

Los Alamos quantum cryptography team is co-winner of prestigious European research prize

December 8 2004

Los Alamos researchers and other members of a multi-nation collaboration that is developing a revolutionary technology for information security have captured half of the European Union's Descartes Prize for Research.

Los Alamos' quantum cryptography team and six other institutions in the Information Society Technologies (IST) QuComm collaboration received the prize for their project to build a secure global communication system using particles of light.

Quantum cryptography makes a more secure global infrastructure possible by enabling two parties to encode a secret key with single photons so they can communicate much more securely than with other cryptographic techniques.

Once the quantum key is encoded through polarization, any attempt by a third party to eavesdrop on the communications is easily detected.

Among potential applications for quantum cryptography include nearly all forms of electronic communications, and electronic banking and voting.

The QuComm partnership will split the one-million-Euro prize (about \$1.3 million) with a team of life scientists studying mitochondrial DNA, whose research might someday lead to therapies to slow the aging process. The prizes, now in their fifth year, were awarded in Prague, Czechoslovakia, last week by Janez Potocnik, EU commissioner for

science and research.

"The idea behind our collaboration was to take quantum encryption out of the laboratory and show that that you can do something useful with it," said Richard Hughes of Los Alamos' Physics Division, who leads the Laboratory's quantum cryptography projects.

"These days the ability to ensure privacy is immensely important, and obviously the jury thought that our work was significant for business, government and eventually for the average computer user," Hughes said. "The prize is awarded specifically for things that will have a major impact on improving society, so we were very pleased to win competing against projects in the biosciences, nanotechnology, chemistry and other equally important fields."

The IST-QuComm collaboration is made up of research groups in Sweden, Germany, France, Switzerland, Austria and the United Kingdom, in addition to the Los Alamos team.

Progress in quantum cryptography and related areas has been rapid in recent years. A key breakthrough came two years ago, when Los Alamos researchers sent an encrypted quantum key nearly six miles from the Los Alamos Neutron Science Center to the Pajarito Ski Area, still the only demonstration of quantum key distribution through the atmosphere in daylight.

Last year, IST-QuComm physicists at the University of Vienna succeeded in sending encrypted photons more than one-third of a mile across the river Danube, while a group at the University of Geneva recently demonstrated quantum teleportation at wavelengths used in telecommunications through a 2-1/2 mile fiber-optic cable. The IST-QuComm consortium also performed the first-ever bank transfer guaranteed by quantum technologies over a 3.7-mile fiber-optic cable in

Vienna this summer. Four years ago, the Los Alamos team made headlines when it sent encrypted photons through 30 miles of fiber-optic cable across the Laboratory grounds.

A high-profile jury from the fields of science industry and government selected the two winning collaborations for the Descartes Prize from among eight finalists, representing the entire spectrum of science and technology disciplines. Jury chair was Ene Ergma, vice president of the Academy of Sciences of Estonia and president of the Estonian parliament.

Source: Los Alamos National Laboratory

Citation: Los Alamos quantum cryptography team is co-winner of prestigious European research prize (2004, December 8) retrieved 19 April 2024 from <https://phys.org/news/2004-12-los-alamos-quantum-cryptography-team.html>

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