OUR NEW MAGNETIC ATTRACTION

SFU’s new nuclear magnetic resonance (NMR) facility in the Department of Chemistry was officially opened at a ceremony in October. Among the many attendees, special guests were BC Member of Parliament Mark Warawa and North Burnaby MLA Richard Lee. No one was prouder than SFU Vice-President, Research B. Mario Pinto, one of the faculty members who’ll use it. When he’s not taking care of his administrative responsibilities, Dr. Pinto studies molecular topography for drug and vaccine design.

“The new system will allow us to push back the frontiers,” says Dr. Pinto. “We’ll use it to determine the structure of proteins or see how a particular protein binds to its substrate. In my field you keep striving for increased sensitivity, and this system, enhanced by its two cryogenic probes, gives us far more sensitivity than we had previously. We’ll look at molecules or cell surfaces, and see how molecules interact with cells or with each other. We’ll trace cancer bio-markers on cell surfaces. We’ll observe how antibodies react with vaccine candidates. The NMR spectrometer will also enable SFU scientists such as Dr. Rob Britton to study minute quantities of natural products, such as pheromones and toxins. It will be a great resource for the regional Centre for Drug Research and Development, and will be used extensively by SFU biochemists, chemists and molecular biologists, as well as by BC’s biotechnology and pharmaceutical development firms on a fee-for-service basis.”

Western Economic Diversification Canada contributed $700,000 to the cost of acquiring the NMR spectrometer. Known by the brand name AVANCE, it was manufactured to SFU’s specifications by Bruker BioSpin Ltd., an Ontario company. The cryogenic probes were partially funded by the Canada Foundation for Innovation through a grant to Dr. Britton.

Company President Henry J. Stronks, who attended the official opening, explains how the complex system was built. “The 14-Tesla magnet (600 MHz) contains approximately 100 kilometres of superconducting wire,” he says. “First, the wire is hand-wound on a series of five or six bobbins assembled together in a concentric fashion. The completed magnet assembly is baked at 700 degrees Celsius for six or seven weeks in a specially designed oven. The baking procedure allows the external bronze matrix of the wire to react with the internal strands to form a superconducting conduit of wire. The complete coil is immersed in a heated paraffin wax chamber for several weeks to ensure strength and rigidity. Next, the spool of wire is welded into a unit called a ‘Dewar,’ which is then filled with liquid helium. At liquid helium temperatures (4.2 Kelvin) the wire becomes superconductive. Now we can send a current of approximately 100 amps into the wire to create a superconducting magnet. Each magnet is tested extensively at the factory and the whole process

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At SFU we are proud of the many ways in which we are engaged with our communities. In this issue I am very pleased to tell you about some of our recent agreements to foster collaborative research with community partners.

**Health Authorities**
Within our Health research theme, many SFU faculty members are conducting research on chronic and infectious diseases. New SFU discoveries and development of platform technologies in imaging science and in materials science and devices also have exciting applications in health. The initial foci of our recently established Faculty of Health Sciences are on population and public health, and global health. To maximize the impact of this work, SFU has signed research affiliation agreements that provide an enabling framework for collaborative research with partner agencies in our local communities: the BC Cancer Agency, the Fraser Health Authority, Genome BC, the Provincial Health Services Authority, and the Vancouver Coastal Health Research Institute.

**Government Agencies**
The BC Ministry of Health has signed an agreement with SFU to share data and provide support of almost $2 million over the next three years for the work of the Centre for Applied Research in Mental Health and Addiction [www.carmha.ca](http://www.carmha.ca). CARMHA’s mandate is to conduct research that can be applied to enhance the effectiveness, efficiency, and quality of mental health and addiction services in British Columbia. Also within the Health research theme, the Children’s Health Policy Centre at SFU [www.childhealthpolicy.sfu.ca](http://www.childhealthpolicy.sfu.ca) provides key support to the BC Ministry of Children and Family Development in the area of integrating research evidence into policy and practice for child and youth mental health services. SFU has a five-year research agreement with the Ministry for over $3.5 million to support the work of the Centre. In the Spring 2006 issue of Research Matters, we featured the agreement with the BC Ministry of Public Safety and the Solicitor General that provides support for two SFU research chairs and graduate students in criminology to help the RCMP improve its ability to prevent and reduce crime.

