

## Special seminar

Friday 15.06 at 10:30 in Room D

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*On-chip microwave spectroscopy: the toolset to understand the Josephson effect in semiconductor nanowires*

Narrow bandgap III-V compounds such as InAs and InSb have become the most studied platform of induced superconductivity in a semiconductor channel due to possibility of creating high quality Ohmic contacts with most metals. Consequently, several novel qubit architectures, such as the gateable transmon (gatemon) [1], Andreev qubits [2] or topological qubits [3] use them as building blocks. In this talk, I will summarize our ongoing efforts to understand and control the Andreev levels in proximitized semiconductor nanowires in various geometries. By adapting the on-chip spectroscopy method pioneered by the Saclay Quantronics group [4], we investigate the Andreev level spectrum in a planar magnetic field up to 0.5 T to extract the Landé g-factor and spin-orbit coupling in the channel [5]. Finally, I will discuss the detection of the  $4\pi$ -periodic Josephson effect in nanowire Josephson junctions above a threshold magnetic field approximately 200 mT, in agreement with the expected topological phase transition [6].

### References:

- [1] Larsen et al, Phys. Rev. Letters, 115, 127001 (2015)  
De Lange et al, Phys. Rev. Letters, 115, 127002 (2015)
- [2] Hays et al, arXiv:1711.01645
- [3] Aasen et al, Phys. Rev. X 6, 031016 (2016)
- [4] Bretheau et al, Nature 499, 3412 (2013)
- [5] van Woerkom et al, Nature Physics 11, 547 (2017)
- [6] Laroche et al, arXiv:1712.08459