image of myself, my own soul, as if looking into a mirror. We always had this feeling of knowing each other from a past life, now we both knew it for sure.

We had found our soul-mates. Nellie once said to me on one of my later visits to her that we were one soul living in two bodies.

That is why we miss each other so much when being apart. It is as if we are not complete unless we are together. Even though we are still 3,000 miles apart, when we get online and would see each other on camera and type back and forth, we could feel the connection, the soul connection.

That night we talked almost until dawn. She told



me of a dream she had the night before I arrived. About a place she had been to as a child and had not been back there since. Somehow this place was important now, and she wanted to take me there.

She spoke of a feeling of having had a past-life there.

I didn't tell her at the time, but I had written out a past-life regression that I had 3 years prior. It took place in a castle turret and had seen a calendar of some kind on a wall next to an arched window. The calendar said 662, so I supposed that was the year. Through the window I saw a young lady walking along the path below. She had a bunch of long stemmed flowers draped over her crossed arms. As I neared the window she looked up and smiled at me. I suddenly knew that I was not supposed to be friendly with her. I was tasked with a position that would not permit it. I kept this paper folded in my overcoat inside pocket, with no idea of why or what I was going to do with it. >>>

The next morning we set off for Whitby Abbey, some 150 miles north of her place. During the drive up to the abbey she talked of how this place was special in some way. That, when visiting the abbey as a child, she knew that she had been there before. She knew every nook and cranny of the place. I listened intently, with no idea of what to expect, and said nothing of my little journal.

We arrived at the Abbey and I, all of a sudden, felt the presence of a particular energy but unlike anything I have felt before.

The morning was cold and drizzly, there was no one present except the curator. We walked the ruins for what seemed hours. Sometimes together in silence, and sometimes we just would wander off on our own. After some time standing in this one barren spot what seemed to me to be the center of the structure, Nellie walked up and said, "Why are you set standing there on the altar?" "Huh?" I said. "Yes, there is a place just over there that says so." "I have no idea" I responded with perplexedly.

After walking the premises together for a while, we came upon an exposed turret staircase that was cordoned off with yellow caution tape. So naturally, I had to go investigate it. Nellie had a look of "Ah Ha!" on her face and took a walk in the opposite direction as I climbed the stairs.

I came up to the first landing in the turret. It had an arched window overlooking the complex. As I neared it I saw a discolored area on the wall that appeared to have something that once hung there. I stuck my head out of the window and all of a sudden, I saw my vision from my past-life regression overlaid on what I was looking at. As if a black and white photo turning to technicolor. I glanced down, and there was Nellie. She was walking along the path below with her sweater draped over her crossed arms. She looked up at me and smiled and said, "We've done this before haven't we?"

I got dizzy with excitement and confusion all at the same time. I rushed downstairs almost unable to speak. I reached into my overcoat pocket and pulled out the paper and handed it to her. She read it with mouth wide open. "I knew it!!" she said, "I just knew we had a connection of some kind".

At the same time, the curator was approaching us and said, "Sorry you two, got to close up now." I asked him if we could have just a few minutes to run through the museum to check just a few things. He looked a bit annoyed but agreed. So off we ran.

Inside the museum was a sketch of the original Abbey before the bombing during the war. Under this it said: The Abbey was built and finished between 660 – 662 and was a monastery.

That night all we could talk about was the paper with my past-life regression written out. We were both gob smacked.

The next morning we headed on a trip to Manchester to a Car-Boot Sale. A large almost arena looking place, where cars backed in and sold things from their trunks. Nellie found this little ring in one of these cars. It was from an estate sale and very old. A small silver ring with three spirals on it. The triple spiral is called a Triskele which is a complex ancient Celtic symbol and often referred to by many as a Triskelion. Its earliest creation dates back to the Neolithic era, as it can be seen at the entrance of Newgrange, Ireland. It represented Mother, Maiden and Crone, the Triple Goddess.

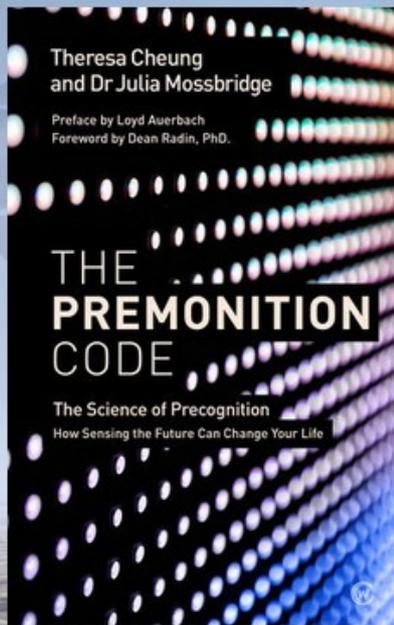
Ok, that's cool. But if the ring was pressed into wax, like a wax seal, it appears to spiral in the opposite direction. We found out months later after a lot of research, that this was the wax-seal symbol from the Abbey during its earliest days. Used to seal the newly translated scrolls from Greek to English of the early scriptures.

In the Synod of Whitby, as it was called then, a meeting was held by the Christian Church of the Anglo-Saxon kingdom of Northumbria in 663/664 to decide whether to follow Celtic or Roman usages.

It marked a vital turning point in the development of the church in England.

So, I was left baffled with the question was I a scribe or a monk in this Abbey? Regardless which, it was obvious why I could not be associated with this young peasant girl.

Next month part III of "Reflections of the Soul Through Past-Life Regressions"



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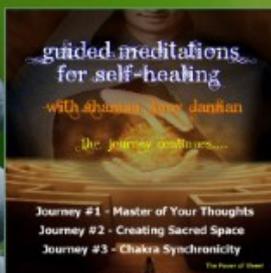
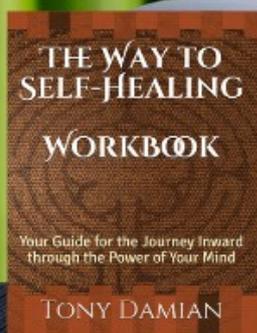
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If You Hold Up a Grain of Sand, the Patch of the Sky It Covers Contains 1000.000 Galaxies

A grain of sand may be tiny, but the patch of sky it covers when you hold it up at arm's length is many light years in diameter due to the truly astronomical distances involved. Thanks to observations by telescopes such as Hubble, we can estimate that there are over one hundred billion galaxies in our universe – and they're just the ones we could see. So, by knowing the proportion of the sky that the grain of sand is covering, we can estimate the number of galaxies in that area.

Stars in your eyes

What's even more mind-blowing is the number of stars your grain of sand is covering. Galaxies are huge swirling masses of stars, dust and dark matter and each galaxy can contain anywhere from 10 million stars for a dwarf galaxy to a thousand billion stars for a giant galaxy. So even if your grain of sand was hiding only dwarf galaxies, that would be around a hundred billion stars!

Our solar system is located on one arm of the spiral galaxy the Milky Way. If you look up on a clear night and away from city lights you can see a smudge of stars across the sky. What you are seeing is the billions of stars that make up the main body of our galaxy. But what you can't see is the super massive black hole that is thought to be at the centre of most, if not all, galaxies in the universe.

If there's all those stars, why is it dark at night?

One hundred billion galaxies, all full of millions of stars, seems like a lot but it isn't nearly enough to make the night sky as bright as day. If there were an infinite number of stars and the universe was infinitely old, there would be a star everywhere you looked in the night sky and it would be very bright indeed.

But the universe isn't infinitely old. It was created approximately 14 billion years ago and since the speed of light is constant, we can only see objects that are less than 14 billion light years away. This means that we are living within a spherical 'observable universe' which is smaller

stars further away from us than 14 billion light years will not have had enough time to reach the Earth. In addition, the universe is expanding and all the galaxies, and their stars, are moving away from us. Thanks to this, the light from a moving star changes colour in a similar way that sound from a moving ambulance siren changes pitch. The light that we observe from distant receding stars is more red than it would be if they were stationary – the light is 'red shifted'. In many cases the red shift is large enough to move the light out of the visible region of the electromagnetic spectrum.

How do we know how many galaxies are in our universe?

According to the best estimates of astronomers there are at least one hundred billion galaxies in the observable universe. They've counted the galaxies in a particular region, and multiplied this up to estimate the number for the whole universe.

Astronomers get to travel to some of the most remote places on Earth to use huge optical telescopes far away from light pollution in order to make observations. Optical telescopes have been used for astronomical observation since the time of Galileo, but the technology has moved on significantly since then.

Twinkle twinkle

Twinkling stars may be pretty and romantic, but this distortion of the starlight by changes in temperature and wind speed as it travels through the atmosphere has been the bane of astronomers' lives. Fortunately, adaptive optics can now compensate for the twinkles. By shining a laser in to the night sky, the path the star light takes to reach the telescope can be found more accurately. And a rapidly tilting mirror to adjust the light coming into the telescope makes the image much clearer.

Telescopes in space

A simpler way to overcome the atmospheric distortions is to put your telescope above the atmosphere. The Hubble Space Telescope orbits >>>

600 km above the Earth and has been sending back the most amazing images of our universe since 1993.

In 2013, NASA, the European Space Agency and the Canadian Space Agency are due to launch the James Webb Space Telescope (JWST) to replace Hubble. The JWST will look at how the universe began and how galaxies are formed, but in order to do this it won't use visible light to produce images. Unlike Hubble it will use infrared light.

By being sensitive to infrared light, the JWST will be able to detect objects hidden behind dust clouds and galaxies that are moving away from us at such speeds that their light has been red-shifted out of the visible region of the electromagnetic spectrum.

Is it true that there could be intelligent life out there?

Despite the huge number of sightings, abductions and government sponsored cover-ups that have allegedly taken place over the years, there is no proof that alien life exists. But this doesn't stop researchers looking.

Searching for aliens

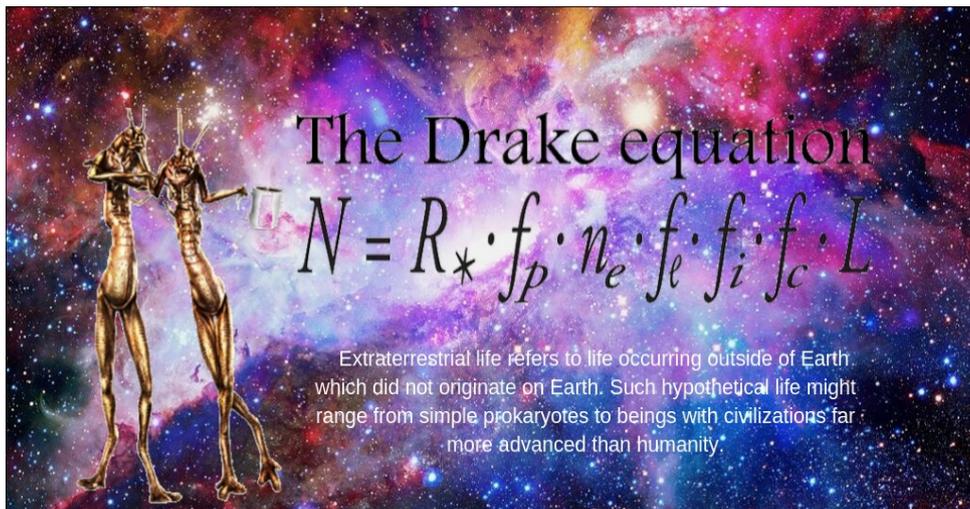
The Search for Extra-Terrestrial Intelligence (SETI) is based at the University of California in Berkley and has several radio telescopes that are dedicated to listening out for signals from alternative life forms. The researchers need to be dedicated since despite constant searching after picking up a promising signal in 1977, they haven't heard anything else.

But SETI isn't just waiting for intelligent aliens to contact us. In 1974, they beamed their own signal out into space from the Arecibo telescope in Puerto Rico. The signal is a binary radio message which, when displayed as a rectangle of squares and spaces, makes up a picture of a human, our position in the solar system and even the structure of our DNA.

The signal was aimed towards the imaginatively titled M13 area of the universe, which is a huge cluster of stars 25,000 light years away. The thinking was that such a large number of stars had a high chance of harbouring a planet with intelligent life. However, we still have another 24,966 years to wait before the signal reaches the area.

Intelligent life in the Milky Way

But could there be intelligent life sharing the Milky Way with us? Consider the number of stars like our Sun in the Milky Way, then take the fraction of stars which have planets orbiting them, then take the fraction of planets with a



suitable environment for life to evolve, then take the fraction of those planets where life has evolved, then take the fraction where life on those planets is intelligent. Finally, take the fraction of intelli-

gent life that is capable of communication, and then take the mean lifetime of that life form. There is a fair bit of guesswork involved in predicting some of these variables, but the outcome is thought to be an estimated 72 civilisations in the Milky Way which are able to communicate. This calculation is called the Drake Equation first written down by Frank Drake who is now the Director of SETI.

But even with so many possible intelligent life forms capable of communication out there, the distances involved mean that it's likely they would be at least 200 light years away. This means that a conversation with even the chattiest of aliens would involve waiting 400 years for a reply to the simplest question. It would be the ultimate long distance relationship!



For more cool stuff on science, www.physics.org



Dr. Brian A. Sharpless

ASSOCIATE PROFESSOR OF CLINICAL PSYCHOLOGY

Dr. Brian A. Sharpless, Ph.D. is an associate professor of Clinical Psychology at the American School of Professional Psychology at Argosy University, Northern Virginia.

Through his broad research, teaching, and clinical interests in Psychopathology (esp unusual and rare psychological disorders) Psychodynamic Psychotherapy Dr. Sharpless has published over 30 articles and chapters on common and lesser-known disorders, psychodynamic therapy, cognitive-behavioral therapy, professional issues, and the history/philosophy of clinical psychology.

His first book, "Sleep Paralysis: Historical Psychological, and Medical Perspectives" co-authored with Dr. Karl Doghramji, was recently released by Oxford University Press. His first edited book, "Unusual and Rare Psychological Disorders", is forthcoming. Dr. Sharpless has presented his work at national and international professional conferences and been interviewed for various TV, radio, and print outlets (e.g. National Geographic, Huffington Post, New York Magazine, the BBC).

