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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:	6.04.2014 – 13.04.2014
Navštívené pracoviště:	Max Planck Institute for the Science of Light, Erlangen, Nemecko
Zahraniční garant:	prof. Gerd Leuchs
Účastník stáže:	Vladyslav Usenko, Ph.D.

Stručný popis navštíveného pracoviště

The Max Planck Institute for the Science of Light (MPL) in Erlangen is one of the 82 Max Planck Institutes in Germany, being the most prestigious status for a research Institute in Germany and a part of the Max Planck Society. The MPL was formed in 2009 on the basis of University Erlangen-Nuremberg. The MPL in Erlangen currently consists of 4 divisions and 2 research groups together with several Technical Development and Service Units. Currently MPI is one of the world leading research Institutes in the field of Optics, including Quantum Optics and Quantum Information Processing.

The visit was held to the Division of Prof. Gerd Leuchs, which is well known as the outstanding experimental group conducting fundamental and applied research in the field of quantum optics and quantum information. It achieved numerous great scientific results, which were published in multiple articles in the high impacted journals.

One of the activities of the division is dedicated to the quantum communication through the free space links. In particular, the division possesses an open-space quantum optical link, operated by the experimental group of Dr. Christoph Marquardt. The linearly polarized laser beam is transferred to a circularly polarized state and sent through the 1.6 km free-space channel from the institute's building to a tall university building, after having been expanded. This unique experimental set-up was of the particular interest for the research, carried out before and during the visit.

Průběh stáže

The aim of the visit was the joint scientific research in the field of Gaussian states of light and continuous-variable quantum key distribution (CV QKD). The experimental data of the Gaussian modulated coherent states transmitted through the channel was recently obtained

and will be used to demonstrate the theoretically predicted positive effect of the sub-channels post-selections, aimed at stabilization of the fluctuating atmospheric channel. Thus, the data analysis was carried out with errors (such as after-pulse related artefacts) corrected. The preliminary results show the promising decrease of the fading-related channel noise after post-selection which will be further studied in the effect on QKD. The channel estimation issues in the context of quantum communication through the fluctuating channels were also addressed based on the intensity measurement characterization of the link performed by the group of Dr. Marquardt, in particular by the Ph.D.-student Mgr. Bettina Heim.

Navázání kontaktů

The visit led to continuation and further improvement of the fruitful collaboration between the Max Planck Institute for the Science of Light in Erlangen and the Department of Optics of the Palacký University in Olomouc.

Shrnutí stáže

The visit has achieved its goals, the scientific collaboration with one of the leading European institutions in the field of quantum optics and quantum information was successfully extended and intensified. The new knowledge on the current research trends in the field was obtained and will be further disseminated to the target group within the scientific seminars.

Fotografická dokumentace

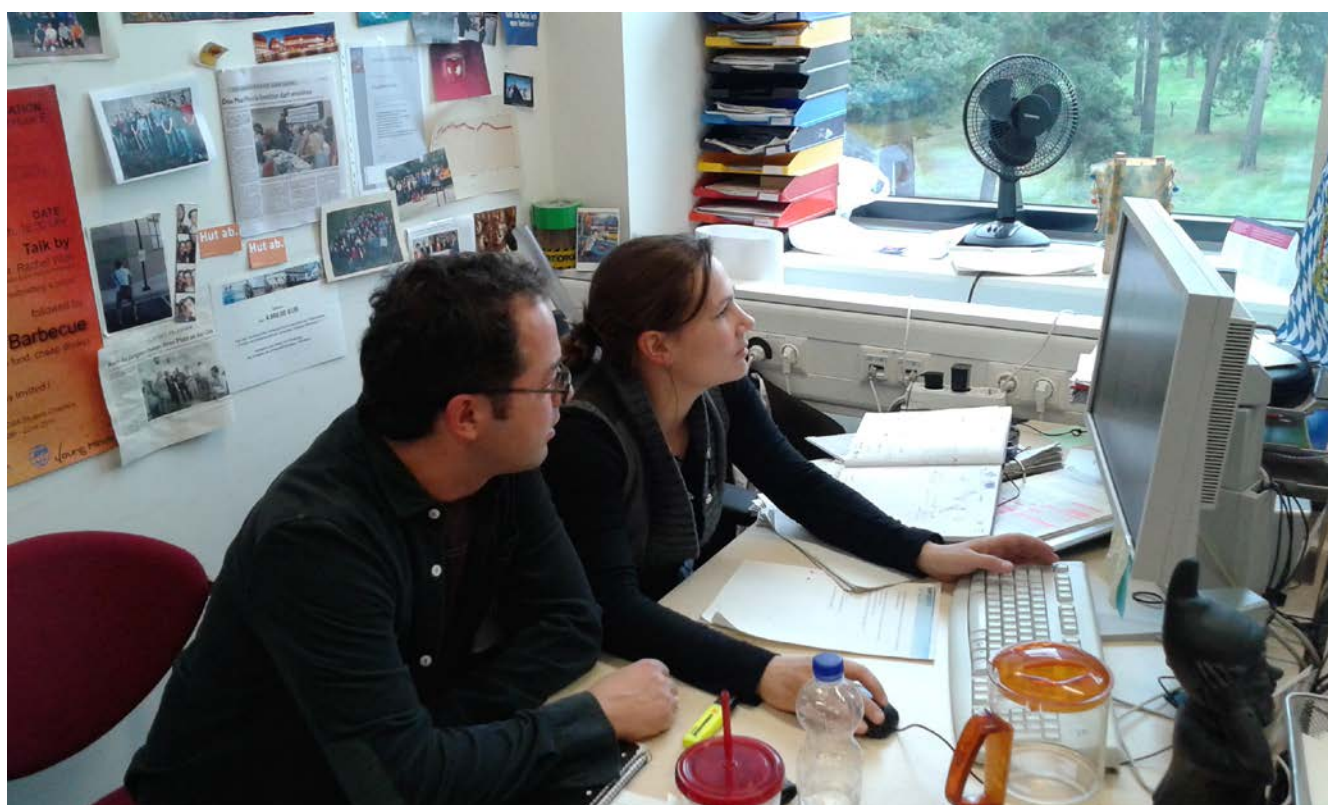


Photo taken during the scientific discussion and data analysis within the stay, depicted are and Dr. Usenko (left) and Mgr. Heim (right).

Vladyslav Usenko, Ph.D.