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## PhD fellowship on quantum structures in nanowires for quantum technologies

### Topic Area:

Condensed Matter, Quantum physics, Nanostructures, Nano-photonics, Thermoelectrics, Spectroscopy.

### Project context:

A fellowship for an experimental PhD thesis work is now available in the Nanophononics group in the Department of Physics of the University of Basel, Switzerland ([nanophononics.physik.unibas.ch](http://nanophononics.physik.unibas.ch)). A part of the team is starting a research field focused on realizing nanostructures in nanowires via post-growth hydrogen irradiation in order to achieve a full control of the properties of nanowires. The quantum dots and other quantum structures obtained in nanowires will be versatile and powerful building blocks of photonic devices, such as photonic crystals and photonic circuits, and thus will impact the fields of quantum computation and cryptography.

### Project description:

Single photon sources are attracting a lot of attention among scientists due to their use in quantum communication. The main challenge of realizing single photon sources is to obtain simultaneously a high efficiency and a control over the position, for optimal integration in solid-state devices. In this project, these two properties will be obtained by realizing quantum dots in nanowires after the nanowire growth. The project is scheduled as follows:

- Realization of quantum dots and quantum rings in state-of-the-art nanowires via selective hydrogen irradiation (to be performed in collaboration with Sapienza University of Rome, Italy)
- Characterization of quantum structures by optical spectroscopy (photoluminescence and Raman)
- Investigation of the properties of the realized quantum dots/wells for quantum communication and for the field of recovery of wasted heat. This will involve optical measurements to determine the presence of single photon emission, as well as thermal transport measurements to assess the thermoelectric figure of merit.
- Exploration of the magnetic properties of the realized quantum rings by optical spectroscopy under very high magnetic field (to be performed in collaboration with the HFML, The Netherlands)

### What we are looking for:

We are looking for a highly motivated and skilled student who is eager to work in a multidisciplinary and international environment and has hands-on experience in experimental physics. You will perform sophisticated optical spectroscopy experiments at cryogenic temperatures and hydrogen implantation.

**Start of the project:** now, duration 4 years.

### To Apply:

Please email a short curriculum vitae including names and contacts of your referees, scanned copies of grades and a statement explaining why you would like to work on this project. Email directly to: [marta.deluca@unibas.ch](mailto:marta.deluca@unibas.ch).

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### Selection procedure:

Review of submitted applications starts immediately.

