Getting to know... Jean-Pierre Luminet

As a scientist, Professor Jean-Pierre Luminet is renowned in the field of astrophysics as one of the first to study the effect of a star passing close to a supermassive black hole, and his theory on the 'wraparound universe' has earned him notoriety.

An artist, poet, musician and author, Luminet has used all available mediums to share his passion for science. Here, *Public Service Review* probes what drew him to astrophysics, and why he thinks it is important to communicate science in an accessible way...

Where did your passion for science come from?

As a schoolboy I was interested in many things, especially music, painting, literature and poetry. I also liked mathematics because it seemed easy to me, so I followed the usual path in the French education system: a scientific degree. It was only during my fourth year of graduate studies that I read by chance an excellent book popularising cosmology, and I realised that fundamental research could be as creative and imaginative as art or literature. It was then that I decided to pursue a career in astrophysics and cosmology. I have always been interested in the things we don't see, in trying to understand the invisible architecture of the universe, and as a theorist as opposed to an astronomer, I am attracted not by the universe as it actually is, but by what it could be.

Who or what inspires you?

Since I was a teenager, my inspirations have come from very wide-ranging fields, including art, music and philosophy, in addition to geometry, of course. It was perhaps my encounter with Greek thinking that led me onto the path of science: without any practical resources, philosophers such as Heraclitus and Parmenides tried to free themselves from pure myth and to understand the universe rationally, whilst endowing it with poetic and metaphysical properties. Indeed, in nearly every culture, philosophers, scholars or artists have supplied various explanations about the size, the origin and the fate of the universe and of its contents. Modern astrophysics and cosmology try to answer these questions by combining mathematical reasoning, physical models and astronomical observations. And they do it rather successfully, with Big Bang models, black holes, high-energy physics and so on.

You are noted as being an exceptional communicator in the field of science. How important is it to make science accessible and interesting to the public?

The challenge of science communication is to make very complex and abstract concepts understandable, not only to leaders and managers but to children as well. I feel it is important to put forward the new paradigms offered by modern science and so encourage all of society's stakeholders to take on board new ideas.

I try to communicate my enthusiasm via a variety of media such as books, exhibitions, television, music or the plastic arts. I have always believed in the links between the various forms of human creation, and I am deeply convinced that different approaches – whether scientific, artistic, philosophical or otherwise – give rise to different perceptions of the world, but with an underlying common imaginary element.

How has your work in astrophysics changed the field?

Firstly, let me be modest in saying that some of my works have indeed contributed to clarify a few aspects of astrophysics, but have not actually changed the field. In cosmology for instance, I started a new domain of investigation called cosmic topology, with the concept of a 'wraparound' universe. This metaphor aims to convey the idea that, even if the universe is finite, it has no boundaries, and its shape can be so complex that it generates multiple images from distant objects across the sky.

When I introduced this concept in the 1990s, it was met with scepticism from my colleagues. However, following analysis of anomalies in the Wilkinson Microwave Anisotrophy Probe satellite data on the cosmic background radiation in 2003, I further proposed that the universe was positively curved with the same shape as a dodecahedron, and dozens of people began to work in cosmic topology.

What is the most interesting thing you have discovered through your research?

Apart from my proposal of a wraparound universe (which is still a hypothesis and not a discovery), I have worked a lot on astrophysical properties of black holes.

In 1979 I published the first computer-generated image of a black hole accretion disc, which quickly became a classic. Just after that, I investigated the observable effects of a star passing so close to a supermassive black hole that it is violently destroyed by gigantic tidal effects. Such a phenomenon was observed some 20 years later by high-energy space telescopes.

What has been your biggest challenge to date?

Most of the concepts and results of modern cosmology are in contradiction with 'common sense', for instance, the idea that finiteness implies limits. Such an argument is flawed, because it relies on propositions coming from supposed common sense, which is indeed mathematical ignorance. Another example is the belief that the real universe is necessarily greater than the observed one – an idea invalidated by the models of a wraparound space. Thus common sense is only an argument of authority for those ideas shared by the greatest number. The fight against this is, for me, the greatest challenge for scientific knowledge.

Other challenges are important and simpler to explain: to help stimulate interest in science, promote the understanding of scientific progress and its implications in wider society, boost scientific culture, and encourage young people to take on scientific careers.

What is your greatest achievement?

Until now, it was to keep non-scientific creation as an integral part of my scientific creativity. My drawings and my poetry reflect some of my questions about space and topology. Music is without a doubt my greatest involvement. I collaborated with Gérard Grisey (a former pupil of Messiaen and Dutilleux) to produce a piece of cosmic music called Le Noir de l'Étoile. This work for six percussionists, magnetic tape and astronomical signals coming from pulsars has become a classic of contemporary music and is regularly performed around the world.

What are your plans for the future?

I hope to maintain enough time and energy to still be creative as an astrophysicist and cosmologist, as well as a writer, artist and communicator. I am profoundly attached to the idea of the prominent role of Europe in the field of knowledge, and I plan to further illuminate the richness of European culture and the clear place of science within it.