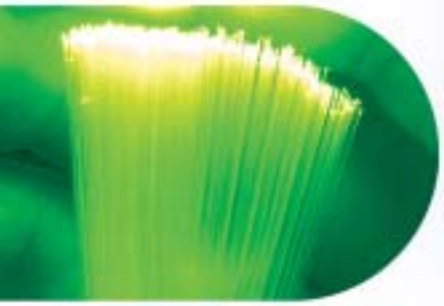

Government of Canada / Gouvernement du Canada

# photonics

## Discover Innovative Canadian Capabilities

### Moving at the Speed of Light: Photonics in Canada

#### Now and in the Future — Nothing Beats Light

Few things are more familiar than light. But only recently have we begun to harness and exploit the dramatic opportunities that light provides — through the technology known as photonics, a field which encompasses lasers, fibre-optics, opto-electronics and optical devices. Photonics is a key enabling technology for the Internet and other information and communications technologies (ICT) applications, and even more advanced applications are now being developed in new areas like biophotonics and nano-photonics. Photonics promises to provide exciting new products and services in areas ranging from ICT and manufacturing to bio-medicine, and from defence and security to entertainment.

#### Canadian Companies Lead the Way

Canada has a long tradition of pioneering excellence in photonics. For example, Canadian photonics expertise helped build the foundations of today's Internet and broadband revolutions. Today, hundreds of Canadian photonics companies, large and small, continue to impress world markets with the introduction of new technologies and integrated solutions for the business, scientific, technical and medical needs of the future. With the growth of e-commerce, the global spread of the Internet, the explosion of worldwide data flows and the continuing deregulation of the world's telecommunications sector, Canadian photonics will continue to flourish and maintain its position as a global leader.

#### Northern Lights Across Canada

While Canada's leadership in light-based communications devices and technologies is well known, we're also on the cutting edge of other emerging applications as well. More than 250 Canadian firms include world pathfinders in areas as diverse as:

- biophotonics and photo-dynamic therapies
- security devices and technologies
- ultra-high-bandwidth fibre-optics
- micro-optical components and modules
- hybrid electro-optical technology
- optical network-testing equipment
- optical switches and sensors
- security and military applications
- environmental monitoring

- Canadian global industry leader **Nortel Networks** offers leading-edge Internet and communications solutions, with exceptional capabilities in optical long-haul networks and photonics. The Brampton, Ontario, company serves the existing and emerging needs of service-providers, carriers, small and medium-sized businesses and large corporations in more than 150 countries around the world.
- **JDS Uniphase** of Nepean, Ontario, sets the market standard in the design, development, manufacture and distribution of advanced fibre-optical products for the telecommunications and cable-television industries.
- A laser-scanning system, developed by Ottawa's **Neptec Design Group**, is enhancing the Space Vision System, also created by Neptec, which has been used on over 20 Space Shuttle missions.
- Canadian companies like **QLT**, **DALSA** and **Ricochet Laboratories** have developed advanced medical applications offering real-time, non-invasive views of the interior of soft tissues, therapies for macular degeneration, and the largest and most sophisticated charged coupled devices (CCDs) for imaging in the world.

Canada

## Canadian Photonics Research and Development — Building Tomorrow's Successes on Today's Achievements

Photonics research and development (R&D) in Canada is second-to-none — already extensive, and promising to increase substantially. Canadian educational institutions provide a steady flow of superbly qualified graduates, from world-leading post-doctoral research fellows to the highly trained technicians required by successful businesses. Our photonics R&D community collaborates in innovative new ways to speed the transformation of basic science to new and marketable advanced photonic materials, components, equipment and networks. Canadian developments in photonics R&D are making the scientific, technical and business communities sit up and take notice:

- The **National Research Council** and the **Communications Research Centre** explore frontiers in nano-photonics, quantum-dot devices, single-molecule optical motors, and optical-communications technologies — and are well advanced in the launch of new photonics research facilities. New facilities at the **National Optics Institute** are up and running, and producing a range of prototypes for new imaging devices and security products.
- Canada offers the most highly developed optical infrastructure in the world. **CA*net 4** is poised to be the most advanced optical research-and-innovation Internet anywhere, and other experimental networks like **Synaps**, **Orion** and **Dark Fibre Networks** are fast transforming optical visions into reality. Canada's **"Smart Communities"** are already part of the optical Internet in every province — and all can easily integrate with advanced Canadian wireless, optical wireless, and satellite communications systems that span the globe.
- A research team at **Simon Fraser University** has developed an experimental lightning-fast transistor that allows fibre-optic transmission of up to 100 billion bits per second — up to 40 times faster than the most widely used systems today.
- **Community colleges** offer programs in close collaboration with the industry, ensuring that sectoral needs are readily understood and rapidly met. Examples include photonic certification programs under way in Ontario and British Columbia, and photonics technologies and technicians programs being offered by Ontario technical colleges.

## Exciting Partnerships, Nationwide: Prosper in a Dynamic and Synergistic Photonics Environment

In Canada's extremely supportive business environment, industry, governments and academia forge partnerships for success. An outstanding characteristic of the Canadian photonics sector is its organization in geographical clusters of activity — magnets for similar enterprises and skilled personnel. Clusters generate new business relationships, allow communities of interest to evolve and identify opportunities, and to develop supply-chain and market channel relationships. Clusters link business to local universities, research institutes and governments — they're an effective vehicle for public–private partnerships, and an arena to generate plans that foster and promote the industry.

Photonics clusters in Vancouver, Toronto, Québec City, Ottawa and Montréal all have significant and growing concentrations of companies, research laboratories and academic institutions, whose various strengths contribute to photonics development. The Ottawa cluster, already considered *the* global leader in photonics R&D, got a major boost in May 2001, when the National Research Council announced plans to construct a $40-million Canadian Photonics Fabrication Centre, a manufacturing facility intended to cement Ottawa's position as "the photonics centre of the world."

## Photonics in Canada: We Have the Products, Services — and Opportunities!

Photonics technology is both creating new industries and changing the way old ones operate — in traditional fields, and in telecommunications, medicine and biology, and imaging display. When the full potential of photonics is realized, the impacts will be felt for decades, and will transform commercial activity in fields from communications to manufacturing, medicine to energy, resource management to transportation.

Canadian companies are already making it happen, and firms and governments from around the world are taking advantage of Canadian expertise and products. There are many ways in which Canadian photonics can help pave the way to your company's success. Or, if you're looking for opportunities in Canada, your business can be part of a vibrant sector that is looking forward to meeting the exciting challenges of the future.

Want to know more? Laser in on Industry Canada's Web site (**http://strategis.gc.ca/infotech**).

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