



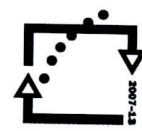
evropský  
sociální  
fond v ČR



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:	26.05.2013 – 15.06.2013
Navštívené pracoviště:	CNRS-LAC, Univ. Paris-Sud, Paříž, Francie
Zahraniční garant:	doc. Frederic Grosshans
Účastník stáže:	Vladyslav Usenko, Ph.D.

#### Stručný popis navštíveného pracoviště

Laboratoire Aimé Cotton (LAC) is the part of the University Paris-Sud (University of Paris XI), which is distributed among several campuses in the southern Paris (including Orsay, Cachan, Sceaux etc) with the main campus and the Laboratory itself being located in Orsay. Paris-Sud is one of the most renowned and the largest French universities, in particular in nature sciences and mathematics. It is ranked No. 1 in France and No. 6 in Europe in the Academic Ranking of World Universities, it is also ranked No. 15 worldwide in Natural Sciences and Mathematics. LAC was founded in Bellevue in 1929 by the French physicist Aimé Cotton, who is famous for his works in magnetism and magneto-optics. From 1967 LAC becomes the part of University Paris-Sud in Orsay and belongs to Centre National de la Recherche Scientifique (CNRS), which is the largest governmental research organization in France and the largest fundamental science agency in Europe. The topics covered by the laboratory include atomic and molecular physics, cluster physics and optics, with connections to plasma physics, astrophysics, condensed matter physics, nuclear physics, chemistry, life sciences and to industrial applications. The staff of the laboratory amounts to about one hundred employees, of which 70 are permanent, including 30 CNRS researchers, 13 faculty employees of University Paris-Sud, 32 engineers, technicians and administrative staff. The laboratory participates in numerous domestic and international projects. The theoretical group of Assoc. Prof. F. Grosshans (a CNRS researcher) is dealing with the fundamental tests and quantum information and is especially active in quantum cryptography. In the tight collaboration with the leading experimentalists in LAC as well as within CNRS (in particular, group of Prof. Philippe Grangier at CNRS Institut d'Optique), doc. Grosshans achieved the outstanding results in the field of quantum information.

**Průběh stáže**

The aim of the visit was to complete the research on the theme of Gaussian continuous-variable quantum key distribution (CV QKD) protocol based on the single-quadrature modulation of coherent states. Such protocol would waive requirement on the phase modulation, which is typically technically more demanding than the amplitude modulation, which could be directly accessed by adjusting the laser power. However, the advantage is followed by the impossibility to fully characterize the quantum channel and thus the security bounds must be established based on the physical limits, imposed on the possible eavesdropping attacks. This leads to a trade-off between the practical simplicity and sensitivity of such protocol. During the visit the study of the protocol was finished with some previously unexpected solution behavior being observed (the pessimistic security assumption appeared to be different from the physicality bounds contrary to the previous expectations). This resulted in the optimization of the protocol with respect to the obtained pessimistic assumption.

**Publikace rozpracované během stáže**

In the view of new obtained results the publication entitled "Continuous variable quantum key distribution with single quadrature modulation" was altered and is scheduled for submission in 2013.

**Navázání kontaktů**

The visit resulted in the intensification of the scientific collaboration with the group of doc. Frederic Grosshans. The possible future joint international projects between the Palacky University and CNRS were also preliminarily discussed. Further directions of research were also discussed.

