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news release

EXTERNAL RELATIONS

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Jan. 25, 2007

U of C recruits information security pioneer

New quantum cryptography lab seeking spy-proof codes will test between U of C and SAIT

In World War II, secret agents handcuffed suitcases to their wrists, and sent the keys by separate covert means. Today's experts don't want you to go to such lengths to protect your private information. Indeed, one of the latest recruits to the University of Calgary aims to make stolen banking information, compromised medical records, and eavesdropping into phone conversations or military intelligence—all threats to information security—a worry of the past.

Dr. Wolfgang Tittel, an internationally-renowned physicist recently recruited from the University of Geneva to become the new iCORE/General Dynamics Canada Industry Chair in Quantum Cryptography and Communication at the U of C, was among the first scientists in the world to apply so-called quantum information techniques to applications outside the laboratory. Now he and his colleagues plan to build information networks that are impossible to compromise.

Quantum information holds great promise in the area of information security because it's carried in bundles with a particular configuration. If anyone tries to "listen in" as these bundles are transmitted, the bundles change configuration, immediately scrambling the information.

These features make quantum technology ideal for generating ultra-secure quantum "keys" that protect private information, like a suitcase with a special lock. Try to pick the lock, and the suitcase blows up.

"Communication security is so important that we want it to be infinitely secure," says Tittel, now a principal researcher at the U of C's Institute for Quantum Information Science and its Centre for Information Security and Cryptography.

The centre and the institute rank among the leading academic entities of their kind in Canada. The rich possibility for collaboration among physicists, mathematicians, engineers and computer security experts was instrumental in attracting Tittel to make his international move. "There are only a few groups in the world doing information security research as broad as the University of Calgary group," Tittel says. "And in the area of applying quantum theory to fibre optics, there are probably only eight or 10 people in the world."

As part of his research program, Tittel will partner with General Dynamics Canada to develop and test quantum encryption technologies on a dedicated fibre optic line between the University of Calgary and a laboratory at SAIT Polytechnic. The testing will build upon pioneering research Tittel conducted at the University of Geneva, where his research group generated the first tests of quantum cryptography technology outside a laboratory. He also lead a revolutionary test of quantumly-linked light particles, an 11-kilometre transmission that is still the world's longest on an optical fibre line.

"Ultimately, we want to adapt the technology to protect information being sent hundreds of ilometers, and it may even be possible to provide quantum encryptions between continents via satellite communication," he says.

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“It’s an incredible opportunity to work with Dr. Tittel, and to bring fundamental quantum research into real life,” says master’s student Josh Slater, one of eight graduate students already doing research with the world-renowned expert. “It’s like working in the Q lab for James Bond.”

Tittel is expected to teach physics to both undergraduate and graduate students. His research chair is supported by $1.5 million over five years from iCORE and General Dynamics Canada, as well as by the University of Calgary, the Canada Foundation for Innovation, and Alberta Advanced Education and Technology. He will participate in QuantumWorks, an innovation platform recently established by the National Sciences and Engineering Research Council of Canada (NSERC) to make quantum technology available to society.

Media briefing and photo opportunities:

Dr. Wolfgang Tittel, master’s student Josh Slater, SAIT Polytechnic instructor Steve Hosier, and representatives from industry and government will be available for media interviews and photos in Dr. Tittel’s new lab in the basement of the Earth **Sciences building, Room 2, from 9 – 10:30 am**, before the official program that launches Dr. Tittel’s iCORE/General Dynamics research chair. The speaking portion of the formal program begins at 11 am in the Biological Sciences Building, Room 587, with public lab tours and a reception to follow at 11:45 am. Parking is available in Lot 22. See U of C campus map at: http://www.ucalgary.ca/map/map_big.html.

B-roll will be provided that shows how ultra-secure quantum “keys” can be transmitted via telecommunication lines, protecting information such as that currently shared over ATM networks, for insurance purposes, and for transmitting military secrets. Media will also have the opportunity to see fibre optic cables and the lasers that Dr. Tittel will be using to test theoretical and practical applications.

More information:

U of C’s Institute for Quantum Information Science: http://www.iqis.org/

U of C’s Centre for Information Security and Cryptography: http://cisac.math.ucalgary.ca/

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