SATYA MOHAPATRA

Curriculum Vitae
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Citizenship: U.S. Permanent Resident, and Indian Citizen

EMPLOYMENT

2022 - present
Scientific Support Analyst
California Institute of Technology

2014 - 2022
LIGO Identity and Access Management Developer
Kavli Institute for Astrophysics and Space Research, Massachusetts Institute of Technology.

2012 – 2014
Computer Systems Specialist / Post-doctoral Scholar
Syracuse University Gravitational Wave Group.

2012 – 2013
Post-doctoral Scholar
Center for Computational Relativity and Gravitation, Rochester Institute of Technology.

2007 – 2012
Research Assistant
Experimental Gravitation and Particle Astrophysics Group, University of Massachusetts, Amherst.

2004 – 2007
Teaching Assistant
Physics Department, University of Massachusetts, Amherst.

EDUCATION

2004 – 2012
Doctor of Philosophy
Physics Department, University of Massachusetts, Amherst.
Thesis: *Searches for gravitational waves from binary black hole coalescences with ground-based laser interferometers across a wide parameter space.* LINK.
(Dissertation Chair: Prof. Laura Cadonati).

2002 – 2004
Master of Science
Department of Physics, Indian Institute of Technology, Kanpur, India.
Thesis: *Laser induced breakdown spectroscopy.*

(Advisor: Prof. R.K. Thareja).

1999 – 2002 **Bachelor of Science**
Physics Honors. BJB Autonomous College, Bhubaneswar, India.

PROFESSIONAL DEVELOPMENT COURSES

- *InCommon Shibboleth workshop,* New Jersey Institute of Technology, Sept 29 - 30, 2014.
- *Tackling the Challenges of Big Data,* MITProfessionalX, Feb 3 - March 17, 2015.
- Machine Learning For Big Data and Text Processing, MITProfessionalX, June 2015
- Internet of Things: Roadmap to a connected world, MITProfessionalX, May 2016
- Data Science: Data to Insight, MITProfessionalX, February 2017
- Quantum Computing Fundamentals, MITx, March 2021

RESEARCH COMPUTING SKILLS

- Authentication and authorization framework such as: shibboleth, grouper, kerberos and ldap.
- Application development - with python, php, javascript, and java
- Content management system: Drupal.
- System administration of the Syracuse University Gravitation and Relativity (Sugar) Computing Cluster.
- Administration of unix based (**Linux** and **Solaris**) systems.
- Quantifying and tuning performance of computer servers.
- Administration with **VMWare** systems and maintaining several virtual machines.
- Scripting in Unix/Linux.
- Scripting in PowerShell.
- Maintenance of several web servers including wikis.
- Maintaining repositories of version controlled software management based on **git** and **svn**.
- **Packaging** of linux based softwares: both for Redhat and Debian systems.
- Maintaining repositories for software updates for linux based systems.
- Experience of high throughput computing with condor.
- Experience of high performance computing with GPU.
- Experience with **Mysql** database management.
- Coding and scripting with **Python**, **Perl**, **Root**, **Php**, **C**, **C++**, **Matlab** and **Mathematica**.
- Scientific data archiving, transfer and management.
- Special interest in data visualization. Link for several Mathematica demonstrations authored by **Mohapatra.** Additional samples of visualization (with Google Charts and Javascripts) made by **Mohapatra**: LINK1, LINK2, LINK3, LINK4, and LINK5.
- Coding contribution to LIGO Algorithm Library.
- Coding contribution to Omega gravitational-wave burst search algorithm.