**Private Sector**
Also in the area of criminology, where SFU has special research strengths, we have just signed a strategic relationship agreement in computational criminology and crime analysis with IBM Canada Ltd. With a total value of almost $5 million, this agreement provides for an ongoing relationship with the IBM Centre for Advanced Studies and the development of a Crime Analysis Centre at SFU as the focal point for collaborative research in computational crime analysis. We have also received a $100,000 donation of hardware from Sun Microsystems Inc. for computationally secure research in the areas of crime prevention, computing and health.

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**SFU’s Recent CFI Successes**

Universities across the country look forward to the regular infrastructure funding announcements from the Canada Foundation for Innovation (CFI), and SFU is no exception. When the awards were announced in mid-November, Vice-President, Research B. Mario Pinto had every reason to be proud. “If you look at CFI’s Leaders Opportunity Fund awards, for example, you can see how well our young faculty members are doing,” he says. “Winners include Robert Britton in Chemistry, Lisa Craig in Molecular Biology and Biochemistry, Max Donelan in Kinesiology and Paul Haljan in Physics. This speaks well of SFU’s recruiting skills and our high standards of scholarship and research.”

Then there’s SFU’s increasing participation and prominence in national and regional research consortia, two of which received CFI awards from the New Initiatives and National Platforms Funds. Both involve SFU and TRIUMF.

Opened in 1974, TRIUMF is the particle and nuclear physics research facility located near the UBC campus in Vancouver, and is among the oldest of all SFU consortia (we were a founding partner). CFI will contribute $2.5 million toward a new muon beam line at TRIUMF. Muons are subatomic particles that can be used to probe extremely small, local magnetic fields of electronic or nuclear origin, in any form of matter. Sixteen Canadian universities support the muon beam project, which is led by SFU chemist Paul Percival.

On another front, SFU physicists Mike Vetterli (also a member of TRIUMF) and Dugan O’Neil are leaders in Canada’s participation in ATLAS, a detector being built to observe particle collisions at CERN’s accelerator in Switzerland. “Every collision..."
AN ANTIDOTE TO TERROR

Burnaby-based Twinstrand Therapeutics www.twinstrand.com was recently awarded a two-year, C$2.2 million contract by the US Department of Defense to develop a human polyclonal antibody to ricin poisoning. A protein derived from the castor bean plant, ricin has toxic properties that give it a dual character. Years ago, Twinstrand’s President and CEO, former SFU chemistry professor Thor Borgford, recognized its potential as a cancer-fighting agent. Indeed, the company was formed originally to exploit that potential. Those same properties have also made ricin a lethal bio-terror agent.

“We’ve already made great strides in the development of the ricin antidote, even though the contract was awarded just last September,” says Dr. Borgford. “In fact we expect to begin a Phase I safety trial on human volunteers early this year.” The company was able to move quickly because it had the necessary research infrastructure in place and molecules available for generating the antidote.

“I’m proud of Twinstrand’s history, our origins in rented space at SFU, and the progress we’ve made thanks to help from colleagues in the Departments of Chemistry and Molecular Biology and Biochemistry,” he says. “What was a rudimentary idea just eight years ago has produced a cancer drug already in human clinical trials, and a spin-off antidote about to be tested.”

ACTIVEPIXEL INNOVATIONS

This is the brainchild of engineering professor Karim Karim and his STAR (Silicon Thin-film Applied Research) lab team. They’ve developed several integrated circuit designs that improve picture performance while reducing the radiation dose in flat-panel medical X-ray imaging. For health care providers, the Hybrid Active Pixel system can mean better diagnostic tools, improved interventions, reduced costs and the ability to provide services not previously possible.

Technology manager Elmer Sum, based at SFU’s downtown TIME Centre, worked with Dr. Karim in establishing the new company. The process included identifying the intellectual property and filing patent applications; selecting a specialist with the business and entrepreneurial skills for business development; negotiating an agreement with the University, Dr. Karim and the entrepreneur; and advising on the business plan. Mr. Sum also sponsored an ActivPixel presentation to VANTEC, the Vancouver angel investment community.