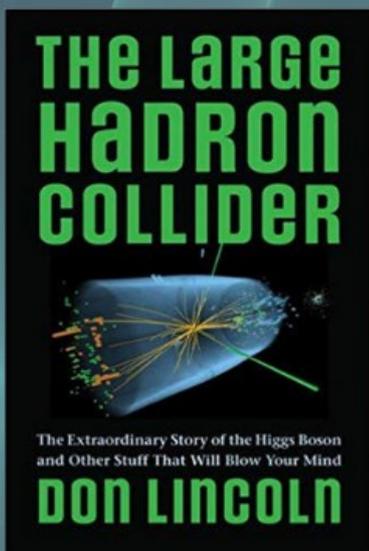
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www.amazon.com



Scientists Start Mapping the Hidden Web that Scaffolds the Universe

By Dr. Andreea Font, www.ljmu.ac.uk

After counting all the normal, luminous matter in the obvious places of the universe – galaxies, clusters of galaxies and the intergalactic medium – about half of it is still missing. So not only is 85% of the matter in the universe made up of an unknown, invisible substance dubbed “dark matter”, we can’t even find all the small amount of normal matter that should be there.

This is known as the “missing baryons” problem. Baryons are particles that emit or absorb light, like protons, neutrons or electrons, which make up the matter we see around us. The baryons unaccounted for are thought to be hidden in filamentary structures permeating the entire universe, also known as “the cosmic web”.

But this structure is elusive and so far we have only seen glimpses of it. Now a new study, published in *Science*, offers a better view that will enable us to help map what it looks like.

The cosmic web provides the scaffolding of the large scale structure in the universe, predicted by the “standard cosmological model”. Cosmologists believe there is a dark cosmic web, made of dark matter, and a luminous cosmic web, made of mostly hydrogen gas. In fact, it is believed that 60% of the hydrogen created during the Big Bang resides in these filaments.

The web of gas filaments is also known as the “warm-hot intergalactic medium” (WHIM), because it is roughly as hot as the sun’s interior. Galaxies are likely to form at the intersection of two or more such filaments, where the matter is densest, with the filaments connecting all galaxy clusters in the universe.

So far, we haven’t been able to detect dark matter. This is because it does not emit or absorb light so it cannot be observed with usual telescopes. The cosmic web filaments are also very hard to find as they are very diffuse and they do not emit sufficient light to be detected. Since the original prediction, there has been



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an intense search for the cosmic web, using a variety of methods.

One of these relies on bright objects that happen to lie in the background along the same line of sight as a gas filament. The hydrogen atoms in the filaments can absorb light at a specific wavelength in the ultraviolet. This can be detected as absorption lines in the light from the background object, when broken down into a spectrum by wavelength.

This method has been applied using quasars, which are very bright massive objects at large distances, and even with background galaxies.

Galaxies lighting up the web

The new study has managed to detect the gas in an entirely new way which allows two dimensional imaging of the cosmic web, rather than relying on the random location of a bright source behind the gas cloud used in absorption studies.

The object they studied, catchily named SSA22, is a proto-cluster, meaning it is a cluster of galaxies in its infancy. It is much farther away than previous measured bits of the cosmic web, >>>

its light travelled about 12 billion years to reach us. This means we are looking back in time to the early stages of the universe, allowing scientists to probe how the filaments first assembled.

A few years ago, a number of extremely bright, star-forming galaxies called “sub-millimeter galaxies” were detected near its centre. This new study has found 16 such galaxies and eight powerful X-ray sources, a rare over-density of such objects at this early epoch. The objects provide copious amount of ionising radiation to all of the hydrogen gas of the filaments, which makes it emit light that we can detect – a technique that holds much more promise than absorption.

Another mystery that this study helps to solve is the formation of sub-millimeter galaxies. The most widely agreed on explanation is that they form as a result of two normal galaxies merging, hence forming a massive galaxy with double the amount of light.

However, computer simulations show that these galaxies can grow from the cold gas pouring in from the neighbouring cosmic web. This scenario is confirmed by this new study.

Detailed map

The new study paves the way for a more systematic, two-dimensional mapping of gas filaments that can tell us about their motions in space.

Future studies help further map the hidden cosmic web. In addition to looking at galaxy clusters full of bright objects, we can also trace the web’s emission in radio or X-ray wavelengths. However, the X-ray traces much hotter gas than the bulk of the WHIM. The proposed Athena X-ray observatory will provide a full picture of the hot filaments around the clusters of galaxies in the nearby universe.

Another proposed mission for beyond 2050 is to use the cosmic microwave background – the light left over from the Big Bang – as a “background light” and look for fine imprints left in it by the cosmic web.

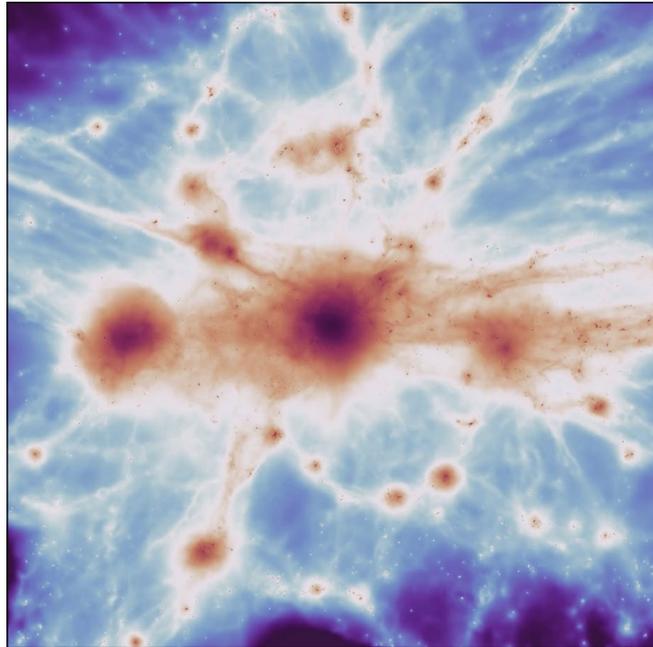
All these tools will reveal the entire structure of the cosmic web and provide us with a definitive census of the matter in the universe.

What’s more, we know that baryons settle in the dark matter filaments of the universe to make their own filaments, like foam over an existing wave. This means that detailed maps of the gas

filaments can help us trace the more hidden dark matter structure and, ultimately, help us understand its mysterious nature.



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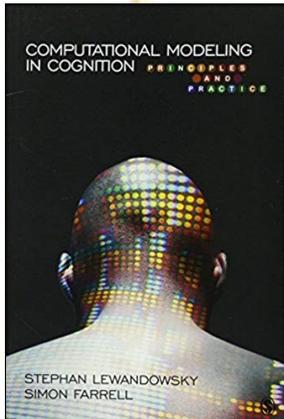
A massive galaxy cluster from the simulation, with filaments. Photo credit: Joshua Borrow using C-EAGLE



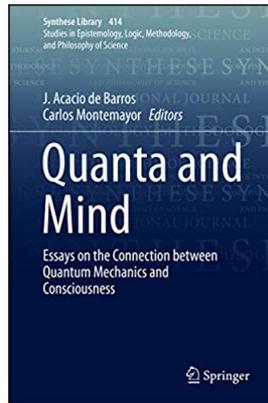
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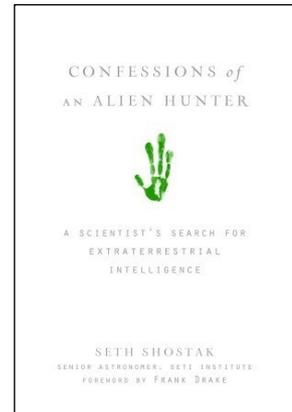
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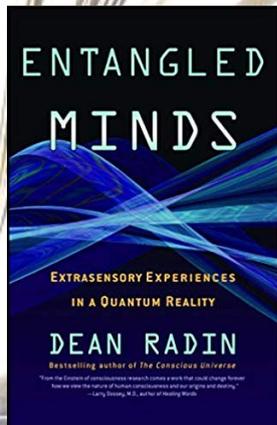
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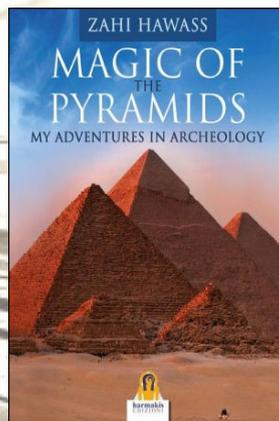
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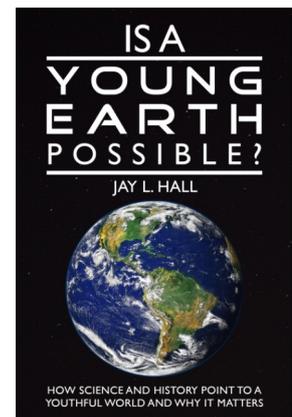
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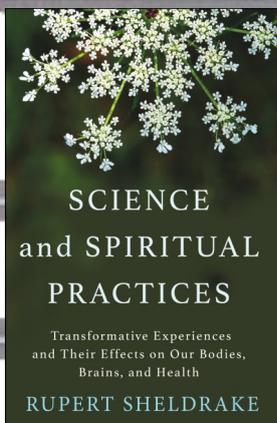
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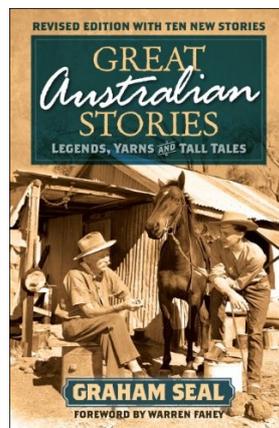
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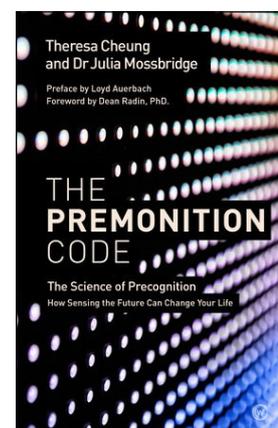
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PRI-UK in the Spotlight

Ellie Maybanks Weighs In

By Maria Anna van Driel, www.nexttruth.com

The supernatural experience of having the dead communicate through the living has now been analyzed with brain scans. This is what researchers of research at the Myrna Brind Center of Integrative Medicine at Thomas Jefferson University in Philadelphia say. For the full article: www.livescience.com But what is it that comes to mind when you think about the word “paranormal”? I assume images of poltergeists, ghost hunters, mediums or little gray aliens pop-up instead of scientific conducted experiments in the area of e.g. psychographic writing. Or perhaps you imagine movies like *The Blair Witch Project* or *Ghostbusters*.

This almost taboo-like word “paranormal” is also known as the prefix “para” simply means above, beside, or beyond. We use the word “parachute” to describe a life-saving device that deploys above your head to hopefully help you hit the ground with a thud and not a splat. Similarly, the word “paramedic” usually elicits the mental picture of a lifesaver or a first responder working above or beside you. In both cases, each word is used to describe something positive and beneficial. In fact, the English language is full of words where the prefix “para” is used as an integral part of the word’s meaning.

So why is it that when the prefix or “para” is used before the word “normal,” we automatically assume elements of fringe science, taboo topics, and witchcraft? After all, the meaning of the word paranormal is relative. What is paranormal today may be considered commonplace tomorrow. Allowing ourselves to make these types of

assumptions about the paranormal at best limits our ability to conduct serious study and at worst, completely paralyzes us with the fear of stigma and peer ridicule.

However, the idea of paranormal realms existing parallel to ours has remained a constant focus of thriller and sci-fi movies which often takes the audience on a wild, but very speculative ride. Talking about the word paranormal in any context other than the entertainment industry usu-

ally results in raised brows and smirks. But is not everything in science paranormal until we eventually perceive it as normal?

Throughout history a myriad of attempts to communicate with the dead and other living human beings, aka spirits have been docu-

mented back to early human history. A quick grasp from our recent history; American photographer Attila von Szalay was among the first to try recording what he believed to be voices of the dead as a way to augment his investigations in photographing ghosts. He began his attempts in 1941 using a 78 rpm record, but it wasn't until 1956, after switching to a reel-to-reel tape recorder, that he believed he was successful.

Konstantin Raudive, (1909-1974) a Latvian psychologist, and a student of Carl Jung, who had taught at the Uppsala University, Sweden and who had worked in conjunction with Jürgenson, made over 100,000 recordings which he described as being communications with discarnate people. And William O'Neil stated, at a Washington, DC press conference on April 6, 1982, that he was >>>



*What we think of as “paranormal”
is often just a fact of nature.*

able to hold two-way conversations with spirits through an electronic audio device called "The Spiricom".

Plowing through the avalanche of articles containing a divergent explanation within this, sometimes creepy, research area the word 'Medium' has undoubtedly passed your screen several times what is being used during discussions about psychic abilities, particularly those involving communication with the spirit world. And even mediumship became quite popular in the 19th-century United States and the United Kingdom after the rise of Spiritualism as a religious movement and modern Spiritualism is said to date from practices and lectures of the Fox sisters in New York State in 1848, traditionally, a medium is someone who speaks, in one way or another, to the dead.

Mediums obtain messages from the spirit world in different ways in a similar manner to you reading a different edition of the same author as I do. Some mediums receive intuitive information, in which images and words appear as mental impressions that are then relayed along to the living. In other cases, a medium may hear actual auditory messages or see actual images of these messages.

But no matter from which angle one approached this field of science, many people who work with spirit communication regularly find that the dead can be quite a chatty bunch sometimes. If they have got something to tell you, they are going to make sure you get told!

Welcome Ellie, I appreciate the time you are taken for letting us peer into your career as a paranormal investigator and medium, and some of your theories and research within the field of the paranormal.

Q: You are a team member of PRI-UK. Can you tell us a little bit about yourself? Who is Ellie Maybanks?

Ellie: I'm a mother to a gorgeous 4 year old little girl and I currently work for the Ambulance Service in Essex (working in haunted hospitals is my favourite part of the job!)

Q: What is your position within the PRI-UK team?

Ellie: My main duty is more or less sitting back and getting a feel of the location we are in from how looking at a picture makes me feel to the at-



mosphere change between each room. I like to keep quiet and write down anything I see or hear and take pictures of each room before, during and after the investigations to note down any changes.

Q: When did you first become interested in the paranormal?

"There is no way that we live and die and that's the end of the road. I believe there is life after death but what it is, I want to know."

Ellie: I first became interested in the paranormal when I

was quite young. I must have been about 6 years old when I saw my first "ghost". Granted it was only a dog that I saw but it still creeped me out considering I never met this dog before.

From that moment on I was always hearing voices and seeing things... I've even been dragged out of my own bed in the middle of the night. As soon as that happened, I KNEW I had to find answers on this. Then I found PRI UK and I'm so lucky and grateful to have met these lovely people!