PUBLICATIONS

- Berry, Christopher *et al***,** *Parameter estimation for binary neutron-star coalescences with realistic noise during the Advanced LIGO,* The Astrophysical Journal, 804, 2 (2015), Eprint: astro-ph/14116934.
- **Mohapatra Satya** *et al.*, *Sensitivity Comparison of Searches for Binary Black Hole Coalescences with Ground-based Gravitational-Wave Detectors*, Phys. Rev. D **90**, 022001(2014), LIGO DCC: P1100198, Eprint: gr-qc/1405.6589.
- Privitera Steve, **Mohapatra Satya** *et al.*, *Improving the sensitivity of a search for coalescing binary black holes with non-precessing spins in gravitational wave data*, Phys. Rev. D **89**, 024003 (2014), Eprint: gr-qc/1310.5633.
- J Aasi *et al.* (substantial contribution by **Mohapatra**), *The NINJA- 2 project: Detecting and characterizing gravitational waveforms modelled using numerical binary black hole simulations*, Class. Quantum Grav. **31** 115004, Eprint: gr-qc/1401.0939, LIGO DCC: P1300199.
- Parameshwar Ajith *et al*. (substantial contribution by **Mohapatra**), *The NINJA-2 catalog of hybrid post-Newtonian / numerical- relativity waveforms for non-precessing black-hole binaries*, Class Quant. Grav. **29**, 124001 (2012), Eprint: gr-qc/1201.5319.
- **Mohapatra Satya**, Nemtzow Zach, Chassande-Mottin Éric and Cadonati Laura, *Performance of a Chirplet-based analysis for gravitational waves from binary black hole mergers*, J. Phys.: Conf. Ser. 363 012031 (2012), Eprint: gr-qc/1111.3621.
- Fischetti Sebastian, Healy James, Cadonati Laura, London Lionel, **Mohapatra Satya**, Shoemaker Deirdre, *Exploring the Use of Numerical Relativity Waveforms in Burst Analysis of Precessing Black Hole Mergers*, Phys. Rev. D **83**, 044019 (2011), Eprint: gr- qc/1010.5200.
- Chassande-Mottin Éric, Miele Miriam, **Mohapatra Satya** and Cadonati Laura, *Detection of gravitational-wave bursts with chirplet-like template families*, Class. Quant. Grav. **27**, 194017 (2010), Eprint: gr-qc/1005.2876.
- Cadonati Laura, Chatterji Shourov, Fischetti Sebastian, Guidi Gianluca, **Mohapatra Satya**, Sturani Ricardo and Vicere´ Andrea, *Un-modeled search for black hole binary systems in the NINJA project*, Class. Quant. Grav. **26**, 204005 (2009), Eprint: gr-qc/0906.2433.
- Aylott, Benjamin *et al.* (substantial contribution by **Mohapatra**), *Testing gravitational-wave searches with numerical relativity waveforms: Results from the first Numerical INJection Analysis (NINJA) project*, Class. Quant. Grav. **26**, 165008 (2009), Eprint: gr-qc/0901.4399.

OTHER PUBLICATIONS

- Das Sudeep, **Mohapatra Satya** and Bhattacharya Jishnu, *The Duffing Oscillator*, Prayas, IAPT Students' Journal of Physics **1**- 2 (2004), alternate link.
- Paily George, **Mohapatra Satya** and Thakur Saikat, *The Bouncing Ball*, Prayas, IAPT Students' Journal of Physics **1**-1 (2004), alternate link.

PAPERS UNDER PREPARATION

- **Mohapatra Satya**, Cadonati Laura and James Clark, *Performance study of Boosted Decision Trees in a Gravitational Wave Burst Search*.

TECHNICAL DOCUMENTS

- P Aijth, **Mohapatra Satya** and Pai Archana, *A Gravitational-Wave Data Analysis Primer for the IndIGO Mock Data Challenge*, LIGO DCC:T1100462.
- **Mohapatra Satya**, *Generation of colored Gaussian noise for a given design sensitivity*, LIGO DCC:T1100126.

TALKS

March 2015	*Updates on IMBBH, IMRI searches*, LIGO Scientific Collaboration-Virgo Meeting, Pasadena, CA, USA. LIGO DCC:G1500254.
June 2014	*Improving the sensitivity of a search for coalescing binary black holes with non-precessing spins in gravitational wave data*, CCRG Seminar, RIT, Rochester, USA. LIGO DCC G1400414.
Jan 2014	*Listening to the universe through ground based gravitational wave detectors*, HEP Seminar, Institute of Physics, Bhubaneswar, India. LIGO DCC:G1301264.
Dec 2013	*A method for comparing the detection performance of algorithms that search for binary black hole coalescences*, Gravitational Wave Physics and Astronomy Workshop, Pune, India. LIGO DCC:G1301142.
May 2013	*Observing gravitational waves from the binary black hole mergers: the challenges*, RIT astro-lunch talk, Rochester, NY. LIGO DCC:G1300495.
March 2012	*Data analysis with NINJA2 waveforms*, LIGO Scientific Collaboration-Virgo Meeting, Cambridge, MA. LIGO DCC:G1200177.
December 2011	*Detectability of binary black hole merger signals in ground based gravitational wave detectors*, ICGC 2011, Goa, India. LIGO DCC:G1100735.
October 2011	*Orbital hang-up effect in binary black hole coalescence and how it affects different search algorithms*, MIT-LIGO lab, MIT, Cambridge. LIGO DCC:G1200041.
June 2011	*IMR update*, LIGO Scientific Collaboration-Virgo Meeting, Orsay, France. LIGO DCC:G1100585.

June 2011 *NINJA update*, LIGO Scientific Collaboration-Virgo Meeting, Orsay, France. LIGO DCC:G1100584.

June 2011 *Chirplet update*, LIGO Scientific Collaboration-Virgo Meeting, Orsay, France. LIGO DCC:G1100601.

