



INNOVATIVE ECONOMY
NATIONAL COHESION STRATEGY



*Foundation
for Polish Science*

EUROPEAN UNION
EUROPEAN REGIONAL
DEVELOPMENT FUND



UNIwersytet GDAŃSKI

OPEN POSITIONS FOR M.Sc. STUDENTS

Two M.Sc. student positions are available at the Institute of Theoretical Physics and Astrophysics, University of Gdańsk, Poland. The positions are a part of the **Foundation of Polish Science Homing Plus project "Quantum Macroscopic Superpositions of Light Generated by Quantum Cloning for Applications in Quantum Technologies"**, aiming at theoretical and numerical research in the **field of quantum optics and quantum information**.

In 2007 macroscopic quantum superpositions (MQS) of light were demonstrated for the first time using the process of optimal quantum cloning. The possibility of observation of non-Gaussian and Schrödinger cat states, being an abstract concept for decades, was created for photons. Attempts to characterize these states with the standard quantum mechanical and optical techniques, were unsuccessful. This project aims at extensive theoretical and numerical study of macroscopic entanglement and quantum superpositions of light, building their physical model and broadening our understanding of this subject. Experimental verifications of the model will outline possible applications of these states for quantum information tasks. The project comprises the following tasks: quantum state engineering and detection of MQS, entanglement and Bell inequalities testing, generation of MQS of light, nonclassicality and macroscopic entanglement of MQS of light as a quantum resource. Each task is dealing with fascinating problems so far little explored or posing open questions of great importance in modern physics.

The research will be carried out in international collaboration with the leading theoretical and experimental groups in the field: GAP-Optique at the University of Geneva (prof. N. Gisin, Geneva, Switzerland), Max Planck Institute for the Science of Light (prof. G. Leuchs and prof. M. V. Chekhova, Erlangen, Germany).

Profile of candidates:

1. Completed three years of study of physics, mathematics or related field,
2. Numerical modeling or programming skills,
3. Ability to work in a team,
4. Good spoken and written English.

M.Sc. students will receive a scholarship from the project 1000 PLN net per month over 24 months (2 years). Additional funds are allocated for the participation of the M.Sc. students in the international and national workshops, schools and conferences. The students will be equipped with laptops. The research will be conducted and Master's theses will be prepared under supervision of Dr. Magdalena Stobińska.

Commencement date: October-December 2012

Applications and inquiries: Dr Magdalena Stobińska, magdalena.stobinska@gmail.com