Q: What is your most hilarious or scariest moment during an investigation?

Ellie: I think the moment that creeped me out the most was when I saw an apparition of a young boy in a secret location in Essex. He was just standing there staring at me and no matter how many times I blinked, looked away, >>>

walked away and came back, he was still there.

Anyone who knows me knows that me and ghost children do not mix, mostly because I have a child of my own. This little boy had no expression on his face and he just stood there and stared at me. I even called other investigators over but they couldn't see it so it seemed like I had some connection with this boy. Looking at him made me feel on edge and quite emotional. Whether it's because I'm a mother too or if he was holding onto me, I don't know but it was quite creepy.

Q: Do you think modern science will soon find proof for the existence of the unexplained?

Ellie: Honestly, I don't think we will ever have a definite answer for the unexplained. It means going into the complete unknown, something that living humans are unable to do. I do hope that science will evolve enough to allow us to find an answer but if I'm being completely honest, I don't think we will ever know until we pass on ourselves.

Q: What is the best advice you can give for aspiring investigators who want to explore the mysteries of the still unknown realms of the afterlife?

Ellie: Just go for it! I jumped right into the deep end and went on my first investigation in a matter of weeks with PRI and now I'm addicted! Do your research, find ways of getting evidence that make sense to you whether it's buying equipment or drawing on a notepad.

Whatever you feel comfortable with and whatever gives you the best evidence will work for you. Always make sure that you investigate SAFELY! I cannot stress this enough to people but please be careful on investigations. Remember that you're in an unfamiliar environment with strange stories and uneasy feelings so don't do anything stupid or because you think it'll be funny. It's not worth getting yourself hurt over. Just be safe, have fun and catch those ghosts!

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Evolving Computers from Tools to Partners in Cyber-Physical System Design

By DARPA, OUTREACH@DARPA.MIL

Program seeks to generate AI-enabled tools to streamline design of cyber-physical systems while uncovering more innovative design approaches

Department of Defense (DOD) systems and platforms are composed of numerous integrated cyber-physical subsystems, which create an enormous amount of complexity and makes their engineering a daunting task. Today, designing cyber-physical systems (CPS) requires an army of skilled engineers with the right domain expertise, and hundreds of domain-specific tools.

The process used to design these systems is largely manual, creating long design cycles that often result in costly redesigns after building and testing the systems.

The flaws in the process are numerous – from balancing predictability with cost-efficiency to operating under tight time constraints to integrating disparate pieces from multiple design teams. Further, teams are often limited to focusing on known design approaches, restricting their ability to create or identify more sophisticated system alternatives or innovative concepts.

“Current approaches to designing cyber-physical systems are largely manual, costly, and inefficient, sometimes taking decades to complete,” said Dr. Sandeep Neema, a program manager in DARPA’s Information Innovation Office (I2O). “Within the defense community, there is increased demand for mission-specific system design that could be stood up quickly. Similarly, updating and advancing large legacy platforms -, remains a challenge.

To support the rapidly evolving defense landscape, we need a way of accelerating and streamlining CPS design – one that could take advantage of new machine learning and automation capabilities.”

DARPA created the Symbiotic Design for Cyber Physical Systems (Symbiotic Design) program to bring intelligent automation into the CPS design process. The program will explore fusing model based design with machine reasoning and learning to develop a core set of AI-enabled tools that designers can use to accelerate the process from

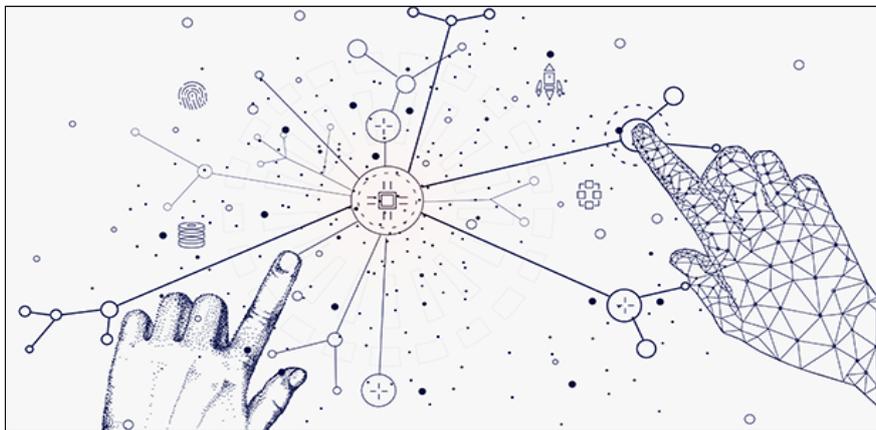
design concept to developed system.

The tools will support the search, composition, evaluation and exploration of knowledge bases and design corpora, and will come together to form an AI enabled co-designer that provides its

human counterparts with a true design partner.

Design corpora already exist but combing through them to find the best options for a set of requirements is an arduous task. Under the Symbiotic Design program, researchers will endeavor to create AI-enabled tools that can mine these knowledge bases to rapidly uncover more sophisticated design options and approaches. The intent is for the tools to propose sets of alternatives to construct a multi-domain design space for the design problem at hand. With the design options identified, the AI tools will also help determine the best way to pick candidate subsystems, and integrate them into a coherent design while identifying any potential gaps to address.

Key to the AI tools will be their ability to >>>



A cyber-physical system is a system that links the physical world (e.g., through sensors or actuators) with the virtual world of information processing.

observe and learn from past successful designs and design corpora. Ultimately, the exchange of ideas between humans and the AI-enabled co-designer will allow the system to “autocomplete” the design based on past learnings or experience. Once the human designer has selected a design candidate, the AI co-designer will automate the evaluation of the design points using relevant domain-specific analysis and simulation tools.

“While existing approaches to design automation have brought some benefits to the process, they are largely utilizing first wave AI, or rule-based systems. These systems are limited in that they rely on human expertise and an ever-evolving list of ‘if-then’ rules. The Symbiotic Design program seeks to employ second and third wave AI, combining learning with advanced search techniques to help synthesize highly sophisticated designs,” noted Neema.

In addition to developing the tools that will form the AI-enabled co-designer, the Symbiotic Design program seeks to create user-friendly interfaces to facilitate human-machine collaborations. Using automation technologies and human-machine interfaces, the program aims to make the design process accessible to more individuals by reducing the need for specialized skillsets, as well as augmenting the skills of experts.

The Symbiotic Design program is a part of DARPA’s AI Next campaign – a multi-year, \$2 billion investment into new and existing programs focused on the development and application of “Third Wave” AI technologies. DARPA views the Third Wave of AI as the development of systems that are capable of acquiring new knowledge through generative contextual and explanatory models.

Interested proposers will have an opportunity to learn more about the Symbiotic Design program during a proposers’ day on August 12, 2019, from 07:30 am to 1:00 pm (EDT) at the DARPA Conference Center, located at 675 N. Randolph Street, Arlington, Virginia, 22203. The purpose of the proposers’ day is to outline program technical goals and challenges, and to promote an understanding of the BAA proposal requirements.



For details about the event, including registration requirements, please visit:

<https://www.fbo.gov/spg/ODA/DARPA/CMO/DARPA-SN-19-72/listing.html>

Additional information will be available in the forthcoming Broad Agency Announcement, which will be posted to www.fbo.gov



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Five Ways Chemicals Can Save the World From Climate Change

By Prof. Harry Hoster, www.harryhoster.blogspot.com

When it comes to the environment, the chemical industry doesn't have the best reputation. Yet it has a vital role to play in developing technological solutions to help save us from climate catastrophe, and could create significant opportunities for global economic development at the same time.

1. Energy storage and transport

The growing use of intermittent renewables such as solar power will increase the demand for storing and transporting energy. We could generate enough energy for the whole planet by covering 3% of the Earth's landmass with cutting-edge photovoltaic (PV) solar panels. But the best place for them is in the middle of deserts rather than close to consumers, meaning we would need to transport the energy over long distances. And the sun doesn't shine at night, so if using PVs we would need to keep at least 12 hours' worth of energy stored as a buffer, too.

The scale of this challenge means that we cannot simply use a pile of batteries made from existing technology. But we are already able to transport and store large amounts of energy in the form of gases or liquids in our global network of pipelines, freight vehicles, and containers. Instead of fossil fuels being taken out of the desert, we are likely to see the production of chemicals with a high energy content such as hydrogen, methane, or ammonia wherever clean energy is available. Their handling, processing, and transport are routine in the chemical industry – expertise the future green energy sector will tap into.

2. Fertiliser production

Ammonia is also used to make fertiliser, and the chemical's large-scale production was a major breakthrough in efforts to feed a growing global population. The fertiliser industry is still a big energy consumer, and producing ammonia close to renewable energy sources and agricultural production sites rather than in centralised facilities will be an important way of reducing its carbon footprint.



Prof. Hoster became Scientific Director of TUM CREATE (Singapore) in 2011. TUM CREATE is a collaborative and interdisciplinary research programme on electric vehicle technology. www.tum-create.edu.sg

Any sustainable fuel or fertiliser cycle will also have to account for the water supply. Making ammonia (NH_3) uses hydrogen, which is present in all high-energy chemicals (fuels) and ultimately requires water for production. The fact that the most solar power can be generated in places where water is scarce is one of the biggest obstacles to a large-scale roll-out of renewables-based fuel – and needs to be addressed.

3. Electric vehicles

Electricity-powered transport is the only way out of polluted cities, but this demands improved energy storage technologies. Incremental improvements in battery materials and manufacturing have brought electric vehicle prices down and their performance up. Further progress is possible, but there are limits as to how far a technology derived from magnetic tape manufacturing can be pushed.

Breakthroughs in completely new technologies that combine lithium with oxygen or sulphur will pave the way for the next generation of electric vehicles. We've also seen fuel cell vehicles that >>>

generate electricity from hydrogen, such as the Toyota Mirai and Hyundai ix35, enter the market. Fuel cells still rely on expensive and environmentally costly platinum, but fundamental chemical research could provide alternatives.

4. Hidden energy storage

The chemical industry itself is actually a massive player in the energy market. Plants can increase or cut their energy usage at the request of grid operators when there's too much or too little electricity being produced in order to balance supply and demand. But they could also provide a form of energy storage.

Many chemicals are produced in several stages, some of which require much more energy than others. Running the more energy-intensive processes when there's lots of electricity available (like when the sun is shining) and storing the chemicals produced for further treatment later is effectively like storing the energy. It means the factory will be using less energy during peak times, freeing up electricity for the rest of the grid. And building more tanks to hold these intermediate chemicals is more cost-efficient than building a complicated energy storage system.

However, this practice will only happen if it becomes profitable, which will require concerted efforts from both the energy and chemical industries in reforming the electricity market.

Politicians can help through tax breaks or subsidies for energy-intensive processes that are designed to encourage companies to become more flexible.

5. Rare materials

Modern LED lightbulbs consume around one tenth the amount of electricity of their traditional counterparts thanks to semiconductor technology based on the chemical gallium nitride. But it comes with a price and another challenge for chemistry: gallium is rarely found on Earth. It is only used in tiny amounts in LEDs, which seems like a good thing at first but also makes it very difficult to recycle and so we could see bottlenecks in its production in the future as demand increases. Similar problems exist with the noble metals such as platinum used in the catalyst filters of petrol and diesel cars and in the electrodes of fuel cells.

Optimising technology to reduce the need for these scarce metals will make them cheaper and require less mining. But again, while that sounds good, it may make recycling impossible. Chemistry is not alchemy: transforming one element into another only occurs in nuclear reactors and particle accelerators, and it will not work on larger scale any time soon. In this way, we need chemists, geologists and logistics experts to join forces to keep us going.



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The Science and Technology of Time Travel May be Less Far-Fetched as it Sounds

By Maria Anna van Driel, www.nexttruth.com

In a universe so vast, is there any hope of us traveling fast enough so that we could visit the far-off realms of space? Will we ever be able to plant a flag in the most distant quadrants of the cosmos? At this point in time we may be as far from reaching other stars as Leonardo da Vinci was from realizing an airplane but it has not stopped scientists from imagining the theoretical possibilities of interstellar travel.

Even time travel is somewhat unique in science fiction, it has long been the Holy Grail for modern science. Some say we will never be able to travel in time, while others believe we are close to achieving the impossible. But what if time travel already exists? According to general relativity - this might actually work. However, when it comes to our understanding of the Universe, general relativity may not be the final word. Theoretical physicist and Professor Emeritus Ronald L. Mallett says there is another way what makes traveling into the past a real option.

“In Einstein’s theory not only matter can create gravity but light itself can create gravity, explains Professor Mallett during the awe-inspiring Skype interview I had with him on the 4th of November 2019. “Even though light does not have matter, it has energy what can create gravity. And that is where my breakthrough is based on. If gravity can affect time and light can create gravity, then light can affect time.”

Although the concept of travelling in time via mechanical means was first popularized more than a century ago in 1895 by HG Wells’ novel “The Time Machine”, which was the first novel what inspired the young Ronald Lawrence Mallett to explore the mind-boggling scientific possibilities of time travel, Prof. Mallett has yet not published a description of a full scale version of his device of which the technology is based upon a ring laser's properties in the context of Einstein's general theory of relativity. But he has agreed with his critics that to distort space-time, to the necessary degree, would require a huge amount of energy,



Prof. Mallett received his B.S., M.S. and Ph.D. in physics from the Pennsylvania State University. He worked for United Technologies from 1973-5, and in 1975 joined the physics faculty at the University of Connecticut in Storrs. Mallett has published numerous papers on black holes and cosmology in professional journals.

like stellar quantities. Nowadays, Prof. Mallett, who is an expert on Einstein's theories, still insists that time travel could become a reality.

Is time travel feasible? Did we already tackle the energy barrier and jumped through time and created new universe branches out into the future? And, is there is a possibility that something has been done in the present, that a laser optical time machine and receiver transmitter (LOTART), described by Professor Mallett in his book *"Time Traveler: A Scientist's Personal Mission To Make Time Travel A Reality"*, will still exist in the future?

To gain a better insight in both the rules which>>>

govern time travel and whether time travel is possible and not just the stuff of science fiction, I reached out to contact time travel specialist Prof. Ronald L. Mallett and gained the privilege to meet him via a Skype conversation.

For the jaw-dropping concept of travelling through time and Prof. Ronald L. Mallett's incredible research I can recommend the You Tube documentary "**The World's First Time Machine**" in where he explains his theories on time travel and the journey that led him to his field of research.

