



PhD position

Coupling hole spins to superconducting resonators

(when physics and engineering walk hand in hand)

SiGe nanostructures have emerged as a promising material for hosting spin qubits. In the past several years intense research has been devoted in studying quantum dots (QDs) defined in SiGe 2DEGs and P donors in silicon [1]. Spin relaxation times of a few seconds and coherence times of close to a second have been reported [2]. Since long coherence times are possible, it becomes conceivable to address problems of higher complexity, such as achieving spin-spin coupling over large distances. Floating gates or coplanar waveguides have been suggested for realizing this goal [3]. Indeed many studies have recently reported the coupling of QDs with superconducting resonators [4]. In our group we work with hole spins hosted in SiGe self-assembled nanostructures [5]. The aim of this project is to couple a single hole spin with the electromagnetic field of a superconducting resonator. This would allow us to create a quantum bus which will allow the flow of quantum information between two quantum bits.

You will work at temperatures as low as 10 mK and magnetic fields as high as 9 Tesla. High frequency electronic transport measurements for manipulating the spin states and dispersive read out techniques for determining the state of quantum bits will be applied [6].

References:

- [1] F. A. Zwanenburg et al., Rev. Mod. Phys. 85, 961 (2013).
- [2] C. B. Simmons et al, Phys. Rev. Lett. 106, 156804 (2011);
H. Büch et al. Nat. Com. 4, 2017 (2013); J. Muhonen et al.,
Nature Nanotechnology 9, 986 (2014).
- [3] M. Trif et al., Phys. Rev. B 77, 045434 (2008);
L. Trifunovic et al., Phys. Rev. X 2, 011006 (2012).
- [4] K. D. Petersson et al., Nature 490, 380 (2012);
J. J. Viennot et al., Science 24, 408 (2015).
- [5] G. Katsaros et al., Nat. Nanotech. 5, 458 (2010);
G. Katsaros et al., Phys. Rev. Lett. 107, 246601 (2011).
- [6] J. M. Hornibrook et al., <http://arxiv.org/pdf/1409.2202.pdf>



Requirements

- High motivation and enjoying working in an international environment
- Enjoying everyday challenges
- Excellent grades
- Solid background in microwave techniques

Apply now

To apply for this position
send your application
(including CV, certificates and two
reference letters) by e-mail to:

georgios.katsaros@ist.ac.at
nanoelectronicsgroup.wordpress.com

