Contribution ID: **274** Type: **Talk**

【414】Non-Abelian Majorana fermions in topological s-wave Fermi superfluids

Thursday 29 August 2019 18:00 (15 minutes)

By solving the Bogoliubov–de Gennes equations analytically, we derive the fermionic zero-modes satisfying the Majorana property that exist in vortices of a two-dimensional s-wave Fermi superfluid with spin-orbit coupling and Zeeman spin-splitting. The Majorana zero-mode becomes normalisable and exponentially localised to the vicinity of the vortex core when the superfluid is topologically non-trivial. We calculate the energy splitting due to Majorana hybridisation and identify that the s-wave Majorana vortices obey non-Abelian statistics.

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Session Classification: Atomic Physics and Quantum Optics

Track Classification: Atomic Physics and Quantum Optics