■ ■ ■

Welcome Professor Mallett, I appreciate the time you took for letting us peer into your career as a theoretical physicist and some of your ideas, theories and research within this intriguing topic of Time Travel.

Q: You are a well known Theoretical physicist and an expert in the one branch of science that allows you to tinker with time. But for those people who don't know much about your background, can you tell us a little about yourself? Who is Ronald Lawrence Mallett?

Prof. Mallett: I am a theoretical physicist and Professor emeritus and a member of both the American Physical Society and the National Society of Black Physicists. I grew up in the Bronx, New York and I was the oldest of 4 children. As I was growing up my father, who was a TV-repairman and the centre of my life, would give me toys like for instance a gyroscope and a crystal radio set. I love reading and I go to the movies for entertainment.

Q: After your father passed on you decided to become a scientist at the age of ten. Was it already clear to you that you would study Physics?

Prof. Mallett: Approximately a year after my father had passed on I read H. C. Wells, "The Time Machine" what contained a phrase that caught my attention. It said; "*Scientific people know very well that time is only a kind of space and we could move forward and backward in time just as we can move forward and backward in space.*"

For me 'that' was the key phrasing that there was a true possibility for us to travel through time and space. It was a life preserver, like a revelation. I thought, that, if we could travel back in time, I can build a time machine and go back in time to see my father again and maybe change things...save his life. And that became an obsession for me. This is the reason why I became interested in physics and time travel.

Q: Your research is based on the two theories of Albert Einstein. How did you become familiar with Einstein's work?

Prof. Mallett: I visit a Salvation Army bookstore where I came across the book "*The Universe and Dr. Einstein*". The cover showed Albert Einstein standing next to an hourglass. And since he was standing next to an hourglass, I thought, maybe he had something to do with time. So, I bought the book. The reading was rough going for me at the age of 11 but I did pick up the essence of it. It said that, in Newton's theory, nothing can alter time but Einstein claimed that it is possible to alter time. To me it meant that if I could understand what Einstein meant with that, it would mean that it could lead to the scientific possibility of building a time machine. And that was the beginning of my interest in Einstein's work.

Q: What is time travel from a scientific point of view?

Prof. Mallett: Einstein has said that there are two ways of altering time. In 1905 he developed the Special Theory of Relativity the essence of which is that time is affected by speed. And in 1915 he developed the theory of General Relativity which speaks of gravity. What Einstein meant by the Special Theory of Relativity is that the faster a clock moves the more time slows down.

Imagine an astronaut who will go out into space and is traveling close to the speed of light to, let's say, a star that is about 25 light-years remote from Earth. For those who stay behind it will appear that it took the astronaut 50 years to go out into space and to come back to Earth. But time has slowed down to such a point that, for the astronaut, only 10 years has past. So, 50 years have passed on Earth but the astronaut has only aged 10 years. And that is what we mean with time travel into the future. >>>

Q: But that is only travelling forwards. What about travelling backwards in time?

Prof. Mallett: Unfortunately, no matter how fast you will travel, you cannot travel back into the past. The light barrier keeps us from going faster than the speed of light (c). Straightforward, the problem lies in the energy barrier. Einstein's equation $E=mc^2$ shows that matter and energy is equivalent to each other. When you have a small amount of matter you can create a large amount of energy. If you have enough amount of energy you can create mass. But the equation works the other way too.

Let's suppose you have built a rocket that goes close to the speed of light c . If you give it enough energy the rocket will go faster but some of the injected energy will go into the mass of the rocket itself what makes it heavier. This means that you need to provide it with more energy for the rocket to keep its speed. But the more energy you inject, the more weight the rocket will gain until it reaches a point it will stop or not leaving Earth at all. So, if you want to let a rocket travel at c you need an infinite amount of energy. This infinite amount of energy is a way of saying, 'you cannot do it'. And that is why you cannot travel faster than c . This, unfortunately, also means that we cannot travel to the past by speed. But there is another way in where gravity can be thought of as a medium rather than a force.

According to Einstein, what we call today "the force of gravity" isn't a force at all. It's actually a bending of space. The simplest way of thinking about it is to imagine a rubber sheet, similar to a trampoline. When you put a bowling ball on the rubber sheet it starts to bend. Now, if you take a marble and put it on that rubber sheet it will roll down towards the bowling ball. Imagine that the rubber sheet being transparent. The only thing you will see is the bowling ball and the marble. Putting the marble on the transparent sheet the visible effect will be the marble moving towards the bowling ball.

As a result it will appear as though the bowling ball is directly attracting the marble but what is actually happening is that the marble is moving towards the bowling ball due to the fact that the transparent sheet is being curved by the bowling ball. According to Einstein in his General Theory of Relativity this is analogous to what the sun is doing to empty space.

In other words, the sun is curving the empty space and the earth is moving in that curved space. So gravity is the curving of space.

The bending of time appears to us as clock slowing down. The more space is curved, the more time slows down. Since time can be bent then there may be ways twisting it so we can travel to the past.

Q: How realistic is the possible that a practicable working time machine is sending information in the form of subatomic particles or an object back into the past?

Prof. Mallett: From a science fiction point of view people have become familiar with the idea of sending an object or even a human being through time. But sending information through time can be much more important than sending an object through time. However, I feel that with current technology it is possible, at the very least, to send subatomic particles back into the past.

Once I received a letter from Germany what contained several photos. The first photo showed a middle aged couple with a young woman. The next photo showed the young woman being happy and in full health. The third photo showed a mangled car. The fourth photo, what actually brought tears to my eyes, showed the young woman in a coffin. The middle aged couple, who wrote me the letter, were the parents of this young woman who was killed in a car accident. The father wanted to know if it was possible to send information back in time for his daughter not to step into that car. And this is why, in some ways, sending information is more important than sending back an object through time.

Q: Sending information through time in order to prevent an event from happening, does that not cause distortions in a parallel universe or time line?

Prof. Mallett: There are several schools of thought concerning the Grandfather Paradox. One of them is that when you go back in time you cause a real ripple effect what alters everyone's reality entirely.

Another view is the "Many-worlds interpretation" which is a view a myriad of physicists like. The parallel universe notion was not invented to deal with time travel. >>>

Back in 1957 physicist Hugh Everett III wanted to apply the Quantum theory to the universe as a whole. Now the Quantum theory is based on the Heisenberg uncertainty principle what says that you cannot predict exactly what is going to happen in the future. It shows the probability of a future.

However, Everett's research led to the following strange prediction; suppose you go to a restaurant and have breakfast. As you are looking at the menu, you see item A and item B and you have chosen item B. According to Everett there is now an actual split of the universe in where there is a Maria who has chosen item B but there is also a Maria who has chosen item A. Although both Maria's do not know each other, they are both real but in separated universes. What Everett did was, he took out the probability and said that both are actually happening. This is called "Super Space".

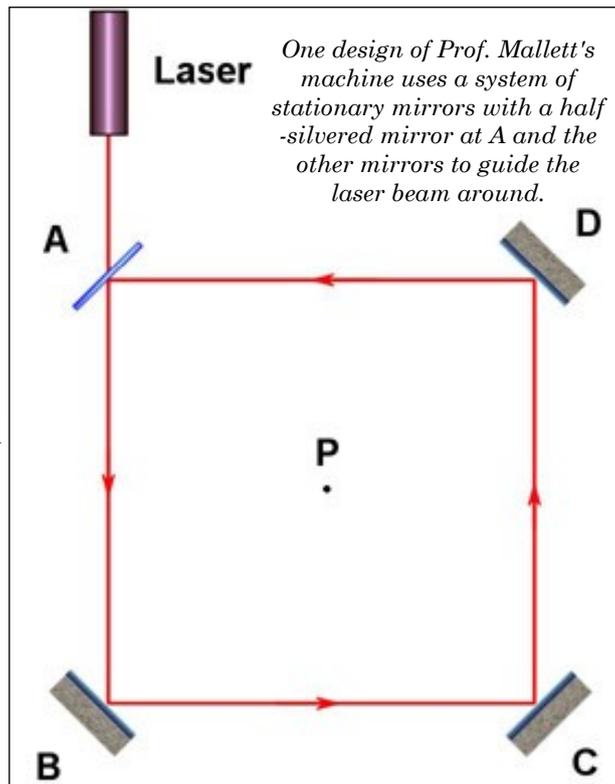
Another view on this paradox is the applying of Everett's notion of the Many-worlds interpretation to time travel by physicist David Deutsch. What he found was that when you travel to the past, there will be a split in that particular universe as soon as you arrive. And so, due to splitting of that particular universe, you could find yourself in a universe in which you can prevent your grandparents for meeting each other. You will then find yourself in a weird universe in which you were never born.

However, there is the other universe in which you don't arrive and in that universe your grandparents meeting each other and eventually you were born. You will find that you cannot go back to your original universe and keep ending up in a parallel universe. As a result David Deutsch's theory actually resolves the Grandfather Paradox.

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Q: How would the technology, or device, what would transmit subatomic particles back into the past due to twisting space and thus time, look like?

Prof. Mallett: Information could be sent to the past in binary form using subatomic particles. A neutron is a subatomic particle that has only two directions of spin. Its axis of spin can be either point up or down. If we assigned the number 1 to the spin up direction and the number 0 to the spin down direction then we can send information by using a stream of neutrons. For example, a stream of neutrons with spin up, spin down, spin down would correspond to 100 which is the binary representation of the number 4. Since computers operate using a binary code of ones and zeros then the information could be read by computers interfaced with suitable neutron detectors.



One design of Prof. Mallett's machine uses a system of stationary mirrors with a half-silvered mirror at A and the other mirrors to guide the laser beam around.

Prof. Mallett's breakthrough research on time travel has been featured extensively in the media around the world, including print media such as New Scientist, Rolling Stone magazine, The Wall Street Journal, and broadcast media such as NPR's This American Life, the History Channel, NGC, ABC's Good Morning America and NBC's Today Show, among others.

Q: How, if possible, does the behaviour of a Black Hole correlate with Time Travel?

Prof. Mallett: First you need a necessary condition which is the twisting of space, which is caused by gravity, and that will lead to the twisting of time, which is caused by rotation, which is the sufficient condition. But the amount of energy that seems to twist space isn't as great as the energy that seems to twist

time. In other words, the rotation of the Earth can cause a twisting in space but the energy of a, for instance, rotating Black Hole can be great enough to lead to the twisting of time. A rotating Black Hole not only allows you to travel to the future but can also lead to loops in time which leads to the possibility of you traveling back into the past.

In fact Kurt Gödel, a mathematician and known for his logic, was one of the earliest scientists >>>

who looked at the notion of a rotating universe. If the universe was rotating as a hole, he had solved Einstein's gravitation equations and was able to show that it leads to loops in time which leads to the real possibility to time travel. For me that was one of the most important papers being published and convinced me that Einstein's Theory of General Relativity was the way to go for me to understand the possibility of time traveling to the past.

Q: Did you ever feel insecure or doubt that you would succeed? And if so, what kept you motivated to not give up and keep striving for what some would say is impossible?

Prof. Mallett: At times I did have doubts about achieving my goal. What sustained me and continues to drive me forward is the love that I had and still have for my father.

Q: Today you are a Professor Emeritus and Research Professor of Physics at the University of Connecticut. You can look back on an impressive career and much to be proud of; what would you say is the moment in your career that stands out as most meaningful?

Prof. Mallett: The moment of my career that really stands out for me was when I had my breakthrough realizing that a circulating beam of laser light could lead to a twisting of space and time and that this could result in time travel to the past. This resulted in my breakthrough paper "Weak Gravitational Field of the Electromagnetic Radiation in a Ring Laser" being accepted and published in the professional journal *Physics Letters A*. It was at this point that I felt that my father would be proud of me.

Q: Can you explain to our readers how this 'closed loop' or 'ring laser' works whereby it is possible to travel to the past and to the future?

Prof. Mallett: First of all, the bending of space causes the bending time whereby this bending is slowing down the time. But there is another effect that can occur as well. It turns out that you not only can 'bend' time but you can also 'twist' time.

Newton's theory says that the only thing that creates gravity is matter, however, in Einstein's

theory not only matter can create gravity but light itself can create gravity. Even though light does not have matter, it contains energy what can create gravity. And this is what my breakthrough is based on. If gravity can affect time and light can create gravity then light can affect time.

This 'device' I describe in my book "*Time Traveler: A Scientist's Personal Mission to Make Time Travel a Reality*" as a 'ring laser', is capable of generating an intense, coherent, and continuously circulating beam of light. At the corners of the device mirrors are placed of which the first mirror is a semi-reflecting mirror. It allows light to come through in one single action. The other mirrors reflect the light what in turn creates a loop of light. Through the light circulating the empty space in the centre is starting to be twisted. This phenomenon is known as 'inertial frame-dragging'. If a neutron is placed in the centre of the laser, the Neutron starts moving around and that is how we would know that space is being twisted.

Q: How long do you expect it will take before a practicable time machine will be fact?

Prof. Mallett: That is a very interesting question. In 2018 I was interviewed by NBC News and they asked me the same question. My reply was "Funding". Many people do not realize how expensive these experiments are. For example, in 2017 the Nobel Prize was won for the discovery of gravitational waves. The experiment observed the collision of two Black Holes which led to the vibrations of empty space that we call gravity waves, which was already predicted by Einstein about 100 years ago, had costs one billion dollars. This also applies to, for example, space programs. For people to travel to the moon, that costs billions of dollars. Not to speak of the Large Hadron collider which cost in the range of 10 billion dollars.

We have submitted my idea of twisting of space, not twisting of time, to the National Science Foundation and that was something they said was doable. But for us to do a feasibility study alone is going to cost about a quarter of million dollars (250,000 dollars).

Even though I have a collaborator, who is a specialist in lasers, scientific progress is not some-▶▶▶

thing you can predict due to, for instance, the competition with other projects. However, let's suppose that we can get adequate amount of funding for it, it will take probably 5 years to demonstrate the effect of space twisting. What we are hoping to learn from the first part is how to overcome the energy barrier that my critics have correctly talked about regarding time twisting. This second part can easily take 10 years, or more, after the first part has accomplished. We don't know yet. We can only see that when the energy barrier has been overcome.

Q: In 2016 Professor Stephen Hawking wrote in Forbes, "I think the universe was spontaneously created out of nothing according to the laws of science." "There is no time for a creator to have existed in." Do you share the same opinion?

