

Host organization: Institute of Solid State Physics, Bulgarian Academy of Sciences

Country: Bulgaria

Organization role: Coordinator

Project Acronym: COPQE

Project start and end date: 6 October 2016 - 7 November 2018

Type of MSC action, H2020 (ITN, IF, COFUND): IF

Your story:

Project objectives and research field:

The present project belongs to the most advanced field: Quantum computation. The proposed investigations are based on the application of the composite pulses (CPs). The research objectives are related to development of CPs for quantum engineering with qubits that are robust to decoherence and non-static control errors; with multi-dimensional quantum systems (qudits); to polarization physics and waveguide arrays.

Tell us why the topic is important and/ or how it brings to advancement in your research field:

There is increasing interest for developments of new tools, methods and approaches in quantum computation, quantum communication and sensing. Achieving reliable quantum information processing is crucially dependent on our ability to control the quantum dynamics with high fidelity, which is limited by unwanted interactions with the environment and imperfections in the applied control fields. This triggered an immense research effort into quantum engineering, which seeks to meet the practical challenges of controlling quantum systems with extremely high fidelities by encompassing both fundamental physics and engineering. The achieved results during the project will have significant effect in the application in the fields of quantum-optical analogies. The theoretical developments already have found application in improvements of some optical devices.

What are the benefits of participating in a MSC action?

Many seminars, participations in conferences and discussions during the progress of the project gave the opportunity for increasing the capacity of Dr. Kyoseva from one side and the team from the Institute of Solid State Physics (ISSP), Bulgarian Academy of Sciences from the other. This exchange of knowledge gave new ideas for the experimental implementation of the CPs for development of new devices and respectively to the enhancement of the investigations in the field of quantum-optical analogies, one of the main subjects of investigation of the research group in ISSP. During the six months secondment in the group of Haim Suckowski at Tel Aviv University, the investigation of Dr. Kyoseva results in two publications in high ranking journals. At the beginning of the project Dr. E. Kyoseva won the Award: John

Atanasoff, October 2016, for her research in the field of quantum optics with application to quantum information technologies. The next year, her research was highly evaluated by EC and she was invited to give a talk at the European Parliament: “QC and its applications to AI”, December 2017.

Did you encounter any challenges during application/ implementation and did you get any help?

During the project, up to now, we did not meet many challenges. There were conditions which require amendments of the period of the project. The main investigator, Dr. Kyoseva stopped the work for a month due to maternity leave. This case was well explained in the guide of the EC and with the help of the project officer from EC, the right prolongation of the project was done on time in a very understandable way.

Would you recommend others to apply? What useful advice/ tips can you give them?

We strongly recommend the application in the MSC actions. Projects under this programme are highly prestigious and allow applicants to integrate successfully into the host group. During implementation, the main investigators reinforce the skills in their scientific field and their leadership qualities as leaders of a scientific group and a research projects. They enhance a research collaborations with other scientific institutions and industrial companies.

What strategies did your organization use to attract the fellow/s? Are they in line with national strategies supporting the widening EC policy?

The Institute of Solid State Physics, Bulgarian Academy of Sciences follows the national strategies supporting the widening EC policy. It has strong and successful experience with national and international projects (EC projects, bilateral projects with countries all over the world). Several successful NATO reintegration grants were realised in the ISSP as a host organisation. The Institute offers advanced scientific apparatus and excellent working conditions. The scientists, well known in the field of solid state physics, quantum physics, soft matter physics, etc. support the development of high quality young and ambitious scientists in the related fields. Strong collaboration with some industrial partners gives opportunities for younger scientists to implement scientific developments into final products.