

At the Institute of Semiconductor and Solid State Physics of the Johannes Kepler University of Linz, Austria a **PhD student position** is available starting from **Sep. 1st 2012** on:

Implementation and study of an energy-tunable source of entangled-photon pairs

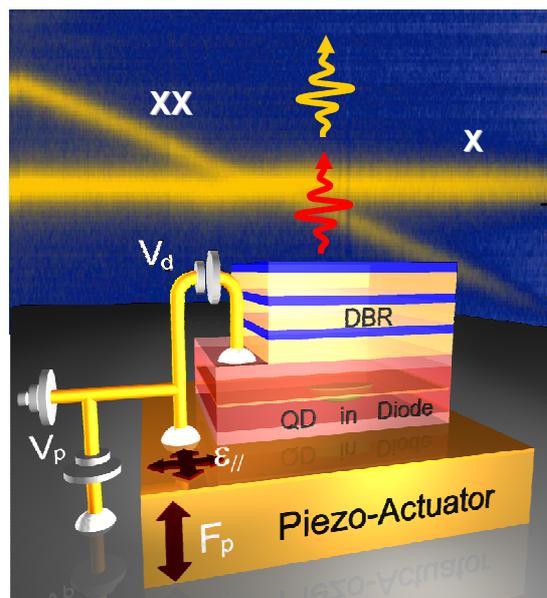
Self-assembled semiconductor quantum dots (QDs) are among the most promising building-blocks for future applications in quantum technologies, since they are sources of single and entangled photons on demand and - unlike other quantum systems - they can be easily integrated into well-established optoelectronic devices [1]. However, the success of QDs for the envisioned applications and for advanced quantum optics experiments will critically depend on the capability of achieving tight control over the QD emission properties via post-growth tuning methods. Over the last few years, our group has established and put forward a new strategy to engineer the QD emission properties QDs via external strain fields [2]. Very recently, we have also fabricated a hybrid piezoelectric-semiconductor device [3], where strain is used in synergy with large electric fields for reshaping the QD physical properties. In particular, we have demonstrated that all the QDs embedded in this novel device are able to generate entangled photons, contrary to what was commonly believed [4]. This novel device has also the potential to address other fundamental and applied problems in quantum optics, which are unsolvable with the existing technology.

The subject of this PhD work is the realization of the first *energy-tunable* source of entangled photon pairs based on single self-assembled semiconductor QDs. The successful candidate will be involved in the design, fabrication and optical study of the device and will work in collaboration with world leading research groups (at TU Delft, CEA Grenoble, IFW Dresden, TU Berlin) to achieve the goals of the project. Additional duties include the contribution to teaching activities.

A strong background in condensed matter physics and/or optics is expected. Candidates must prove a strong attitude towards experimental physics and show interest for technological work and optics.

Information requests and applications (including a CV, list of attended university courses and two references) should be addressed to:

Dr. Rinaldo Trotta and Prof. Armando Rastelli
rinaldo.trotta@jku.at armando.rastelli@jku.at



- [1] C. L. Salter, *et al. Nature* **465**, 594-597 (2010). [2] F. Ding *et al., Phys. Rev. Lett.* **104**, 067405 (2010); A. Rastelli *et al. Phys. Stat. Sol. B*, **249**, 687 (2012). [3] R. Trotta *et al., Adv. Mat.* **24**, 2668 (2012). [4] R. Trotta *et al., ArXiv:1206.1561* (2012).