

Pushing the physics envelope

Canada's new Perimeter Institute is planning to apply the risk-taking approach of venture capitalism to the pursuit of theoretical physics, says David Spurgeon.

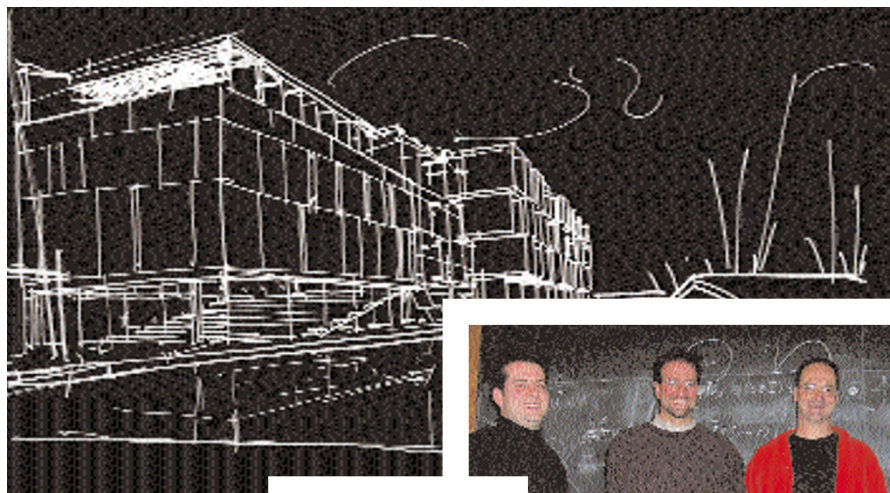
When Mike Lazaridis was a boy growing up in Windsor, Ontario, he was fascinated by physics. But when he went to the University of Waterloo he chose to study engineering, for the simple reason that there weren't enough job opportunities in physics.

Now, having made his fortune as president of a company called Research In Motion, which makes wireless Internet devices, Lazaridis has returned to his first love. In October 2000, he announced a gift of Can\$100 million (US\$63 million) to establish the Perimeter Institute for Theoretical Physics, supplemented by Can\$20 million from two other executives at Research In Motion (see *Nature* 408, 125; 2000).

One year later, as the institute's first recruits start settling into their temporary quarters in Waterloo's old post office, they are hoping to apply Lazaridis's entrepreneurial spirit to some of the most difficult questions in physics. "The institute was explicitly created to encourage young, innovative scientists in their research prime to pursue issues that are often deemed 'too hard' and 'only to be done after procuring tenure,'" says Howard Burton, its executive director. Perimeter scientists will tackle notoriously thorny problems in areas such as quantum gravity, quantum information theory, elementary particles and cosmology.

For Lee Smolin, the risk-tolerant environment promised by Lazaridis and Burton was instrumental in his decision to join the institute. In fields such as his speciality of quantum gravity, Smolin believes scientists can learn from high-tech industry, where venture capitalists typically look for a 10% success rate. "It would be much better if we could work in an environment in which we're perfectly honest about the risks we take," says Smolin, formerly of Pennsylvania State University and Imperial College London. "One of the things that particularly excites me about Perimeter is the willingness to not only accept such risk, but actually to embrace it."

Smolin argues that most academic physics departments also suffer from narrow specialization — usually including representatives of only one theoretical approach to a particular problem. In trying to devise a theory of quantum gravity, for instance, there are two main approaches. The first, string theory, aims to unite gravity with the other forces of nature by viewing all fundamental particles as infinites-



imal vibrating strings. The second seeks to make the geometrical view of spacetime proposed in Einstein's theory of general relativity compatible with quantum mechanics by invoking similarly tiny geometrical entities called loops.

"Unfortunately, there are places where one approach or another is dominant," says Smolin. But at Perimeter, he says, both will be represented equally. And the institute is looking for recruits from either camp who are sympathetic to the views of the other — Rob Myers, for instance, a Perimeter Institute string theorist formerly of McGill University in Montreal, also has a strong background in general relativity.

Thinking space

Construction of a permanent home for Perimeter should begin next February on a site donated by the city of Waterloo, overlooking a lake and park a few minutes' walk from the city's university. The architects plan to achieve a harmonious balance between private spaces for quiet contemplation and calculation, and public areas for discussion.

Interaction is a watchword for the Perimeter Institute. "The areas we're working on at Perimeter all have a common theme, in that they're looking at the foundations of physics," says Myers. "The potential for interactions between all these diverse fields is the important aspect." To help this, the institute is trying to hire theorists with a polymath bent, such as Fotini Markopoulou, who comes to Perimeter from the Albert Einstein Institute in Potsdam, Germany, and has worked in quantum gravity, quantum cosmology,



Physicists (from left) Michele Mosca, Howard Burton, Rob Myers and Raymond Laflamme have all joined the Perimeter Institute, founded by Mike Lazaridis (inset).

causality, quantum computing and logic.

Currently, the institute has seven members — three permanent staff and four postdocs. Within seven years, the new building should house some 40 resident physicists and postdocs as well as about 30 visitors and associate members. Its first associate members are Raymond Laflamme and Michele Mosca, experts in quantum information theory at the University of Waterloo.

"They're off to a good start," observes University of Oxford mathematician Roger Penrose, a member of the institute's scientific advisory board. "Of course, it depends on how the recruitment goes from now on, but I expect Perimeter to do well."

The institute has already launched a high-school outreach programme, and recently initiated a public lecture series. By creating jobs for theoretical physicists and reaching out to schoolchildren, Lazaridis hopes that the institute will encourage budding physicists to stick with the subject, rather than being diverted as he was along other — admittedly more lucrative — paths. "Perimeter is an attempt by me and my colleagues to say physics really matters and that there are people in the community who really understand its importance and are willing to step up and fund it," he says. ■

David Spurgeon writes for *Nature* from Montreal.

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