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Resonant to bound state transitions in superconducting graphene: roles of local spin-orbit coupling and magnetic moments.[1] DENIS KOCHAN, University of Regenbsurg, LUCIA KOMENDOVA, Uppsala University, JAROSLAV FABIAN, University of Regenbsurg — The unique electronic band structure of graphene allows formation of resonant states near its charge neutrality point. Resonant impurities that locally enhance spin dynamics, via adatom induced local spin-orbit coupling (SOC), or local magnetic moments, turn those resonances into spin hot spots, that strongly affect spin-relaxation. It is of great practical and theoretical importance to disentangle effects originating from the local SOC and the local magnetic moments.
Superconducting graphene offers such a possibility. The proximity induced gap can significantly affect the formation of resonances. Moreover, the interplay between s-wave pairing and local spin dynamics creating the spin hot spots causes formation of bound states (Shiba states). Those can be detected and analyzed by STM experiments. We discuss the formation of such bound states focusing on LDOS and spatial variation of the superconducting pairing, exploring potential imprints distinguishing local SOC features from local magnetic moments.

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