Fonctions Optiques pour les Technologies de l'informatiON

http://foton.cnrs.fr

PhD studentship

Optoelectronic properties of perovskite materials for low-cost photovoltaics and light emitting devices

Applications are invited for a PhD studentship in the simulation team of FOTON Institute located in Rennes (campus of INSA Rennes engineering school, France), to work on an exciting collaborative project investigating halide perovskite materials for low-cost photovoltaics and light emitting devices.

Starting date: 1th october 2020 to 1th december 2020

Supervisors:

- Jacky EVEN: https://cv.archives-ouvertes.fr/jacky-even

Research team: Simulation group, at FOTON Institute - INSA Rennes

Keywords: Materials science, Condensed matter physics, Density Functional Theory

Project description:

The simulation team in Rennes (~8 permanent staff) dedicated to perovskite research is a joint team between FOTON Institute and ISCR institute. The joint simulation team has a pioneering activity in the field of halide perovskite semiconductors, which started at FOTON Institute in 2010. 3D halide perovskites have opened over the last years a route towards low-cost solar cells offering currently conversion efficiencies of more than 25% at the level of the best known solar cell technologies. The expected applications of this new class of semiconductors are now expanding including light emitting devices. More, the joint simulation team has a strong activity on low-dimensional halide perovskites materials, such as 2D layered perovskites and 0D quantum nanostructures, including major breakthroughs in collaborations with experimental teams.

The task of the PhD student will be to perform abinitio (density functional theory DFT) and empirical simulations of the optoelectronic properties of perovskite materials and nanostructures. This activity will take place in the context of three starting H2020 applied european projects (Dropit, Perocube, Polloc) extending from 2020 to 2023. Besides partnerships in Europe, the PhD student will also benefit from strong experimental collaborations with renown US laboratories in the field of perovskites located at Rice University in Houston, Northwestern university in Chicago and Los Alamos National laboratory.

Qualifications

Candidates should have a master degree in materials science or solid state physics, preferably including documented background in the area of atomistic simulations of the materials electronic properties, including density functional theory (DFT), tight-

binding or empirical approaches such as multiband k.p. Good communication skills in English are required.

About FOTON Institute (CNRS, UMR6082)

FOTON Institute conducts research in the area of photonics for information technology, advanced concepts of photovoltaics, sensors and microwave applications, etc. The targeted technological applications, including many societal challenges, concern optical high-speed telecommunications, optical connections intra and inter chips, the Internet of Things, the autonomous systems, gas detection, medical diagnosis, terahertz metrology, and the development of high-efficiency PV cells on low-cost substrates. The simulation team is involved in all stages of the research effort from fundamental questions up to optoelectronic device simulations. The successful candidate will carry out his research in Rennes.
General informations about FOTON: http://foton.cnrs.fr/v2016/?lang=en.

High Performance Computing

Access to National (CINES, TGCC) supercomputing facilities will be provided under the GENCI proposal. The candidate will also have access to local facilities and will be requested to use DFT codes, such as Vasp, Siesta or abinit, as well as home-made empirical codes.

Application procedure

Send an email to jacky.even@insa-rennes.fr , including a CV (max 4 pages) and a motivation letter (max 2 pages)

All qualified candidates are invited to apply before 7th september 2020.