Prof. Mallett: To understand what happened at the moment of creation requires a theory that successfully combines quantum mechanics and general relativity. No completely successful theory yet exists. What happened before the moment of creation is open to speculation.

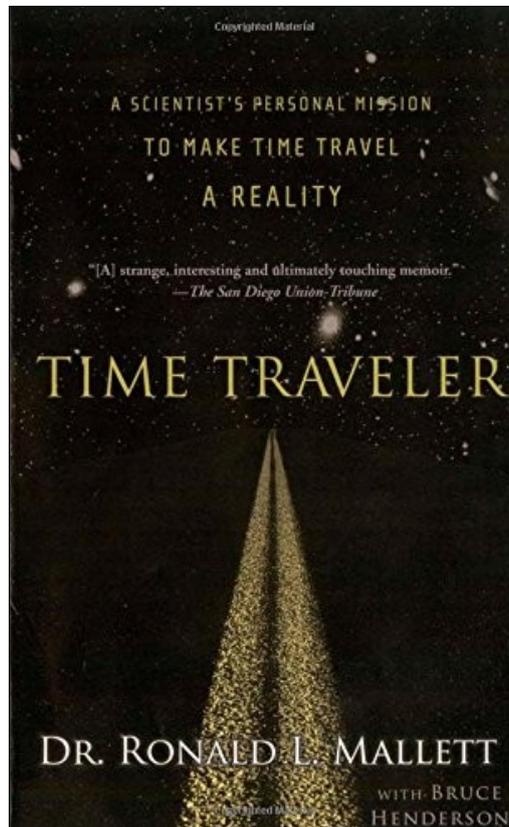
Q: In the prologue of your book you write; 'Since the age of eleven, I had only told a few confidants about my secret dream.' '...my hope for turning one man's favorite science fiction fantasies into a scientific reality.' How did you experienced this remarkable moment of presenting your work in great detail?

Prof. Mallett: I was really nerves. Especially because the person who gave a talk before me was actually was a very well known and respected physicist Bryce DeWitt. I felt very proud when at the end of my talk DeWitt said; "I don't know if you ever see your father. But I do know he would have been proud of you."

My critics where not criticizing my equations but

the possibility of realizing the technology behind it all. So you might say that the highest form of praise is when you colleagues feel that it is worth their while to actually say that what you have done is serious and critique it.

Q: Not only are you seen as a true pioneer in describing the technology of a real practicable working time machine, what is indeed a culmination of a lifelong quest, you also authored a book about your work. What inspired you to write the book, "Time Traveler; A Scientist's Mission To Make Time Travel A Reality!?"



"Time Traveler: A Scientist's Personal Mission to Make Time Travel a Reality" has been translated into Korean, Chinese, and Japanese. Award-winning filmmaker Spike Lee has written a script for a feature film of the memoir. www.amazon.com

Prof. Mallett: I wrote "Time Traveler" as both an autobiography and popular science book to make the general public aware of the real scientific possibility of time travel based on Einstein's theories of relativity and to also give insight into the struggles that I had to overcome with poverty and prejudice as an African-American to acquire the knowledge necessary to achieve my goal. My hope was that the book would be informative and inspirational.

Q: What does the future holds for your books?

Prof. Mallett: Well, I am thinking of writing a sequel once I get the funding. But

what I am really excited about is that Hollywood has become interested in my memoir and has decided to make a feature film of it. For me there two things why I am this excited about this movie; to see my father portrayed on a big screen will almost seem that he is being brought back to life. The other thing is that my work is going to be brought to a huge audience. Maybe there is someone in the audience who is interested in investing in the scientific possibilities behind it. Someone who says, 'Hey, let's talk to Mallett and find out what he is up to'.

When the script is done this year, it means that it will go into development next year and >>>

hopefully come out in 2021.

Q: Prof. Mallett, thank you so much for this interview. I am sure it will be an inspiration to many. Do you have any additional advice you can give for aspiring physicists and theoretical physicists who want to dive into the mysteries of the universe?

Prof. Mallett: When I talk to people I emphasize STEM (Science, Technology, Engineering and Mathematics) because we live in a highly technological world. And what I tell young people that, for me, I cannot think of a better way of life than to try to contribute to the human race by advancing, by using our knowledge in science, in engineering and in math to actually improve things for the human race. I have found that that is the most satisfying thing to me in my life.

Think about it, to be paid to explore the universe and to try to find out what the real things of nature are...I cannot think of anything that is more exciting than that.

Sometime people ask, especially when it comes to physics, 'How are you going to make a living from that?' But the thing is you will be able to find that way. Yes, it does enquire dedication and hard work though but there are so many exciting scientific fields out there. All of these scientific fields have contributed in ways more than thought about originally.

For instance, think about what the science of DNA have done as far as for the criminal justice system. It actually allows people who were convicted wrongly to set free and people who deserved to be convicted, to go to jail.

I encourage young people to think about exploring some of these excited fields of science and experience how exciting it is to deal with something that is actually going to make a major impact for mankind. They will be able to contribute to the betterment of the human race.

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Prof. Tok Thompson

Can a chimp use habeas corpus to sue for freedom?
Can androids be citizens?

There are two main threads of posthumanism: the first dealing with the increasingly slippery slope between "human" and "animal," and the second dealing with artificial intelligences and the growing cyborg quality of human culture.

In *Posthuman Folklore*, author Tok Thompson traces both the philosophies behind these shifts, and the ways in which people increasingly are enacting such ideas to better understand the posthuman experience of contemporary life.

www.amazon.com



From Alchemy to Chemistry; The Origins of Today's "Central Science"

By Michelle Feder, www.khanacademy.org

A quest for purity

The word “alchemy” brings to mind a cauldron-full of images: witches hovering over a boiling brew, or perhaps sorcerers in smoky labs or cluttered libraries. Despite these connotations of the mythic and mystical, alchemical practice played an important role in the evolution of modern science.

Historically, alchemy refers to both the investigation of nature and an early philosophical and spiritual discipline that combined chemistry with metal work. Alchemy also encompassed physics, medicine, astrology, mysticism, spiritualism, and art. The goals of alchemy were: to find the “elixir of life” (it was thought that this magical elixir would bring wealth, health, and immortality); to find or make a substance called the “philosopher’s stone,” which when heated and combined with “base” (nonprecious metals such as copper and iron) would turn it into gold, thought to be the highest and purest form of matter; and to discover the relationship of humans to the cosmos and use that understanding to improve the human spirit.

Alchemy was scientific but it was also a spiritual tradition. Some of its practitioners had altruistic intentions. For instance, if alchemists could learn the secret of “purifying” base metals into gold, they might gain the ability to purify the human soul. At the same time, alchemy has often been seen as a get-rich-quick scheme and many alchemists as charlatans and pretenders. But many alchemists were in fact serious-minded practitioners whose work helped lay the groundwork for modern chemistry and medicine.

The central science

Alchemy began as a quest to know the world around us — its composition as well as our own. That quest for knowledge required an understanding of chemical processes, and while alchemy itself would not survive the Enlightenment (the Age of Reason of the 17th and 18th centuries), the quest it began continues today in chemistry. To understand the ever-evolving field



Alchemist's equipment in a 14th--century castle in Arcy-sur-Cure, France © Alain Nogues/Sygma/Corbis

of chemistry, which is sometimes called “the central science” because it connects natural sciences like physics, geology, and biology, it’s critical to grasp its beginnings.

Alchemists contributed to an incredible diversity of what would later be recognized as chemical industries: basic metallurgy, metalworking, the production of inks, dyes, paints, and cosmetics, leather-tanning, and the preparation of extracts and liquors.

It was a fourth-century Indian alchemist who first described the process of zinc production by distillation, a 17th-century German alchemist who isolated phosphorus, and another German alchemist of the same period who developed a porcelain material that broke China’s centuries-old monopoly on one of the world’s most valuable commodities. These contributions proved valuable to the societies in which alchemists lived and to the advancement of civilization.

But alchemists often made no distinction between purely chemical questions and the more mystical aspects of their craft. They lacked a common language for their concepts and processes. They borrowed the terms and symbols of biblical and pagan mythology, astrology, and >>>

other spiritual arenas, making even the simplest formula read like a magic spell or ritual. And although there were commonly used techniques, alchemists shared no standardized, established scientific practice.

Roots in the ancient world

The origins of alchemy are difficult to track down. In the East, in India and China, alchemy started sometime before the Common Era (CE) with meditation and medicine designed to purify the spirit and body and to thereby achieve immortality. In the West, alchemy probably evolved from Egyptian metallurgy as far back as the fourth millennium BCE. The ideas of Aristotle (384–322 BCE), who proposed that all matter was composed of the four “elements” — earth, air, fire, and water — began to influence alchemical practices when his student Alexander the Great (356–323 BCE) established Alexandria as a center of learning.

Alexander is said by some to have discovered the Greek god Hermes’s famous *Emerald Tablet*, reputed to contain the secret of the philosopher’s stone, and to have built the Library of Alexandria specifically to house alchemical texts. These texts were, however, almost entirely destroyed in the third century, and soon thereafter the Alexandrian Zosimus wrote what are now the oldest known books on alchemy, which emphasize its mysticism rather than its medical or practical applications.

Islamic Arabs took over Alexandria in the seventh century CE, and as the center of learning shifted to Damascus and the newly founded Baghdad, alchemical texts were translated from Greek to Arabic. An eminent figure at that time was Jabir ibn Hayyan (721–815, although some sources say he never existed), who became a royal alchemist in Baghdad. Jabir’s writings were the first to mention such important compounds as corrosive sublimate (mercuric chloride), red

oxide of mercury (mercuric oxide), and silver nitrate. Like Aristotle, Jabir believed metals grew in the Earth, adding to Aristotelian theory the notion that metals were differentiated by how much mercury and sulfur they contained. Making gold thus required the purification of these ingredients. Scholars in the West first learned about alchemy in roughly the 12th and 13th centuries as they copied and translated Arabic texts into Latin. Medieval science was still dominated by the ideas of Aristotle.



Robert Boyle is often considered the father of modern chemistry. An engraving of Robert Boyle by William Faithorne © Bettmann/CORBIS

Alchemy after the Middle Ages

Among the most important of the European alchemists was Paracelsus (1493–1531), a Swiss traveling physician/surgeon and the first toxicologist. Paracelsus believed that the body’s organs worked alchemically, that is, their function was to separate the impure from the pure, and proposed that a balance of three controlling substances (mercury, sulfur, and salt), which he called the “tria prima,” was necessary for maintaining health. Paracelsus treated the plague and other diseases with an alchemical approach that included administering inorganic salts, minerals,

and metals. He believed that what he called the “alkahest,” the supposed universal solvent, was the philosopher’s stone but had no interest in the transmutation of metals, writing, “Many have said of Alchemy, that it is for the making of gold and silver. For me such is not the aim, but to consider only what virtue and power may lie in medicines.”

In 1662, Robert Boyle (1627–1691) articulated Boyle’s law, which states that the volume of a gas decreases as the pressure on it increases, and vice versa. For this and other important contributions to scientific inquiry, Boyle is sometimes called the father of modern chemistry, but he was not a scientist in the current sense of the word. Rather, he is what is called a natural philosopher, someone who studied fundamental questions about nature and the physical universe >>>

before the 19th century, when dramatic advances in technology began to revolutionize our understanding of and approach to these questions.

Boyle wrote two papers on the transmutation of the elements, claiming to have changed gold into mercury by means of “quicksilver,” the ingredients of which he did not reveal. This caught the attention of Isaac Newton, another enthusiastic alchemist, who, like Boyle, was motivated in his research “by the good it may do in the world.” The two struck up a correspondence.

Central to Boyle’s efforts was his “corpuscularian hypothesis.” According to Boyle, all matter consisted of varying arrangements of identical corpuscles. Transforming copper to gold seemed to be just a matter of rearranging the pattern of its corpuscles into that of gold.

Boyle used his 1661 text *The Sceptical Chymist* to explain his hypothesis and to dismiss Aristotle’s four-elements theory, which had persisted through the ages. Boyle recognized that certain substances decompose into other substances (water decomposes into hydrogen and oxygen when it is electrically charged) that cannot themselves be broken down any further. These fundamental substances he labeled elements, which could be identified by experimentation.

Boyle was a prolific experimenter who kept meticulous accounts about both his failures and successes. He was a pioneer of chemical analysis and the scientific method, endlessly repeating his experiments with slight variations to obtain better results and, unheard of among earlier alchemists, always publishing the methods and details of his work in clear terms that could be widely understood.

A new framework

By the late 18th century, the field of chemistry had fully separated from traditional alchemy while remaining focused on questions relating to the composition of matter. Experimentation based on the scientific method, the publication of research results, the search for new elements and compounds and their application in medicine and industry beneficial to all mankind, and other concerns first addressed by alchemists dating back many centuries were now the domain of modern science.

Among the most significant of the post-alchemic chemists were the French nobleman Antoine-Laurent Lavoisier (1743–1794) and the Russian chemist Dmitri Mendeleev (1834–1907). In 1789, Lavoisier wrote the first comprehensive chemistry textbook, and, like Robert Boyle, he is often referred to as the father of modern chemistry.

Lavoisier agreed with Boyle that Aristotle’s four-elements theory was mistaken, and in his textbook, he compiled a list of metallic and nonmetallic elements that would point toward the periodic table developed by Mendeleev in 1869. It was Mendeleev who demonstrated that the elements could be arranged in a periodic, regular and recurring, relationship to each other based on their atomic weights and who created a periodic table that could accurately predict the properties of elements that had yet to be discovered. Mendeleev’s table is still used today.

Chemical questions: Our best hope for tomorrow

Just as alchemy was a touch point for myriad crafts, creations, and — for its time — cures, chemistry resides in the center of the sciences. As an inquisitive discipline, chemistry touches physics on one side and biology on the other. Chemical questions lead to environmental, industrial, and medical applications.

Often working together in research teams at universities and corporations, chemists around the world are developing new techniques and inventions. Like alchemists, sometimes the process of discovery might entail isolating specific components; other findings might come from developing new compounds.

Some recent research:

University of California–San Francisco biochemists identified a memory-boosting chemical in mice, which might one day be used in humans to improve memory.

Cheaper clean-energy technologies could be made possible thanks to a new discovery by a professor of chemistry at Penn State University.

The Duke Cancer Institute found that an osteoporosis drug stopped the growth of breast cancer cells, even in resistant tumors.

These are just a few examples of how modern chemistry carries on the alchemical quest for the elixir of life.



