

# THE LAST VOYAGE OF ULYSSES

MATILDE MARCOLLI

It was a long voyage and a beautiful one. Our collaboration started almost immediately after I joined the MPI faculty in the summer of 2000 and lasted to the very end, with our two last joint papers posted on the arXiv less than a month before Yuri died. From the very beginning it was Yuri who started to refer to this as “the last voyage of Ulysses”, from Dante’s Divine Comedy, which he liked to read in the original Italian. If you download from the arXiv the source file of our very first joint paper “Continued fractions, modular symbols, and non-commutative geometry” (math/0102006), you will find it right there at the beginning, hidden by a % in the tex file, “*de’ remi facemmo ali...*”, the last voyage of Ulysses. We read that canto of the Divine Comedy together, and I memorized it to be able to recite it for him. He asked me a few times over the years.

We ended up with 25 joint papers, written over a span of 23 years, though several of them had in fact been concentrated in these last few years. Curiously, but perhaps not entirely surprisingly, we collaborated a lot more intensely after I left the Max Planck Institute and relocated in California, than we did during the years when we were both working in the same institute and we were seeing each other daily. The way I like to think of all these papers is as the outer windows to an inner space, to a very personal place, where a long dialog was unfolding through these two decades, a continuing conversation that cut across the boundaries of different fields and disciplines, across our distance in space and time, and the passing of the years. It was a very special and stable place, filled with its own very special affective as well as intellectual intensity.

We had been in the habit of spending New Year’s Eve together at his home in Bonn, every year since I first arrived in Bonn. We continued with our regular New Year events after I moved to California. Every year I was always returning to Bonn in December, right at the end of our Fall term, usually in time to give the last talk of the year in Yuri’s “Algebra, Geometry, and Physics” seminar, and I would stay until early January, when I made my return for the start of the next term at Caltech. I always tried to make sure to have something new for the talk I would be giving for him upon arriving in Bonn, something that would be different, surprising, entertaining. Year after year, I brought back cosmology, linguistics, information theory, and various unexpected motivic incarnations. During those winter breaks, Yuri and I would finish up our current ongoing project (many of our papers are posted to the arXiv on the first of January) and we would start discussing the next thing to think about. We met everyday to work together, including on Christmas day, first mostly at the MPI and in the later years mostly at his home. Sometime a new project started in relation

---

*Date:* 2023.

to whatever little mathematical trophy I was bringing back from my previous year in California: that's how we ended up writing our own linguistics paper in 2016, for example, just after I had taught my first linguistics class at Caltech in 2015 and written my first linguistics papers out of that experiment. Other times a new idea came up as a way of returning to previous conversations that had remained dormant for some years. To me it always felt like going home, to a unique place that was always reliably there... until that one time when suddenly it was forever gone.

In Homer's *Odyssey* the voyages of Ulysses draw a chart of encounters with the multiform liminal creatures of Greek mythology, composite figures that cross the designated boundaries of the realms of nature, the human, the animal, and the divine. Our mathematical cartography is usually similarly split into supposedly impenetrable boundaries, and yet there too a pantheon of hybrid chimeras can be envisioned, tantalizing, elusive, luring like the siren's song: noncommutative boundaries of arithmetic varieties, fields with one element, holography from Arakelov geometry, phase transitions and noncomputability in spaces of codes, categorized dynamics of neuronal networks, modular and elliptic curves in cosmology, Grassmannian semantics, and other such magical creatures. In Dante's last voyage, Ulysses sails right through the pillars of Hercules, the established and impassable frontier of the system of knowledge of the ancient world, embarked on a heroic, but not solitary, intellectual quest. The voyage ends tragically in a final storm, with the rising mountain of the netherworld looming large on the distant horizon.

There was no grandiose plan guiding our long voyage of exploration, no holy grail hypothesis to chase. It was a peaceful state of meditation, a voyage of curiosity rather than a conquering campaign. It meant a lot to me to be able to finally discover, through our joint work, that mathematics does not need to be a bloody battlefield out there, does not have to be governed by aggression, territoriality, violence, like I have too often experienced it elsewhere. It can also be that peaceful shared inner space and that long shared voyage of discovery beyond *"dov' Ercule segnò li suoi riguardi acciò che l'uom più oltre non si metta"*.

CALIFORNIA INSTITUTE OF TECHNOLOGY, PASADENA, USA  
*E-mail address:* matilde@caltech.edu