evropský sociální fond v ČR
EVROPSKÁ UNIE
MINISTERSTVO ŠKOLSTVÍ, MLÁDEŽE A TĚLOVÝCHOVY
OP Vzdělávání pro konkurenceschopnost
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 stáži

Datum konání stáže: 08.01.2014 – 02.03.2014

Navštívené pracoviště: Max Planck Institute for the Science of Light, Erlangen, Nemecko

Zahraniční garant: Prof. Dr. Gerd Leuchs

Účastník stáže: Ivan Derkach, Mgr.

Stručný popis navštíveného pracoviště

Max Planck Institute of Light (MPL) was founded on January 1, 2009 and is based on the Max Planck Research Group "Optics, Information and Photonics" in University of Erlangen-Nuremberg. MPL is the one of the youngest in the grid of 82 Max Planck Institutes, that are considered to be the most successful research organization in Germany. Currently MPL includes four divisions, two independent research groups and three Technical Development and Service Units.

The visit was done to Prof. Dr. Gerd Leuchs Division. The Division carries out the research in the fields of classical and quantum optics, including metrology, quantum radiation, nanooptics, quantum information processing (QIV) and optical quantum information theory (OQI). Leuchs Division is famous for its progressive approach, numerous influential publications and pioneering scientific developments.

Experimental group of Dr. Christoph Marquardt operates link that is of particular interest - a quantum communication link of length 1.6 km in open-space situated in urban environment with sender station at the top floor of MPL and receiver station on the 12^{th} floor of a neighboring university building. A link contains a laser source with wavelength 809nm, that coincides with low atmospheric losses. Quantum key distribution protocols involving polarized beams propagating in free-space can be carried out in this particular setup.

Průběh stáže

The aim of the visit was a cooperative research of entanglement properties of Gaussian states of light and security of continuous-variable quantum-key distribution over free-space fading channel. An experiment involving transmission of Gaussian coherent states through aforementioned optical communication link in atmospheric channel was conducted. During the current visit experimental data analysis was carried out with the aim to study methods of fading discrimination and further post-selection. The covariance matrices of the quadrature operators were derived taking into account the control measurements and the detection efficiencies and the first steps towards the

security analysis of the respective quantum key distribution scheme were carried out. Within the visit fruitful discussions concerning details of experimental setup and optimization of work on obtained experimental data were held.

Navázání kontaktů

The visit led to establishing of personal contacts and continuation of effective and successful cooperation between the Department of Optics of the Palacky University (Olomouc, Czech Republic) and Max Planck Institute for the Science of Light (Erlangen, Germany).

Shrnutí stáže

The visit was doubtlessly helpful, provided useful scientific experience for both collaboration sides, strengthened partnership between institutions and surely advanced the research progress. Further research will use obtained results and will benefit from accomplished tasks. The new information will serve as a basis for experimental proof of previous theoretical work and will lead to further scientific publications.

Fotografická dokumentace

Photo taken during analysis and discussion of experimental data, depicted are I. Derkach (bottom) and C. Peuntinger (top).

Ivan Derkach, Mgr.