The Top 10 Scientists of All Times With Short Profiles on Their Most Significant Achievements.

Sir Isaac Newton (1642–1726) Newton was a polymath who made investigations into a whole range of subjects including mathematics, optics, physics, and astronomy. In his *Principia Mathematica*, published in 1687, he laid the foundations for classical mechanics, explaining the law of gravity and the laws of motion.

Louis Pasteur (1822–1895) Pasteur contributed greatly towards the advancement of medical sciences developing cures for rabies, anthrax and other infectious diseases. Also invented the process of pasteurisation to make milk safer to drink. He probably saved more lives than any other person.

Galileo (1564–1642) Creating one of the first modern telescopes, Galileo revolutionised our understanding of the world, successfully proving the Earth revolves around the Sun and not the other way around. His work *Two New Sciences* laid the groundwork for the science of Kinetics and strength of materials.

Marie Curie (1867–1934) Polish physicist and chemist. Discovered radiation and helped to apply it in the field of X-ray. She won the Nobel Prize in both Chemistry and Physics.

Albert Einstein (1879–1955) Revolutionised modern physics with his general theory of relativity. He won the Nobel Prize in Physics (1921) for his discovery of the Photoelectric effect, which formed the basis of Quantum Theory.

Charles Darwin (1809–1882) Darwin developed his theory of evolution against a backdrop of disbelief and scepticism. He collected evidence over 20 years and published his conclusions in *On the Origin of Species* (1859).

Otto Hahn (1879–1968) Hahn was a German chemist who discovered nuclear fission (1939). He was a pioneering scientist in the field of radiochemistry and discovered radioactive elements and nuclear isomerism (1921). He was awarded the Nobel Prize for Chemistry in 1944.

Nikola Tesla (1856–1943) Tesla worked on electromagnetism and AC current. He is credited with many patents from electricity to radio transmission and played a key role in the development of modern electricity.

James Clerk Maxwell (1831–1879) Maxwell made great strides in understanding electromagnetism. His research in electricity and kinetics laid the foundation for quantum physics. Einstein said of Maxwell, “The work of James Clerk Maxwell changed the world forever.”

Aristotle (384 BCE–322 BCE) A great early Greek scientist who made many types of research in the natural sciences including botany, zoology, physics, astronomy, chemistry, meteorology and geometry.

“100 Scientists Who Shaped World History“ (*Paperback*) www.amazon.com

A Peek At the Birth of the Universe

Study on New Radio Telescope in South Africa

MPI for Radio Astronomy, Press Release July 24, 2019, www.mpifr-bonn.mpg.de

The Square Kilometre Array (SKA) is set to become the largest radio telescope on Earth. Scientists of Bielefeld University and the Max Planck Institute for Radio Astronomy (MPIfR) with international partners have now examined the SKA-MPG telescope—a prototype for the part of the SKA that receives signals in the mid-frequency range. The study, published today (24 July) in the journal ‘Monthly Notices of the Royal Astronomical Society’, shows that the telescope, jointly developed by the MPIfR and MT-Mechatronics GmbH, is not only a prototype to test the SKA design, but can also be used on its own to provide insights into the origin of the universe.

‘The SKA-MPG telescope in South Africa will help us to understand the cosmic background radiation,’ says Dr Aritra Basu, lead author of the study and physicist in Bielefeld University’s Astroparticle Physics and Cosmology Working Group. The cosmic background radiation is light in the microwave range that was produced shortly after the Big Bang, and exploring it provides information about the origin of the universe. ‘However, measurements of the cosmic background radiation are distorted by other effects in the foreground, such as ultrafast electrons in the magnetic field of the Milky Way. In order to measure cosmic background radiation, we need to know more about these effects. Our study shows that the new telescope is excellent for investigating foreground radiation with ultra precision’, says Basu.

The SKA-MPG telescope was jointly developed by the Max Planck Institute for Radio Astronomy,

in Bonn and MT-Mechatronics GmbH. The abbreviation ‘MPG’ stands for the Max Planck Society, which is funding the telescope. The radio telescope has a diameter of 15 metres and can receive signals between 1.7 and 3.5 GHz. It is currently being assembled in the South Africa’s Karoo desert. Dr Gundolf Wieching of the MPIfR, project leader of the telescope, expects a first regular deployment in autumn 2019.

The radio telescope is primarily designed as a prototype for a part of the SKA that receives signals from a medium radio frequency range. If the prototype performs well in a series of tests, around 200 such telescopes will be built for the SKA in South Africa. The SKA will observe medium as well as low radio frequencies.

This second instrument is to consist of thousands of small radio antennas that can be combined to simulate a huge radio telescope. The two parts of the SKA will then extend over one square kilometre in Australia and South Africa—hence the name ‘Square Kilometre Array’.

‘Even with our prototype, we are able to look deep into the universe thanks to a clever design for the telescope and new developments in receiver and backend technology,’ says Dr Hans-Rainer Klöckner, astrophysicist at the MPIfR. ‘I am curious to see what we will discover once 200 of these telescopes are synchronised for the SKA’. The SKA will be used, for example, to explore gravitational waves and dark energy, or to test Einstein’s theory of relativity under extreme conditions. >>>



Reflector of the SKA-MPG Telescope of 15 m diameter just before mounting (Karoo Desert, South Africa).

Photo credit: South African Radio Astronomy Observatory (SARAO)

The SKA will be the first global science organisation with locations on three continents: Africa, Australia, and Europe. In addition, data centres are being set up around the world. A special challenge lies in dealing with the enormous volume of data: the SKA will collect over 600 petabytes of observation data per year—equivalent to the storage capacity of more than half a million laptops.

The German research institutions involved in the preparatory work for the SKA have joined forces in the ‘German Long Wavelength Consortium’, including Bielefeld University and Max Planck Institute for Radio Astronomy. The consortium’s projects also include D-MeerKAT, in which the prototype SKA-MPG telescope is being evaluated—for example by the recently published study. The German Federal Ministry of Education and Research is funding D-MeerKAT as a joint research project. Professor Dr Dominik Schwarz, head of the Bielefeld Astroparticle Physics and Cosmology Working Group, coordinates D-MeerKAT.

‘Our investigations with the SKA-MPG telescope are an important independent contribution to modern cosmology—with a lot of work and a bit of luck, we may be able to open a new window into understanding the Big Bang,’ says Schwarz.

The Max Planck Institute for Radio Astronomy is participating in these projects, via (S-Band) receiver development for the MeerKAT radio telescopes and also via SKA-MPG prototype telescope in preparation for the SKA.

Background Information:

The SKA-MPG telescope was jointly developed by the Max Planck Institute for Radio Astronomy (MPIfR) and the MT-Mechanics GmbH, and funded by the Max Planck Society (MPG). The surface of the dish (panels) was manufactured by the Chinese company CETC54. The German Federal

Ministry of Education and Research (BMBF) is funding the work on the SKA-MPG through a joint research project coordinated by Bielefeld University.

SKA-MPG is hosted by the South African Radio Astronomy Observatory, which is a facility of the National Research Foundation, an agency of the Department of Science and

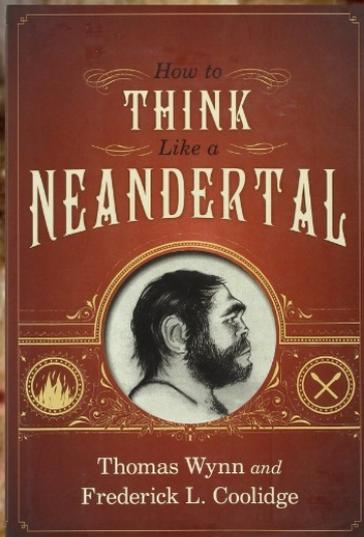
Innovation in South Africa.

Authors of the original paper in „Monthly Notices of the Royal Astronomical Society“ are Aritra Basu, Dominik J. Schwarz, Hans-Rainer Klöckner, Sebastian von Hausegger, Michael Kramer, Gundolf Wieching and Blakesley Burkhart; co-authors from MPIfR include Hans-Rainer Klöckner, Michael Kramer und Gundolf Wieching.



Assembling the SKA-MPG Telescope (Karoo Desert, South Africa).





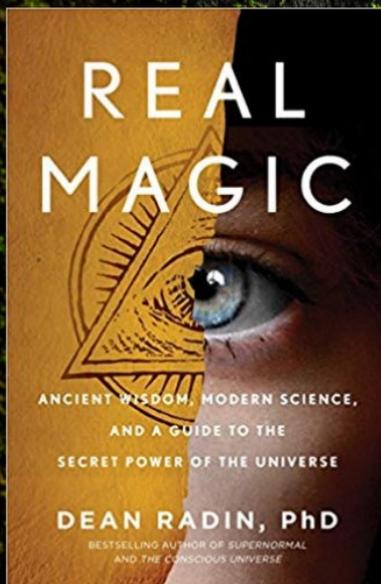
In the book "How to Think Like a Neandertal", archaeologist Thomas Wynn and psychologist Frederick L. Coolidge team up to provide a brilliant account of the mental life of Neandertals and offer an eye-opening portrait while painting a remarkable picture of these long-vanished people and providing insight, as they go along, into our own minds and culture.

Indeed, some Neandertal remains are not fossilized! The book explores the brutal nature of their lives, especially in northwestern Europe, where men and women with spears hunted together for mammoths and woolly rhinoceroses.

www.amazon.de

TED TALKS

IDEAS WORTH SPREADING



Dean Radin, PhD.

The chief scientist at the Institute of Noetic Sciences (IONS) Dr. Dean Radin turns a critical eye toward such practices as telepathy, clairvoyance, precognition and psychokinesis.

Are such powers really possible? Science says yes.

www.amazon.com

AI and the Paranormal

By Nick Howe and Andy Wilson, www.paranormalresearchinvestigators.co.uk

The unnamed public house in Carshalton, the epitome of broken Britain, has played host to many memorable nights, who can forget the fight between Dan “Dare” Biggs and Corky “The Screw” Matthews and the lock in when the pub was drunk dry in 34 minutes 28 seconds flat (the previous record was 35 minutes 16 seconds)? Of course, some may argue that its most memorable moment came when it was raided by the police to purge the district of nasty Class A narcotics only to discover that the only “drugs” found on site were the barmaid’s contraceptive pill, a smattering of Viagra and the odd tab of Prozac. It was odd because it was found on the very personage of a man who was later identified as a man of the cloth. Well, things were clearly getting to that man of the cloth.

Perhaps even greater than all of the above goings on are the unnoticed and occasional (a relative term) meetings of two of Britain’s greatest but unknown paranormal investigators and researchers, Andy Wilson and Nick Howe. It should be noted that their greatest intellectual output has always been achieved under the influence of the strong stuff, but as they’re quick to point out their gems of wisdom dissipate with the growing intensity of the following day’s hangover.

So, it was on a recent particularly cold and wet October evening that these intellectual Titans met in the saloon bar of the said public house where their thoughts quickly turned to their second favourite subject, the paranormal. Nick recently had “an event” which involved a talking toaster, a novelty item that would pronounce in a sort of mid Pacific Chinese voice that one’s toast was ready.

Tongue in cheek he swore blind that the toaster actually spoke to him in the voice of his deceased mother who proclaimed that she was doing very well, dad was with her and that Nick could expect his nasty rash to clear up as long as he kept taking the antibiotics.

Now being rationalists our protagonists began to wonder on the future effect that artificial intelligence (AI) could have on perceived paranormal phenomena. Let’s face it it’s not that long ago that AI would probably have been seen as paranormal.



In their words after 3 pints of a heady brew, “we know of Gilbert Ryle’s concept of ‘the ghost in the machine’, the dualist concept of the relationship of mind and body. OK, so the principal may not have intended paranormal connotations but in the broadest sense it

could be argued that it does actually contain a paranormal element”. Define ‘paranormal’ as events or ‘phenomena’ that are beyond the scope of normal scientific understanding and there’s a valid argument that dualism is a paranormal concept. Taken literally, the image is a powerful one and one that certainly fires the imagination, that our bodies are not anchored to just a physical existence and that there is an ethereal element to our life, and who knows beyond?”

Bring the concept of the physical world and the concept of a non-physical one together, i.e. dualism, and this is where it all begins. Can a machine have its own consciousness? Believe that and it’s a short hop to believing that it could be controlled by a paranormal entity. There’s plenty of serious research into the subject, take for example D Scott Rogo and Raymond Bayless’s >>>

“Phone Calls from the Dead” and more recently by Dr Callum E Cooper in his book “Telephone Calls from the Dead”. The point of these ramblings was not that this can happen but more along the lines that people will begin to perceive certain interactions with AI as paranormal.

Going back to the physical world and putting aside AI, one of the intriguing aspects of paranormal experiences has been an attachment to almost every facet of our world and as our material world has grown so the claims of paranormal attachment have grown accordingly. The paranormal is not just limited to earth, wind and fire, but extends to places, buildings, people and everyday objects and possessions. Just how many of those ghastly TV programs are based on haunted objects for example?

Take a step back and it’s clear that attachment extends beyond our planet, beyond the solar system and into the universe. The effect on us producing concepts of astrology, hauntings are all seemingly embedded in our conscious regardless of whether you believe or disbelieve in paranormal events.

So how long will it be before seemingly paranormal experiences are linked to AI? Given the plethora of material already linking contact by the dead through the popular contemporary methods of communication it’s not difficult to gaze into the crystal ball and guess how those stories will unfold.

Claimed experiences of communication from beyond the grave through electronics started occurring back in the days of the telegraph and as technology progressed so “the spirits” seem to have embraced the changes. The telephone, radio, TV, digital recorders, email and texts all appear on the list of everyday devices supposedly

manipulated by the dead for the purposes of contact with the living.

But then it may not be limited to the usual electronic methods of communication, how about such objects such as electric kettles, vacuum cleaners, chain saws, fridges which spookily communicate with hapless victims? Calum E. Cooper’s book includes anecdotal reference of such “hauntings”. Even in the sometimes murky world of the ghost hunter, stories abound of equipment

failure, battery packs being drained by unseen forces, K2 meters (an electromagnetic field (EMF) radiation detector) triggered by manipulative spooks.

So back to the crystal ball and It doesn’t take Andy and Nick long to see through the swirling mists and perceive the immediate future of the paranormal in an age of artificial intelligence where entities can not only control but communicate through the Metal Mickeys and the like. What will be interesting is how the distinction will be made between consciousness and rational AI thought, between actions and the distinct notion that the machine has become “possessed” with the tell-tale signs of a machine

malfunction, the manifestation of a mechanical poltergeist, malevolent and intent on causing fear or harm. Of course the degree and type of damage would then depend on the type of AI that becomes possessed, a full blown “I Robot” type android or smarter than average phone chip?

