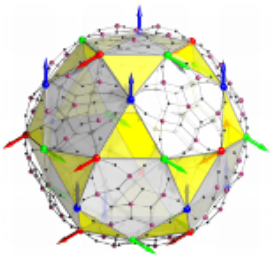

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# Semiconductor / Ferromagnetic Insulator InAs/EuS Epitaxy

*Wednesday, 5 June 2019 12:30 (30 minutes)*

Material development holds promise as the basis of topological quantum computing with Majorana fermions. These quasiparticles have been predicted at ends of semiconductor nanowires (NWs) coupled to conventional superconductors. This prediction was followed by a series of experiments providing strong evidence. However, in the current system, an external magnetic field along the NW axis is always needed to realize Majorana states. Therefore, in order to integrate and scale up qubit devices, it is aimed to induce a self-sustaining parallel magnetic field on semiconductor-superconductor (SE-SU) hybrid NWs. Composite tri-crystals using ferromagnetic insulators (FMIs) in close proximity to the SE-SU structure have been proposed as a solution to lift the spin degeneracy, where the Zeeman splitting could be induced by the exchange field from the FMI. In this work, we study hybrid InAs/EuS epitaxy as the initial basis of tri-crystal SE-SU-FMI NW systems. The EuS thin film grown on (100) Zinc Blende InAs surface is fully coherent. The interfacial band alignment preserves semiconducting nature. The exchange field exists at InAs//EuS interface. The magnetic moments are located around In atoms. The results do not only show the InAs//EuS//Al hybrid crystals as promising candidates for topological quantum computing, but also confirm EuS as a promising FMI for various spin applications.

**Primary authors:** LIU, Yu (Microsoft Quantum Materials Lab & Niels Bohr Institute, University of Copenhagen); Prof. KROGSTRUP, Peter (Microsoft Quantum Materials Lab & Niels Bohr Institute, University of Copenhagen)

**Presenter:** LIU, Yu (Microsoft Quantum Materials Lab & Niels Bohr Institute, University of Copenhagen)

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