“Magic angles and topology in twisted nodal superconductors”

“Twistronics” paradigm has been tremendously successful in realizing strongly correlated and topological phases of electrons in two-dimensional semiconductors or semimetals. In my talk, I will show that twisted bilayers of nodal superconductors allow a similar degree of control over the neutral quasiparticles in superconductors.

I will demonstrate that the spectrum of the superconducting Dirac quasiparticles close to the gap nodes is strongly renormalized by twisting and can be further controlled externally. In particular, the application of an interlayer current transforms the system into a topological superconductor with a Chern number equal to the number of nodes, while magnetic field can be used to create periodic lattices of alternating Chern domains. Close to the “magic angle”, where the Dirac velocity of the quasiparticles is found to vanish, the interactions between them lead to a time-reversal symmetry breaking transition. A promising platform to observe these effects is provided by the high-Tc cuprates, and I will discuss the theoretical description of the recent experiments on twisted flakes of $Bi_2Sr_2CaCu_2O_{8+x}$.