EU MARIE SKŁODOWSKA-CURIE ACTIONS - PhD Position

Within the project consortium "Lossless Photon management – Optical design for manufacture at different length scales" (NOLOSS) funded by the EU MARIE SKŁODOWSKA-CURIE ACTIONS, the consortium partners JCMwave, Berlin, Germany, and Abbe Center of Photonics, Jena, Germany offer a PhD position on

“Adaptive finite-element methods for nanophotonics simulations”.

Nanophotonics is one of the main branches of modern optics research. Using matter structured on length scales comparable to the wavelength of light to shape light’s propagation has the potential to enable solutions and applications with a large impact on everyday life. However, as structuring technologies become ever more sophisticated, the number of possible degrees of freedom in nanophotonic systems has grown while the minimal structure size shrinked. These trends render it basically impossible to gain fundamental understanding of light matter interaction in nanostructures by purely experimental means, since the individual experiment is getting more and more complicated whereas the number of needed experiments grows with the number of degrees of freedom.

Hence, rigorous simulations have taken the role of experiments as a main tool to scan large parameter spaces and directly witness how nanostructures influence the propagation of light. Therefore, the development of efficient and precise numerical algorithms is one of the cornerstones of modern photonics research. One of the challenges for current numerical algorithms are the vastly different length scales and material parameters that occur when nanophotonic elements are part of larger optical devices, e.g. when metallic nanoparticles are embedded into dielectric substrates structured on much larger length scales.

Finite element methods in principle allow for the efficient simulation of such systems by adapting the numerical resolution to different features in the simulation domain. The offered PhD position will be concerned with implementing such self-adaptive numerical simulation tools. Specifically, the focus will be on so-called hp-adaptive finite element methods. The PhD candidate will furthermore verify the implemented algorithm against existing rigorous simulation tools, characterize its speed and precision, and apply it to state-of-the-art nanophotonic systems.

To be able to successfully complete this PhD project, the PhD candidate should have an outstanding academic record with already some background in programming and numerical algorithms.

JCMwave is a company based at Berlin, Germany. JCMwave develops and distributes software for precise optics simulations, with application areas including Silicon optics, solar cells, optical metrology, nano- or micro-structured laser and LED light sources, and others. The PhD candidate will be part of the research and development team.

The Abbe Center of Photonics is a large interfaculty institution of the Friedrich-Schiller-Universität Jena, Germany, devoted to research and education in all branches of modern photonics. The PhD candidate will be part of the Nano-optics group, which is aiming to use nanostructures to control all aspect of light propagation.
The PhD project will be carried out between both partners and is funded for a duration of three years. According to the rules of the MARIE SKŁODOWSKA-CURIE ACTIONS the PhD candidate will spend at least half of his/her time at JCMwave in Berlin and the other part of the PhD project in Jena. The position is a full-time position with a salary according to the MARIE SKŁODOWSKA-CURIE ACTIONS rules and adapted to local regulations. To be eligible, the candidate must be an Early Stage Researcher. He must not have a PhD and must have fewer than four years of research experience. These eligibility requirements for MARIE SKŁODOWSKA-CURIE ACTIONS are non-negotiable and ineligible candidates will not be considered.

The Friedrich Schiller University Jena seeks to increase the number of female scientists and therefore strongly encourages qualified women to apply. The University is committed to providing a family-friendly workplace. In case of equal qualification, handicapped persons will be given preference.

The positions will start as soon as possible, latest from April 1, 2017. Interested candidates should apply using the online application system of the Abbe School of Photonics (https://www.uni-jena.de/asp_online_application). Technical questions on the application procedure should be directed to phd-asp@uni-jena.de. More information on the project can be obtained from Dr. Frank Setzpfandt (f.setzpfandt@uni-jena.de).