RIBOSEN TECHNOLOGIES

Chemistry professor Dipankar Sen has developed a way to build DNA-based sensors that detect and quantify small molecules. “Two properties of DNA combine to make it a good sensor,” he explains. “First, it can conduct a small electrical charge. Second, we can make customized DNA molecules that act as receptors that bind specifically to molecules we choose on demand.”

With Technology Manager Ziba Afshar’s help, Dr. Sen and his colleague Dr. Hogan Yu secured UILO Prototype Development Fund and NSERC Idea to Innovation (I2I) grants to advance the technology to the prototype stage. Ms. Afshar helped them apply for patents, secure seed funding, set up the new company RiboSen Technologies, and find a CEO. “Our goal is to make novel bio-sensors for monitoring disease-related markers, as well as environmental pollutants,” says Dr. Sen.
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produces 1.5 megabytes of data,” says Dr. Vetterli, “and the system can detect some 200 collisions per second. So, in a year, we’ve collected up to 4.0 petabytes of data for analysis. If that data were stored on CDs laid on top of each other, the stack would be ten times the height of Toronto’s CN Tower!”

Actually the data are stored on hard drives and computer tape located at specially-equipped sites across Canada and around the world. SFU’s membership in the WestGrid high-performance computing network, run by a consortium of western Canadian universities, enables researchers including Drs. Vetterli and O’Neil to access the ATLAS data. CFI’s November 2006 announcement included $20 million for WestGrid, of which close to $2.9 million is earmarked for SFU, and $8.2 million for the ATLAS data analysis centre to be housed at TRIUMF. Matching funds of over $4 million for the ATLAS project have now been confirmed from the BC Knowledge Development Fund.

For more information, visit these Web sites:
CFI: www.innovation.ca
TRIUMF: www.triumf.ca
CERN: www.cern.ch
ATLAS: http://atlasexperiment.org or http://hep.phys.sfu.ca/atlas/
WestGrid: www.westgrid.ca

TRIUMF is one of only a few sites in Canada that are part of the worldwide computing grid for the huge ATLAS particle physics experiment at CERN’s particle accelerator complex in Switzerland. (Image from Google™ Maps, extracted by Reda Tafirout, TRIUMF Research Scientist)
NEW INTERDISCIPLINARY CENTRE AT SFU SURREY

Decision-making can be tough. Fortunately, in many situations, applied mathematics can help. That’s what SFU’s new Centre for Operations Research and Decision Sciences is all about. Established in 2006 and based at SFU Surrey, the Centre brings together people from Faculties and departments as diverse as Business Administration, Resource and Environmental Management, Health Sciences, Computing and, of course, Mathematics and Statistics.

Operations research, as defined by the Institute for Operations Research and the Management Sciences, is “the discipline of applying advanced analytical methods to help make better decisions.” It uses techniques such as mathematical modelling to analyze complex situations. This enables executives to make more effective decisions because they have access to more complete data, better information on options, outcome predictions and risk, plus the latest decision tools and techniques.

Centre Director Abraham Punnen and his colleagues are involved in research on transportation, medicine, telecommunications, healthcare, forestry and government. “Research Associate Dr. Snezana Mitrovic-Minic and I are working on a project with BC Ferries to deal with optimizing their current operations and assisting in long-range planning,” he says. “We have a MITACS project on facility location optimization [MITACS is an SFU-based national Network of Centres of Excellence with an applied mathematics theme], and we are currently focusing on specialized vehicle routing and scheduling operations for another client. We’re continually exploring opportunities to work with government, companies, granting agencies and other research organizations.”

Dr. Punnen is confident that the new Centre will put SFU Surrey on the research map in a significant way. Two recent faculty appointments in operations research are Dr. Tamon Stephen, a University of Michigan graduate, and Dr. Zhaosong Lu from Georgia Tech. Dr. Punnen and his colleagues are exploring the possibility of an interdisciplinary graduate program in operations research and decision-making.