So what of the possibility of possession? If people believe in demonic possession of the human form how long will it be before there are claims of possession of the forms of AI, the type that is perceived as having or being close to having a conscience? Time will tell but the money’s very much on it happening and probably within our >>>



lifetimes. Andy ponders what a possessed talking toaster would do in Nick's home? Perhaps it would deliberately burn his breakfast toast, scream obscenities at him and remind him of all his flaws and weaknesses each morning, the epitome of a 35 year marriage!

Our protagonists then turned their beer befuddled brains back to the question of communication. Taking the definition of ghost as an apparition of a dead person, probably the most common global definition, Andy and Nick considered communication from beyond the grave through electronic and mechanical devices. As they had already mentioned these claims already exist and there is absolutely no reason why this won't extend to forms of AI. Indeed, they are quite happy to put their befuddled heads on the block and say it will happen.

There is another element to our protagonist's meanderings and that is how AI could be used to monitor and capture anomalous events and to interpret the data and provide a rational explanation. Of course, it could be argued that only humans with the psychic abilities can truly detect the paranormal but what if machines could be programmed to undertake a huge variety of tasks, record them and then analyse the results providing subjective and irrefutable evidence that currently unknown forces are at play? Or not!

The list of data that could be analyzed is pretty much as long as the proverbial piece of string but, for example, air pressure, changes in air temperature, sonic events, seismic readings, changes in electromagnetic fields, fluctuations in gravity fields. Anything could be thrown into the mix, readings could extend beyond the area of 'haunting' and include other factors such as solar flares, lunar influences etc. It would be a field day for every loony tune idea or notion, but bring it on, let AI unravel the myriad strands of folklore and rational thought and make some sense of it. Let's hope the answer to the paranormal investigator's big question is not 42.

So, AI could provide the answers but there will be those who will undoubtedly question any rational explanation, it's part of the human condition and in the eyes of Andy and Nick there is little doubt that some will challenge anything that suggests that "ghosts" are not the returning spirits of the deceased, that there is a higher

ethereal plane, a cosmic energy, a god(s) or whatever. Who knows? Andy and Nick are not here to judge what people think they are only offering an insight into how AI could interact or be used as a means of explaining some, if not all, paranormal events. What a drab world it would be if the fabric of our cultural heritage was torn apart by a Metal Mickey spluttering out a thesis on why ghosts in any form do not exist.

Control, communication and detection, what else? The dreaded call of "last orders" is looming but there is one other wonky line of thought about to be explored. It's more of a continuation on the theme of detection but one which is very close to Andy and Nick and has broader scientific implications. "What, what, please tell us" we hear you shout out. The retort is "space and time travel". Well, how does that fit into AI and the Paranormal? The line of thought goes like this: one of the major constraints of space travel is the limitations of the human body in terms of the forces exerted and length of time, nothing new there. However, developments in AI can only increase the scope for exploration in terms of space and time and surely the possibility of exploring wormholes, black holes and any other type of hole you care to mention. It's already found a foothold, or rather a wheel hold, in the form of the Mars Rovers.

Now taking that a stage further, go beyond the mathematics of the theory of a Multiverse, if that theory becomes a recognised reality together with the ability to break through space and time then surely AI will have an important role to play? The archetypal 'Greys' in alien abduction cases are often described as having a hive mentality; machine like behaviour and extremely coordinated. Could these 'creatures' be AI from another dimension, sent by entities beyond our conception?

To complete the circle Andy and Nick introduce the concept of time slip, that much of what is being described as paranormal in the form of, say ghosts and UFOs, can be attributed to folds in the veil of time which somehow cross over so that all that is being experienced is this distortion of time and space.

That connection might sound like a big leap, even tenuous but they don't think it's unreasonable. It could be that this is just pure bunkum but let Metal Mickey have his moment and allow him >>>

to be absorbed by the wonders of time and space and let him work it out. And if it's findings are that there is absolutely no evidence of time slips or the like then so be it, the chances are that in linear time Andy and Nick's physical remains will already have been consigned to dust in all dimensions but then maybe Mickey can travel dimensionally and wag a mechanical finger in their faces and say "wrong!".

And so we return to the near present, whatever and wherever that may be and the surly underdeveloped Neanderthal bar man is wagging his finger in their faces and saying "out" which just about sums up the whole experience. So, until next time.

■ ■ ■



Paranormal Research Investigators UK

Paranormal Research Investigators UK (PRI UK) are pleased to announce that they are now an affiliate group of ASSAP (The Association for the Scientific Study of Anomalous Phenomena).

www.paranormalresearchinvestigators.co.uk

Follow us



Benjamin Radford

Ben Radford is one of the world's few science-based paranormal investigators, and has done first-hand research into mysterious phenomena in sixteen countries on four continents including psychics, ghosts and haunted houses; exorcisms, miracles, Bigfoot, stigmata, lake monsters, UFO sightings, reincarnation, and crop circles, and many other topics. He is perhaps best known for solving the mysteries of the Santa Fe Courthouse Ghost in 2007, the Hispanic vampire el chupacabra in 2010, and his book *Bad Clowns*, the first to fully examine the evil clown phenomenon.

[HTTP://BENJAMINRADFORD.COM/](http://benjaminradford.com/)

INVESTIGATING GHOSTS

The Scientific Search for Spirits



BENJAMIN RADFORD

Author of *Scientific Paranormal Investigation: How to Solve Unexplained Mysteries*

World's Fastest Camera for Ultrafast Phenomena Provides Temporal Information

By Prof. Lihong Wang, www.caltech.edu

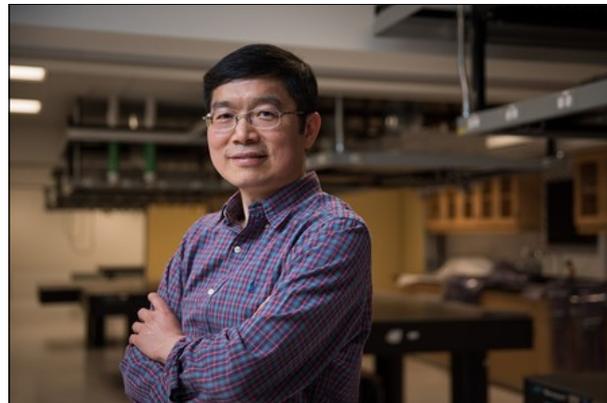
My name is Lihong Wang and I'm a professor at Caltech. I work on imaging primarily photoacoustic tomography but we also built the world's fastest camera for ultra-fast phenomena.

If you were to use your smartphone to record a video you are talking about maybe a 30 Hertz frame rate, meaning you capture 30 frames per second. That is good enough for daily phenomenon but if you want to capture something much faster, we have to do something very different. Of course the fastest phenomenon in the world is light propagation. Light pulses propagate at the speed of light and as we know that's the terminal speed, nothing can propagate faster than the speed of light. The fastest 1D camera is something called "streak camera" that gives you 1 T images but at a very high, not frame but, line rate, so we want to add one more dimension to it.

A good analogy is, you can watch something through a slit and you can watch a horse racing by for example but that doesn't really give you an intuitive picture of what's going on.

We want to mimic your smartphone but at a much higher frame rate so we added the vertical dimension to a standard streak camera. Now we can capture X Y images but at 100 billion frames per second, that is 1 billion is 10 to the 9th. In fact we have upgraded our system to 10 trillion frames per second and at this type of rate, even a 100 billion frames per second, we can see a light pulse propagating in space so we are capturing the scene literally at the speed of light.

In 2017 we extend this extend this technology to an application something called "Mach cone". If I speak and I stand still I emit approximately a spherical wave going out but if I walk and talk that we found it will be distorted. If I walk at the speed of sound or passing the speed of sound, I will create a cone structure that is called a "Sonic Mach cone" that is the sonic version of Mach cone. It is better known as a sonic boom because when a supersonic jet runs at a supersonic speed



Prof. Wang's research focuses on biomedical imaging. In particular, his lab has developed photoacoustic imaging that allows peering noninvasively into biological tissues. www.coilab.caltech.edu

it will generate this loud noise when it breaks the sound barrier and I was wondering if there's this photonic version that we can image.

So there is this photonic Mach cone, so something has to propagate superluminally meaning the light source has to propagate at a speed faster than the speed of light in the medium. Now in vacuum of course, nothing can propagate faster than the speed of light but if we have a background medium of some sort the speed of light will be reduced in the medium relative to the speed of light in vacuum.

What we did was, we created a tunnel where the speed of light in the tunnel is greater than the speed of light in the medium and so we propagate a very short light pulse in that medium, with spray some scatters within a tunnel, so the generate secondary light sources and a light source will be propagated in the background medium so the light source will propagate at a greater speed and that create a superluminal light source. And that will create a photonic Mach cone that would basically tag to the light source and propagate this way.

It was really cool to watch and it's 100% analogous to the sonic version of the Mach cone. >>>

In terms of applications, the March cone is a fundamental phenomenon.

There is a version which is called Cherenkov radiation and this has even applications in medicine. Brian Pogue, many of you know him, his group has been using Cherenkov radiation to monitor radiation dose. I advise you to check out his work as well.

There are many applications for our camera of course and any time you said, 'I wish I had a faster camera' when you monitor a certain phenomenon, you should think about our camera.

Now sometimes people say, 'Hey, I don't need that kind of frame rate. That is too high for us'. Don't worry, we can slow down our camera to a rate that you need.

Now of course the idea we use to generate this camera can be translated into many other versions. You can start with a base device then we use our method, you can make the camera faster and so we can fill the gap between the current limit for a sufficient number of frames what is about one kilohertz or two kilohertz frame rate. And now we are talking about 100 billion frames per second and ten trillion frames per second and we can fill many orders magnitude in between using our technology.

The camera is very generic. It is very much like we have a camera that can image really fast so this is the temporal resolution but you can adapt any type of optical imaging devices to it. It is like a CCD camera for example that can be attached to a microscope or telescope. Our camera can be used the same way. We can attach our camera to a microscope then we can study spatially microscopic structures. Or we can attach it to maybe a Hubble telescope so you can look into the outer space and discover some very much macroscopic phenomena. But hopefully there is some temporal information you can use to study the phenomena.



Visit Caltech and check out the world's fastest camera filming the speed of light. It is truly mind-boggling when you think of what you are actually seeing on screen.

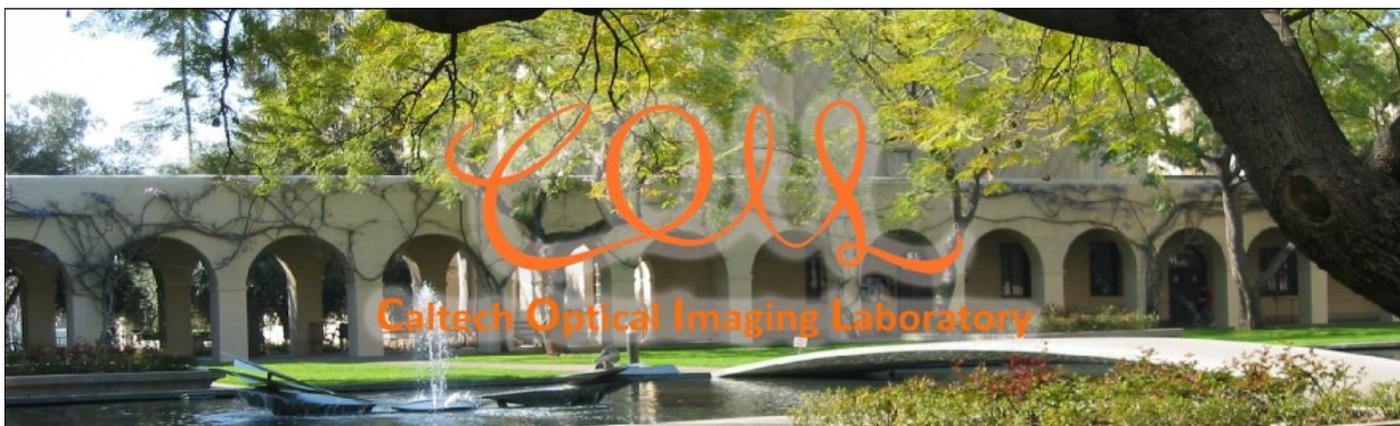
This is again very generic you can use in many different ways. Some people liken our camera to be a temporally microscopic device that allows you to detect ultrafast phenomena with very high temporal resolution.

For example, one of the bio-

medical applications we are after is to image action potential propagation in a neural network. So essentially we want to see the live traffic within the brain and find out how the brain is wired and that would elucidate the mysteries of the brain.



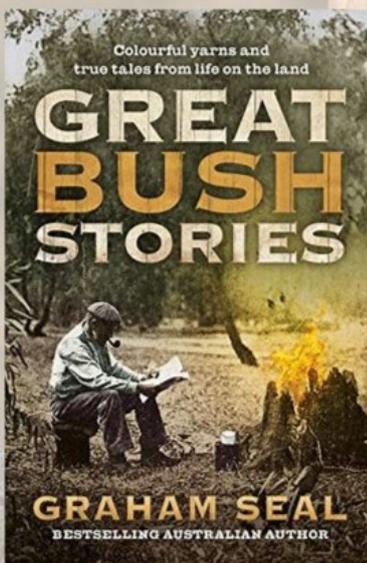
This article was original published on You Tube as a video interview from SPIE.TV, <http://spie.org/pw>





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Prof. Graham Seal

Bestselling Australian author Graham Seal has gathered classic and little-known stories from when most Australians lived outside the cities, and communication was by dirt track or boat.