June 2011 *Increasing the detectability of binary black hole mergers in a gravitational-wave burst search*, 14th Eastern Gravity, Princeton University. LIGO DCC:G1100554.

April 2011 *Orbital hang-up effect in binary black hole merger*, bag lunch seminar, Physics Department, University of Massachusetts, Amherst.

March 2011 *Burst searches with GSTLAL*, LIGO Scientific Collaboration-Virgo Meeting, Arcadia, CA. LIGO DCC:G1100184.

March 2011 *Comparing the sensitivity of search pipelines for the detection of binary black hole coalescence signal in the high mass region*, LIGO Scientific Collaboration-Virgo Meeting, Arcadia, CA. LIGO DCC:G1100185.

March 2011 *Using multivariate classifier for burst analysis*, LIGO Scientific Collaboration- Virgo Meeting, Arcadia, CA. LIGO DCC:G1100179.

March 2011 *Increasing detectability of longer duration binary black hole merger signals in a burst search*, LIGO Scientific Collaboration-Virgo Meeting, Arcadia, CA. LIGO DCC:G1100183.

Nov 2010 *Searching for gravitational waves from binary black hole coalescences with chirplet template families*, 20th annual midwest relativity, Guelph, Canada. LIGO DCC:G1000993.

Oct 2010 *Inspiral-Merger-Ringdown comparison tools and preliminary results from spin-aligned Inspiral-Merger-Ringdown waveforms*, LIGO Scientific Collaboration-Virgo Meeting, Kraków, Poland. LIGO DCC:G1000850.

March 2010 *Progress with spin-aligned Inspiral-Merger-Ringdown waveforms*, LIGO Scientific Collaboration-Virgo Meeting, Arcadia, CA. LIGO DCC:G1000267.

May 2008 *Black Hole Ringdown, bag lunch seminar*, Physics Department, University of Massachusetts, Amherst.

March 2008 *Inspiral-Merger-Ringdown waveforms in Omega burst search*, LIGO Scientific Collaboration-Virgo Meeting, California Institute of Technology.

Oct 2007 *LIGO: A Gravitational Wave antenna*, bag lunch seminar, Physics Department, University of Massachusetts, Amherst.

Nov 2006 *Generalized Israel Junction condition*, Math-Physics seminar, Mathematics Department, University of Massachusetts, Amherst.

Oct 2006 *Thin Shells in General Relativity*, Bag lunch seminar, Physics Department, University of Massachusetts, Amherst.

POSTERS

(†) Authored by **Mohapatra**.
(§) Substantial contribution by **Mohapatra.**

July 2013 (†) *Effect of inclusion sub-dominant modes of gravitational-waves emitted from binary black hole mergers measured by a gravitational- wave burst search algorithm*, Amaldi10–GR20, Warsaw, Poland. LIGO DCC:G1300130.

March 2012 (†) *The NINJA-2 catalog of hybrid post-Newtonian/numerical-relativity waveforms for non-precessing black-hole binaries*, LIGO Scientific Collaboration-Virgo Meeting, Cambridge, MA. LIGO DCC:G1200118.

July 2011 (†) *Performance of a Chirplet-based analysis for gravitational waves from binary black hole mergers*, Best student poster prize, Amaldi9- NRDA2011, Cardiff University, UK. LIGO DCC:G1100582.

July 2011 (§) *Sky localization measurements for binary black hole coalescences in simulated data for the NINJA-2 project*, Amaldi9-NRDA2011, Cardiff University, UK. LIGO DCC:G1100581.

May 2011 (†) *Prospects for observing the orbital hang-up effect in a binary black hole merger through a gravitational wave Burst search*, Advances and Challenges in Computational General Relativity workshop, Brown University, Providence. LIGO DCC:G1100459, alternate link.

Jan 2011 (†) *Burst search with gstreamer pipeline*, Gravitational-wave Physics and Astronomy Workshop, University of Wisconsin, Milwaukee. LIGO DCC:G1100049.

Jan 2011 (†) *Estimation of binary black hole coalescence event rate exclusion plots with mass and spin parameters from burst search results*, Gravitational- wave Physics and Astronomy Workshop, University of Wisconsin, Milwaukee. LIGO DCC:G1001165.

June 2010 (†) *Preliminary Data Analysis Results on NINJA-2 Simulated Data*, Numerical Relativity and Data Analysis Meeting, Perimeter Institute, Waterloo, Canada. LIGO DCC:G1000643.

March 2010 (†) *Omega frequency estimation on non-precessing spinning Inspiral-Merger-Ringdown wave*, LIGO Scientific Collaboration-Virgo Meeting, Arcadia. LIGO DCC:G1000189.

