

Name of the MSC Fellow: Elica Kyoseva

Nationality: Bulgarian

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

Country of the Host: Bulgaria

Project Acronym: COPQE

Project start and end date: 6 Oct 2016 to 6 Nov 2018

Type of MSC action, H2020: IF



Your story:

Project objectives and research field:

The objectives of my project were to design and develop novel control techniques for error correction in quantum computing. I considered qubits, which are the basic units of information in quantum computers, and applied tools from control theory to prescribe a robust and broadband method for qubit gates implementation. The obtained results can be implemented in any physical qubits.

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

The field of quantum computing possesses a tremendous potential to transform many, if not all, existing technologies including computing, security, materials, pharmaceuticals and others. This is the reason why quantum computers are gaining such a popularity and there is a widespread effort to bring them to practical implementation. To do so one must overcome the sensitivity of quantum systems to their environment and the corresponding control knobs of the experimental implementation, and realize very high fidelity quantum gates. My research is aimed at solving this challenge and is in the field of quantum control and engineering. I design novel control methods for robust and broadband gate implementation called composite pulses. The composite pulses which I design can be implemented in any

physical realization of qubits and are a very powerful tool for realizing the target computational gates in the presence of errors and inaccuracies both in the qubits and in the control fields.

What are the benefits of participating in a MSC action?

Being an MSC fellow enabled me to pursue my scientific and research interests whilst building upon my existing scientific expertise. The financial support, which I received as an MSC fellow, was crucial to me and thanks to it I returned to Europe after 8 years in Asia to continue my scientific career here. Notably, the option to have a planned secondment proved invaluable to my career and I created excellent and very fruitful research collaboration with scientist from Tel Aviv University, Israel, which will continue also after the completion of my fellowship.

Why did you choose a widening country as a Host? What was the reason that convinced you? What is making you professionally happy here?

I chose Bulgaria as my host country because this is where I am from and being close to my family again after 8 years in Singapore was my main motivation. I enjoyed collaborating with and getting to know the scientists at the Bulgarian Academy of Sciences.

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

I would definitely recommend others to apply for MSCA fellowships as they are esteemed and reputable, and provide researchers with the necessary creative freedom to pursue their interests and develop into leading and independent scientists.