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A Density Matrix Embedding Theory Study of Superconductivity in Spin-Valley Locked Systems JORDAN VENDERLEY, Cornell University, JASON IACONIS, LEON BALENTS, UCSB, EUN-AH KIM, Cornell Univerisity, EUN-AH KIM'S GROUP AT CORNELL TEAM, LEON BALENTS' GROUP AT UCSB TEAM — A recent perturbative renormalization group study (1) raised the possibility that interplay between spin-valley locking and repulsive interactions in p-doped type VI transition metal dichalcogenides can lead to topological superconductivity. However, a more recent density matrix renormalization group (DMRG) study indicated that there is a threshold interaction strength for the pair field at the edge to reveal robust p-wave pairing tendencies in the bulk. Unfortunately, the DMRG study was limited to a quasi-one dimensional system of limited size as is standard for DMRG. In order to mitigate the finite size effects and the constraints of the quasi-one-dimensional system and to elucidate the possibility of topological superconductivity in spin-valley locked system with finite interaction strength, we turn to density matrix embedding theory (DMET). Herein, we spontaneously break particle-number symmetry according to the different irreducible representations of the lattice and observe how the associated order parameters evolve under the DMET self-consistency procedure. This enables us to investigate the phase diagram in a truly two-dimensional fashion and more faithfully determine the dominant superconducting instabilities. (1) Hsu et al. ArXiv e-prints (2016), 1606.00857.

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