**Shrnutí stáže**

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

**Fotografická dokumentace**

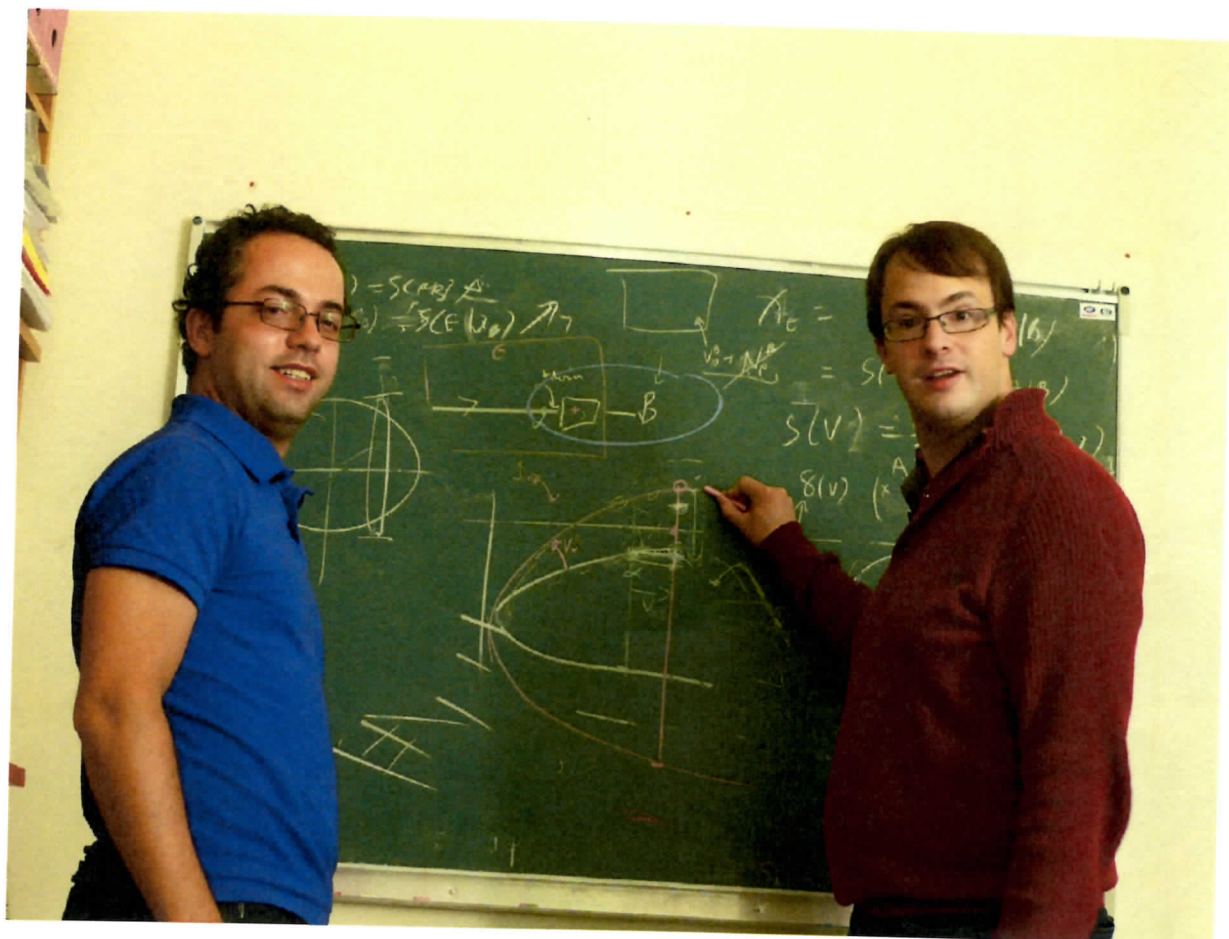
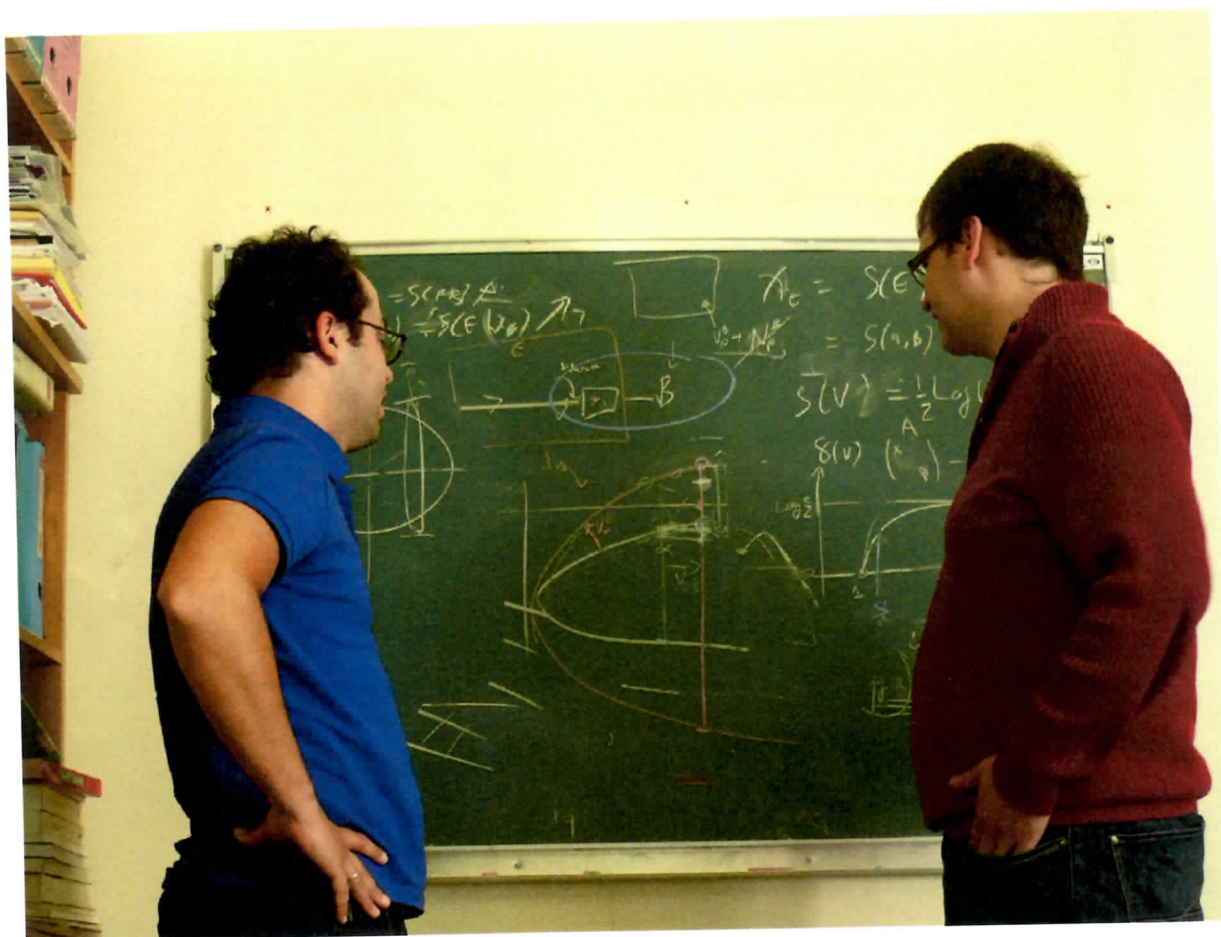


Photo taken during the scientific discussion within the stay, depicted are doc. Grosshans (right) and Dr. Usenko (left).



Doc. Grosshans (right) and Dr. Usenko (left).

Vladyslav Usenko, Ph.D.