Nalini Anantharaman at the French Academy of Sciences: the world as seen through the theorem

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A researcher from the Institute for Advanced Mathematical Research (IRMA) is among the 18 newly elected members to the French *Académie des sciences*. Let us look back at Nalini Anatharaman's career in mathematics.

It was already late in the evening when Nalini Anantharaman learned of the news. "It was the 18th of December, the day when the university's website was down, and I hadn't been able to see the mail informing me of my nomination. My mother, who has a friend at the Academy, phoned me to congratulate me, it was then that I knew", recalls the researcher from IRMA, very moved by this recognition of her work that she was not expecting at all.

Nalini Anantharaman's work includes wave propagation in the context of random geometry. Photo MR

Nalini Anantharaman was born into a family of mathematicians and grew up with equations. During her first year at the *École normale supérieure*, she studied mathematics and physics before opting definitively for the former, preferring the theoretical side of mathematics to the experimental side of physics. "Mathematics is to physics what music is to poetry, and in neither case do we need words. Our way of understanding what surrounds us is the theorem", reveals the 44-year old researcher, who has been playing the piano since a very young age and is shy about language.

Quantum physics and spectral theory

During her thesis work at the University of Paris VI, Nalini Anantharaman became interested in geometric issues on negatively curved spaces. When she was appointed as a senior lecturer in Lyon, physics was coming to the fore again in her research. "I was asking myself questions about wave propagation linked to the geometric characteristics of their environment".

After five years, Nalini Anatharaman was recruited by the French National Centre for Scientific Research (CNRS). She worked at the *École Polytechnique* and, following that, at Paris XI University, before settling in Strasbourg with her husband, also a mathematician. "Here I am setting up a small team that is working on themes including dynamical systems, quantum physics and spectral theory." What does she value at IRMA? The freedom to divide her time between pure mathematics and applied mathematics.

This passionate mathematician admits she never cuts off completely. “If an idea comes to me, I will note it down on a napkin or metro ticket”, says Nalini Anantharaman, smiling. She recalls one week when she was suffering from a sprain and decided to make the most of her imposed rest to read comics. In the end “my mind was working a little in spite of myself and my thoughts fell into place, even if I wrote nothing, as I only do that when I am convinced that I’m on the right track”.

“Having the impression of understanding everything stifles progress in research”

Nalini Anantharaman is persistent and adept at slow mathematics, nurtures humility and likes to dig deep into subjects. She has been known to spend two years trying to prove a theory without being able to stop. “Just reading an article can sometimes take me a full day for two pages. One must acknowledge that we do not know everything and devote the time necessary to a topic. As far as I’m concerned, having the impression of understanding everything stifles progress in research.”

With regard to her projects, Nalini Anantharaman is working with a doctoral student on wave propagation in the context of random geometry. This is a challenge that is added to this new appointment. “The Academy will enable me to have a more political activity with the possibility of participating in different working groups on themes such as climate. It’s very exciting for me to think that in 20 or 30 years I’ll still be there.”

Marion Riegert

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