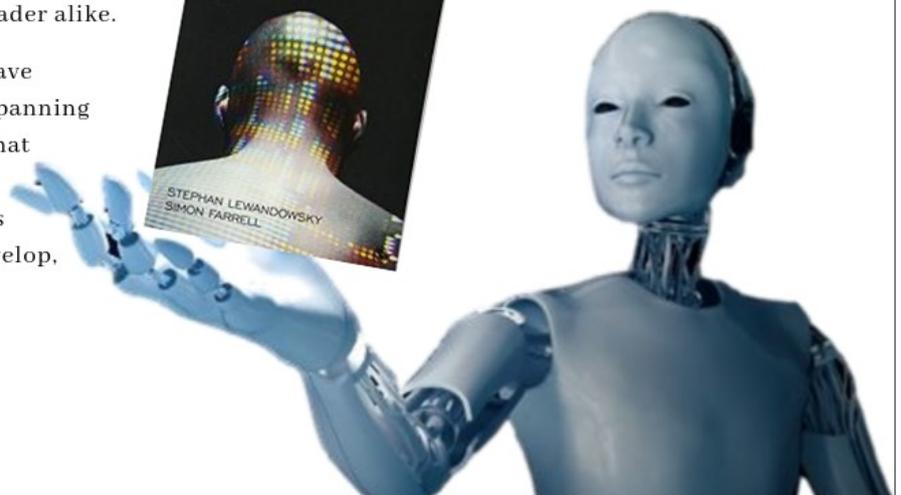
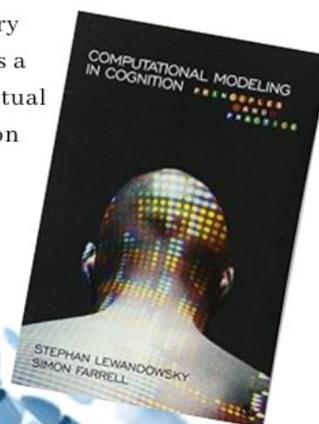
True or more than a little exaggerated, these stories reflect the distinctive way of life of rural and outback folk which continues to this day.

www.amazon.com

This educational masterpiece is a must-read for every aspiring student of cognitive modeling as it provides a comprehensive and in-depth coverage of the conceptual and practical foundations of computational cognition for the beginner and the experienced reader alike.

The authors Farrell and Lewandowsky have indeed succeeded in their ambition of spanning introductory to cutting-edge material what provides researchers and students the knowledge and tools to interpret models published in their area, as well as to develop, fit, and test their own models.

www.amazon.com



UV Satellite Will Open New View on Exploding Stars and Black Holes

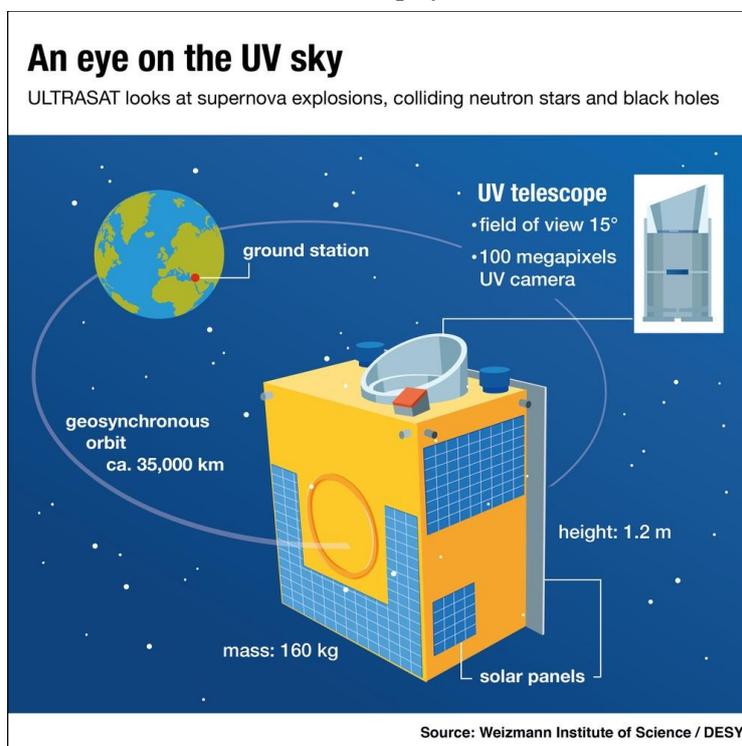
DESY Press Release, 28-10-2019, www.desy.de

A new space telescope will open up an unprecedented view of the universe in ultraviolet light: The ULTRASAT satellite will provide fundamental new insights into high-energy phenomena such as supernova explosions, colliding neutron stars and active black holes, all of which can also generate gravitational waves and act as cosmic particle accelerators. On Monday in Rehovot, Israel, the President of the Helmholtz Association, Otmar D. Wiestler, and the Director of the Helmholtz centre DESY, Helmut Dosch, agreed with the Weizmann Institute of Science on a cooperation for German participation in the Israeli-led project. DESY will build the 100-megapixel UV camera for the space telescope. For the project, DESY is working with the German Aerospace Center DLR, which also is a member of the Helmholtz Association.

“Helmholtz has had many excellent scientific collaborations with Israeli partners for decades. Together with the Weizmann Institute of Science, we are now taking another important step in the field of astrophysics. I am extremely pleased about this,” said Helmholtz President Otmar D. Wiestler. “The cooperation on the ULTRASAT space telescope has the potential to create a completely new basis for the detection of gravitational waves and related astrophysical events, at the highest international level.”

DESY Director Helmut Dosch added: “We have a long and fruitful cooperation with a number of Israeli partners. We are now continuing this

success story with our participation in Weizmann Institute of Science's challenging satellite project.” DESY's Research Director for Astroparticle Physics, Christian Stegmann, emphasised: “ULTRASAT offers us unique insights into the high-energy universe. With the camera for the telescope, DESY will be able to combine and contribute its outstanding expertise in detector development for astroparticle physics and X-ray physics.”



ULTRASAT will study the sky in the ultraviolet range (220 to 280 nanometres wavelength) of the electromagnetic spectrum and have a particularly large field of view of 225 square degrees – about 1200 times as large as the full moon appears in our sky. “This unique configuration will help us answer some of the big questions in astrophysics,” said Eli Waxman, principal investigator of ULTRASAT at the Weizmann Institute of Science.

For example, the satellite will search for the origin of the heavy chemical elements. Apart from the lightest elements like hydrogen and helium, the elements were almost exclusively created by nuclear fusion in the cosmos. Stars produce their energy from this nuclear fusion, but this only works up to iron. The fusion of heavier elements such as lead or gold costs energy. Their synthesis takes place in the most powerful processes in the universe, such as the explosion of a star as a supernova or the collision of two neutron stars – the nuclei of burnt-out suns that have collapsed under their own weight to such an extent that they have a density like a gigantic atomic nucleus. >>>

Every gold atom on Earth and in the rest of the cosmos comes from an exploding sun or from a neutron star crash.

“We want to understand exactly how the elements are produced and how they are distributed,” explains David Berge, Lead Scientist at DESY. Both, supernova explosions and neutron star collisions can be followed particularly well in UV light, as Berge points out. “The direct phase of a supernova in the first minutes, hours and days is mainly seen in the UV. During this time, the UV light contains characteristic signatures that indicate the predecessor star.” Later, a shockwave breaks out of the hot fireball, within which charged subatomic particles are also accelerated to high energies. “The satellite can therefore help us to understand the origin of such cosmic particle accelerators,” says Berge. “We also want to find out which type of star explodes in which kind of supernova.

ULTRASAT is particularly sensitive to high-energy phenomena. “Everything that gets extremely hot shines brightly in the UV light,” reports DESY researcher Rolf Bühler, project manager for the UV camera. This includes active black holes, which absorb matter from their environment and also accelerate particles, and colliding neutron stars.

The observation of neutron star crashes can not only provide information about element synthesis in the cosmos, but is also of great importance for gravitational wave research. “If gravitational waves are registered by merging neutron stars, their position can so far only be coarsely resolved on the basis of the gravitational wave data,” explains Bühler. “ULTRASAT can orient itself to the target region within a maximum of 30 minutes and, thanks to its large field of view, can then determine the exact position almost immediately.”

The satellite thus has a decisive function for the young field of multi-messenger astronomy (MMA), which studies the universe via various messengers such as cosmic particles, gravitational waves and electromagnetic radiation and forms a new area of research at DESY. With its large field of view, the satellite will have a particularly large section of the sky in view and will thus also be able to detect unknown objects that suddenly flare up in the UV range.

With a total weight of only 160 kilograms and a volume of less than one cubic metre, ULTRASAT (Ultraviolet Transient Astronomy Satellite) is a small scientific satellite. The Weizmann Institute of Science and the Israeli Space Agency ISA share funding and management. The launch is scheduled for 2023. The space telescope will then collect data for three years. It will be put in a high orbit about 35,000 kilometres above Earth's surface. This guarantees that disturbances from the ultraviolet background radiation, which Earth's atmosphere reflects from the sun, are negligible and allows large areas of the sky to be surveyed. UV radiation can only be observed from orbit because it is largely absorbed and reflected by the atmosphere.

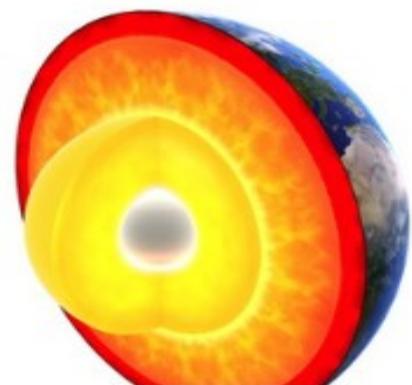
The UV camera, which DESY is developing and building, will be the heart of the telescope. It will have a UV-sensitive sensor area of nine by nine centimetres and a resolution of 100 megapixels. With these parameters, the developers are breaking new ground: A UV space camera with such a resolution and sensitivity has never been built before. For the camera, DESY experts in astroparticle physics work together with specialists in detector development from the field of research with synchrotron radiation. With this project, DESY is contributing about 5 million euros to the satellite, which will cost about 70 million euros in total. ■ ■ ■

WELCOME.
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National focus MECSPE Observatory

Exports remain a driving factor for SMEs and 8 out of 10 manufacturing companies in Italy believe in their own digital transformation

MECSPE Press Release, by Sabrina Arcagni, www.mecspe.com

Milan, July 2019 - Technologies such as artificial intelligence, augmented and virtual reality are opening up new scenarios, which might change the future way of work, envisaging thereby the emergence of mixed work teams, composed of men and smart technologies. This is the opinion of 43% of Italian manufacturing SMEs, that have already adopted or intend to introduce, by 2019, innovative technologies/processes including IT security, cloud computing, collaborative robotics and the internet of things.

That is the national analysis presented by Senaf at the opening of the 18th edition of MECSPE, the reference fair for the 4.0 manufacturing sector, held from 28th to 30th March 2019 at Fiere di Parma (2,306 Exhibitors with more than 200 German companies; 135,000 sqm Exhibiting Area, 12 Thematic Shows and 56,498 Professional Participants). According to the last MECSPE Italian Observatory, related to the second half of 2018, 8 companies out of 10 believe in their own digital transformation occurred in recent years and almost all (over 9 out of 10) believe they have a medium-high level of knowledge with respect to the technological and digital opportunities on the market.

The focus in 2019 will aim at new enabling technologies, continuing in the direction towards

mainly IT safety (74%), connectivity (60%), cloud computing (33%) and collaborative robotics (28%) that have already been introduced, and at research and innovation: 61% will invest up to 10% of their turnover and 25% will dedicate between 10% and 20% thereof, while targeted advice

(51%), knowledge transfer (42%), confrontation with competitor companies (39%), but also workshops (21%) and the tutorship of a university (15%) are considered as useful tools for the development process.

Focus - economics trend of Italian small companies in the mechanic and subcontracting sector, IInd semester 2018

Company trend of Italian companies in the mechanical and subcontracting sector is currently overall satisfactory, in which 62% of entrepreneurs reports a very positive company trend. In the second half of 2018 compared to 2017, turnover recorded a 53% growth of companies, while 38% declared stability and only 9% a decrease.

75% of companies sees its order portfolio as "adequate" to its own levels of financial sustainability, in contrast with the remaining part according to which it is insufficient. >>>



As regards forecasts for 2019 and with reference to turnovers, 40% expect growth, 48% stability and 12% expects a decrease.

Exports remain a driving factor for SMEs and almost 7 out of 10 declare to export their products and services, with a variable incidence. 25% say they make less than 10% of their turnover abroad, 17% "from 10% to 25%", 16% "from 26% to 45%", 9% "from 46% to 70 %" and 6% "over 70% ". Exports aim mainly at the countries in Central and Western Europe (78%), followed by Eastern Europe (27%), Asia (19%) and North America (18%). About 13% export to Russia, while 10% to South America and the Middle East, 5% to Oceania and Northern Africa which represent the other outlet markets. No doubt about the future market on which the single companies will be operating: over the next 3 years, 12% expect a contraction of the scenario in which it is operating, in contrast with 40% which is openly convinced of the development of its own reference market and 48% believe there will be no big changes compared to the current trend. Instead, the cases of staff growth are increasing by 52%, 43% are stable, while 32% expects to expand its workforce in 2019 with respect to 64% that declares it will not change.

Today's sustainability has taken on a strategic role in corporate decisions: 34% declare they have increased their commitment in this direction over the last few years, 32% is aware of the importance and intend to look after this aspect in the future. 15% considers it a strategic competitive factor to distinguish themselves on the market, above all in foreign relations, and they also

undertake to communicate it, but the percentage of those who believe it is a marginal factor is considerably high and go no further than doing what is required by law (19%). With a view to full attention and sustainability, the ranking of the investments, mostly aimed at, sees in the first place the reduction of consumption (61%), attention to pollution and environmental impact (57%), attention to ethics in the relationship with suppliers and customers (47%). This is followed by the focus on employees (CSR projects) (36%), support for local economy (23%), eco-sustainability of products (21%) and at the bottom joining charity/charity projects (12%).

However, if we think about the relationship with the customer and the aspects on which they are most sensitive, according to the companies, the priority (41%) is given to the environment over ethics, which constitutes only 17% according to the entrepreneurs. 18% think that both factors affect purchasing decisions, while 25% believe that customers are not sensitive to any aspect of sustainability in what they buy.

Also MECSPE, in collaboration with Tecniche Nuove, has awarded sustainable companies, through the creation of the path "I do more", which highlights the companies that stand out for their green and eco-friendly attitude.

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CRISP's core aim is to generate and disseminate new knowledge about 'information, surveillance and privacy'.

www.crisp-surveillance.com

**As the holiday season is upon us,
we find ourselves reflecting on
the past year.**

**Our thoughts turn gratefully to
those who have made The Next
Truth's success possible. It is in
this spirit we would like to
express our sincerest
appreciation to those who have
helped us shape magazine and
make it global.**

**Thank you for your support and
the trust you have placed in us.**

**The team of The Next Truth
wishes you peace, joy and
prosperity throughout the
coming year.**

