

Ideas on the Edge



Deciphering the Wall

SCIENTISTS AT WATERLOO'S PERIMETER INSTITUTE ARE SEARCHING THE PUZZLING WORLD OF THEORETICAL PHYSICS FOR FUNDAMENTAL INSIGHTS THAT MAY ONE DAY HAVE SURPRISINGLY PRACTICAL APPLICATIONS.

The south façade of Waterloo's Perimeter Institute for Theoretical Physics tells you a lot about the problems the people inside are working on. And the inside tells you a lot about how those problems may ultimately be solved.

The wall is an imposing black plane, pierced by apparently random blocks of windows. It's as if a giant, impenetrable code has been embossed on the surface—an apt reflection of the daunting challenges that face today's theoretical physicists as they seek to understand space, time, matter

Perimeter Institute's new building, opened in 2004, was designed by the Montreal architecture firm Saucier + Perrotte. The design has won a Governor General Medal In Architecture.

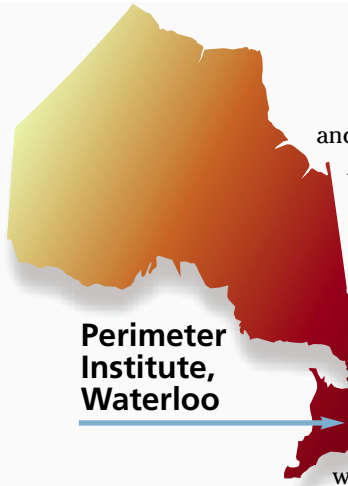
and information at the most basic level. The search for a unified "theory of everything," pursued most famously by Einstein in the last century, has yet to produce any satisfying results. Some of the esoteric concepts being investigated at the Institute—superstring theory, quantum gravity, quantum information theory—offer promising windows of understanding, but there's still no complete and coherent picture of how the universe works.

If any such picture is going to emerge, it will likely

RESEARCH THAT MATTERS REAL-WORLD BENEFITS FOR ONTARIANS:

- exposure of young Canadians to world class scholars, helping to develop home-grown innovators for all areas of society
- potential for fundamental insights vital to development of future technologies

happen through a combination of brilliant individual insight and intense collaboration. Perimeter Institute is designed to foster both. The light-filled interior offers fiftysome resident researchers—plus 300 visiting scholars each year—a soothing, cocoon-like environment for contemplative thought



Perimeter Institute, Waterloo

and complex calculation. And in a telling gesture, there's no system of clocks on the walls.

Insights like Einstein's don't happen on a schedule. Nor are

they likely to happen in isolation. That's why the Institute's new

building—funded in part by an investment from the Ontario Innovation Trust—also offers plenty of space for both formal and informal interaction. Blackboards are scattered through the hallways to enable the quick interchange of ideas. There are comfortable lounge areas, espresso machines, and a bistro—plus two seminar rooms and a 205-seat lecture theatre. If the Institute is about having ideas, it's also about sharing them.

Why devote such significant resources to questions that seem to have no connection to daily life? The short-term reasons include attracting the world's best minds to Canada, and seeding society with new generations of deep thinkers. But there's a solid long-term rationale as well: apparently abstract theories often lead to very practical applications. One example is the work of the



Project: Perimeter Institute for Theoretical Physics
Research Sector: Natural Sciences
Principal Investigator: Howard Burton
Trust Investment: \$5,624,892
CFI Investment: \$5,624,892
Total research investment from all sources: \$21,788,010



The Institute's mandate includes a multi-faceted outreach program that reaches students, teachers and the general public across Canada and around the world. EinsteinFest, 2005 (pictured), attracted over 28,000 to the Institute in a span of three weeks.

Scottish physicist James Clerk Maxwell. In the 1860s, Maxwell was the first to successfully describe a unified understanding of the forces of electricity and magnetism. At the time, it was a purely theoretical insight. But over the decades that followed, Maxwell's equations provided the foundation needed to launch the communications revolution that defined the twentieth century.

It's hard to predict what new, fundamental knowledge will emerge from Perimeter Institute or how others will apply the ideas to society, but that doesn't keep the scientists here from patiently searching the dark and difficult field of theoretical physics—like an admirer scanning the south façade—in the firm conviction that the quest will be rewarded.



Ontario Innovation Trust

MaRS Centre, Heritage Building
101 College Street, Suite HL20
Toronto, ON M5G 1L7
416-977-9188 Fax: 416-977-9460
innovation@oit.on.ca
www.oit.on.ca

Infrastructure for Innovation About the Ontario Innovation Trust

The Ontario Innovation Trust was created in 1999 by the Government of Ontario to invest in research equipment and facilities at Ontario's universities, colleges, hospitals and other non-profit research institutions. The Trust is governed by a volunteer Board of Directors, according to the terms of a Trust agreement established by the Ontario government. A small permanent staff looks after day-to-day operations.

Since its inception, the Trust has committed almost \$843 million to strengthen Ontario's position in the global marketplace of ideas. This represents more than a third of the \$2.44 billion in total funding that has been invested in Trust-supported projects.