year

INVESTICE DO ROZVOJE VZDĚLÁVÁNÍ

Název projektu: Mezinárodní centrum pro informaci a neurčitost

Registrační číslo: CZ.1.07/2.3.00/20.0060

Zpráva z účasti na konferenci

Název konference: 17th Conference on Quantum Information Processing (QIP'2014)
Datum konání: 3.2. - 7. 2. 2014
Místo: Barcelona, Španelsko
Účastník konference: Mgr. Vladyslav Usenko Ph.D.

Stručný popis konference:
Quantum Information Processing is the series of the annual conferences, which started in Aarhus in 1998 and was last held in Beijing in 2013. It is one of the most representative international meetings for scientists working on the theoretical aspects of quantum computing, quantum cryptography, and quantum information. In 2014 the conference was hosted by the Autonomous University of Barcelona (UAB), the University of Barcelona (UB) and the Institute for Photonic Sciences (ICFO). The venue was the AXA Auditorium in Barcelona. Many renin scientists were inviolved in the organization of the Conference, including Antonio Acín (ICFO) and Emilio Bagan (UAB) – the chairs of the Conference), José Ignacio Latorre (UB), Maciej Lewenstein (ICFO) and Andreas Winter (UAB).

Základní údaje:
Počet účastníků: >400
Počet přednášek: 45
Počet posterů: ~250

Zajímavé přednášky

David Reeb: ***An improved Landauer Principle with finite-size corrections and applications to statistical physics***
The presentation of Dr. Reeb from Department of Mathematics of Munchen Technical Unviersity was dedicated to study to improve the Landauer principle, which relates entropy decrease and heat dissipation during a logically irreversible processes. In particular, the principle can be applied to the logically irreversible erasure of information, stored physically in the degrees of freedom of a memory register, that leads to a corresponding entropy increase in the environment or in the non-information-bearing degrees of freedom. In this case the Landauer bound

lower limits the heat to be dissipated with the entropy decrease in the memory through the inverse temperature [1]. The authors derived an improved version of the Principle, which is formulated as an equality rather than an inequality. The proof of the principle is based on quantum statistical physics concepts rather than on thermodynamic argumentation. From this equality version, the authors obtain explicit improvements of Landauer's bound that depend on the effective size of the thermal reservoir and reduce to Landauer's bound only for in the fnite-sized reservoirs [2].

Literatura:

[1] R. Landauer, "Irreversibility and heat generation in the computing process", IBM J. Res. Dev. 5, 183 (1961).
[2] D, Reeb, and Michael M. Wolf, arXiv:1306.4352 (2013).

Carlo Ottaviani: ***Two-way quantum cryptography at different wavelengths***

Dr. Ottaviani from the Department of Computer Science of the University of York presented the study of the two-way quantum cryptography protocol at different wavelengths. The aim of the two-way quantum key distribution protocols is to provide the increased stability against channel noise by sending the quantum states form one trusted party and the back with the proper state manipulations and homodyne detection at the both sides of the channel [1]. In particular, the authors In considered a two-way quantum communication protocol where Gaussian-modulated thermal states are subject to random Gaussian displacements and then measured. The authors show the security threshold of the protocol (in reverse reconciliation) is extremely robust with respect to the preparation noise and is able to outperform the security thresholds of one-way protocols at any wavelength. As a result, improved security distances are claimed to be accessible for implementing quantum key distribution at the very challenging regime of infrared frequencies [2].

Literatura:

[1] S. Pirandola, S.Mancini, S. Lloyd, and S. L. Braunstein, Nature Phys. 4, 726 (2008).
[2] Ch. Weedbrook, C. Ottaviani, and S. Pirandola, Phys. Rev. A 89, 012309 (2014)

Vlastní prezentace

V. Usenko and R. Filip, *Squeezing can minimize information leakage in countinuous-variable quantum key distribution.*

The authors addressed the role of nonclassicality in the security of the continuous-variable quantum key distribution (CV-QKD) protocols with Gaussian modulation [1]. Considering generalized preparation scheme the rolve of the classical and quantum resources in providing the robustness of the protocol to loss and noise was revealed [2]. The authors shown that information leakage i.e. information which is available to an eavesdropper upon collective attacks can be minimized or completely canceled by proper combination of a nonclassical resource (namely squeezing) and Gaussian modulation. The result opens possibility to build optimal Gaussian protocols which are stable against imperfections, such as low error correction efficiency and finite-size effects. The presentation was followed by discussions with Dr. Furrer from Tokyo Unversity, Dr. Ottaviani from the University of York, with Dr. Pilyavets from the University of Brussels and others.

[1] C. Weedbrook, S. Pirandola, R. Garcia-Patron, N. J. Cerf, T. C. Ralph, J. H. Shapiro, and S. Lloyd, Rev. Mod. Phys. 84, 621 (2012).
[2] V. Usenko, and R. Filip, New J. Phys. 13 (11), 113007 (2011)

Mezinárodní vědecká spolupráce

The pariticpation in the QIP'2014 conference was successfully used to enforce and expand the contacts and scientific collaboration with the world renowed groups working in the fields of quantum optics and quantum information.

The conference participants were informed about the project of International Center for Information and Uncertainty, supported by the OP VK program.

Fotografická dokumentace

Dr. Usenko during his presentation at QIP'2014.

Vladyslav Usenko, Ph.D.