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Topological Yu-Shiba-Rusinov chain in monolayer transition-metal dichalcogenide superconductors[1] JUNHUA ZHANG, VIVEK AJI, University of California, Riverside — Monolayers of transition-metal dichalcogenides (TMDs) are two-dimensional materials whose low energy sector consists of two inequivalent valleys. The valence bands have a large spin splitting due to lack of inversion symmetry and strong spin-orbit coupling. Furthermore the spin is polarized up in one valley and down in the other (in directions perpendicular to the two-dimensional crystal). We focus on lightly hole-doped systems where the Fermi surface consists of two disconnected circles with opposite spins. For both proximity induced and intrinsic local attractive interaction induced superconductivity, a fully gapped intervalley pairing state is favored in this system, which is an equal superposition of the singlet and the m=0 triplet for the lack of centrosymmetry. We show that a ferromagnetically ordered magnetic-adatom chain placed on a monolayer TMD superconductor provides a platform to realize one-dimensional topological superconducting state characterized by the presence of Majorana zero modes at its ends. We obtain the topological phase diagram and show that the topological superconducting phase is affected not only by the adatom spacing and the direction of the magnetic moment, but also by the orientation of the chain relative to the crystal.

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