Sept 2009	(§) *Inspiral-Merger-Ringdown waveform analysis performance of search algorithm at a fixed false alarm rate*, LIGO Scientific Collaboration- Virgo Meeting, Budapest, Hungary. LIGO DCC:G0900113.
July 2009	(§) *Exploring the Use of Numerical Relativity Waveforms in Burst Analyses of Binary Black Hole Mergers*, Numerical Relativity and Data Analysis Meeting, Potsdam, Germany. LIGO DCC:G0900668.
June 2009	(†) *Performance study of Boosted Decision Trees in a Gravitational Wave Burst Search*, Amaldi8, Columbia University, New York City. LIGO DCC:G0900565.
March 2009	(§) *Inspiral-Merger-Ringdown waveform analysis performance of search algorithm at a fixed SNR threshold*, LIGO Scientific Collaboration- Virgo Meeting, Arcadia, CA.
Jan 2009	(§) *Un-modeled search for black hole binary systems in NINJA*, Gravitational Wave Data Analysis Workshop-13, San Juan, Puerto Rico. LIGO DCC:G0900019.

ONGOING RESEARCH PROJECTS

- Developing a matched filtering algorithm with Inspiral-Merger- Ringdown templates to search for intermediate mass binary black holes.
- Methods for combining multiple searches that target binary black holes.
- Applying gravitational wave burst searches to target low mass compact binary coalescences.
- Comparison of different search algorithm for the detectability of Inspiral-Merger-Ringdown signal.

MENTORING

2012	Mentored German exchange student Florian Weiser from Karlsruhe Institute of Technology, on higher modes detectability study on binary black hole merger.
2011 – 2012	Mentored former high school student Jackson Henry on three dimensional physics animations with python project.
2010 – 2011	Mentored former undergraduate Zachary Nemtzow on chirplet burst search analysis project.

2008 – 2009	Helped former undergraduate Sebastian Fischetti on omega burst search analysis of Inspiral-Meger-Ringdown waveform.

TEACHING EXPERIENCE

June 2010	Organizer of introductory Python workshop for University of Massachusetts, Amherst-LIGO group.
Spring 2008	Teaching Assistant for Prof. Narayan Menon, course: PHY 553, Optics lab (Physics majors).
Spring 2008	Teaching Assistant for Prof. Stephane Willocq, course: PHY132, Introductory Physics (Biology majors).
Fall 2007	Teaching Assistant for Prof. Lorenzo Sorbo, course: PHY 568/821, General Relativity (graduate and advanced undergraduate Physics majors).
Fall 2007	Teaching Assistant for Prof. Krishna Kumar, course: PHY556/715, High Energy Physics (graduate and advanced undergraduate Physics majors).
Summer 2007	Instructor for PHY152, Mechanics (Engineering majors).
Spring 2006	Instructor for PHY154, Introductory Physics Laboratory-II, Electricity (Engineering majors).
Fall 2005	Instructor for PHY153, Introductory Physics Laboratory-I, Mechanics and Optics (Engineering majors).
Spring 2005	Instructor for PHY133, Introductory Physics Laboratory-II, Electricity (Biology majors).
Fall 2004	Instructor for PHY134, Introductory Physics Laboratory-I, Mechanics and Optics (Biology majors).

AWARDS AND FELLOWSHIP

- LIGO-Virgo-Kagra Computing Award, 2022
- Best student poster prize, Amaldi9 - NRDA 2011, Cardiff University, 2009.
- Indian Academy of Sciences Summer Student Fellowship, 2003.
- Visiting Students' Research Program of Tata Institute of Fundamental Research, Mumbai, India, 2003.
- Best Graduate Award, BJB Autonomous College, Bhubaneswar, India, 2002.

REFERENCES

Dr. Warren Anderson
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LIGO Lab
Caltech
e-mail: anders15@caltech.edu

Dr. John T. Whelan, Associate Professor
School of Mathematical Sciences Center for Computational Relativity and Gravitation
Rochester Institute of Technology Rochester, NY
phone: 585-475-5083
e-mail: john.whelan@astro.rit.edu

Dr. Laura Cadonati,
Professor, School of Physics and Center for Relativistic Astrophysics
Georgia Institute of Technology
e-mail: cadonati@gatech.edu

Dr. Duncan Brown, Associate Professor
Department of Physics
Syracuse University, NY
e-mail: dabrown@physics.syr.edu

Dr. Chad Hanna, Assistant Professor
Department of Physics
Pennsylvania State University, PA
e-mail: crh184@psu.edu

Dr. Éric Chassande-Mottin, Researcher
AstroParticule *et* Cosmologie
Paris, France
e-mail: ecm@apc.univ-paris7.fr

Peter Couvares, Senior Scientist
LIGO Lab
Caltech
e-mail: pcouvare@caltech.edu