Meanwhile, for three days in January 2007, the Centre played host to the 2nd International Conference on Algorithmic Operations Research. The conference brought together researchers, practitioners and graduate students from several countries for three days of lectures, seminars and related activities.

BEING #34 ON THIS LIST IS AN HONOUR

The Milken Institute is a US-based think tank that publishes a regular review of the commercialization of university biotechnology research. It doesn’t restrict its view to the USA or even North America; it looks at hundreds of universities around the world, and ranks them according to the data it collects. In the latest survey, SFU ranked 34th overall on the Milken University Technology Transfer and Commercialization Index – right behind the University of Toronto. Harvard topped the list, followed by the University of Tokyo and the University of London.

“In some categories, we ranked at or near the top,” explained SFU Vice-President, Research B. Mario Pinto. “For instance, in the period 2000-2004 we were fourth overall among US and Canadian universities in invention disclosures per million dollars of research expenditure. That was the highest of any Canadian university. And when the Institute surveyed the number of start-up companies created in that same period per million dollars of research expenditure, we topped the list. We also came first in the number of startup companies created per patent issued. Not bad for a university that just marked its 40th anniversary!”


MAGNETIC ATTRACTION FROM PAGE 1

takes at least six months. The cryogenically cooled probe (detector) that is inserted into this magnet provides SFU with cutting-edge technology that will serve them well for many years.

Astronomers seek increased telescope light gathering and resolving power to probe the structure of stars and galaxies. Similarly, chemists like Drs. Britton and Pinto need greater sensitivity in NMR spectroscopy to probe the structures and shapes of molecules and how they interact with cells or other molecules. “Most of our research can be done at 600 MHz using the new system,” notes Dr. Pinto. “SFU researchers can also use the 800 MHz (19-Tesla) National High Field Nuclear Magnetic Resonance Centre (NANUC) at the University of Alberta.”

Access to NANUC for SFU researchers, and the availability of SFU’s new NMR system to off-campus researchers and companies, illustrate a key element of Dr. Pinto’s research vision – partnerships and consortia. “We’re a major player,” he says. “Increasingly we are invited to become partners in multi-user scientific facilities, even to lead them.”

Dr. Robert Britton, SFU Department of Chemistry, is one of the scientists who will use the NMR facility for his research.
Who's New

We’re delighted to welcome Greg Sasges to the Office of Research Services (ORS), and Angie Van Vliet and Catherine Campbell to the University/Industry Liaison Office (UILO).

As Research Contracts Officer in ORS since early December, Greg Sasges ensures that certain contracts and agreements involving SFU research operate in the best interests of all concerned. “Specifically I advise on, review, negotiate, draft and administer agreements where issues such as research funding, confidentiality, material and technology transfer, and commercialization come into play,” he explains.

Mr. Sasges has been practising law since 1986, focusing on corporate finance, technology transfer and related commercial law. “After 20 years in private practice I was determined to work in the public sector. I enjoy working with talented people, using my skills and knowledge to help them pursue their goals. This position gives me that.”

Angie Van Vliet became the new UILO Projects and Administration Assistant in November. She provides project support and office, secretarial and administrative assistance to the UILO staff. However, she’s no stranger to SFU. “In the four years prior to coming to the UILO I was a grants assistant in the Office of Research Services,” she notes. “Before that I was a registration clerk in Conference Services, a secretary in Facilities Management, and a program assistant in University Advancement.”

Catherine Campbell is a WestLink intern, on an eight-month placement in the UILO that began in September 2006. The Calgary-based WestLink Innovation Network (to which SFU belongs) supports the acceleration of technology commercialization in Western Canada. Its internship program develops managers knowledgeable in technology management, commercialization in a high-tech company and venture capital/finance.

This is her first WestLink placement. When she leaves SFU in May she hopes her next will be in a biotechnology company. “I’m interested in companies that do research on neurodegenerative diseases, such as Alzheimer’s and Parkinson’s,” she says.

Funding Links

The Office of Research Services (ORS) regularly publicizes research funding opportunities for SFU faculty members. For further information, please visit: www.sfu.ca/ors/funding_opp.html