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SU(4) quantum spin liquids in critical Coulomb impurity lattices on MoS₂ X. DOU, University of Oklahoma, V. N. KOTOV, University of Vermont, BRUNO UCHOA, University of Oklahoma — In the critical regime, massive Dirac fermions are known to form a bound state in the vicinity of a Coulomb impurity. We find that in the presence of electron-electron interactions, the electrons in this bound state will valley and spin polarize. We show that the interaction of the spin and valley polarized electrons bounded to two different Coulomb impurities naturally maps into a Heisenberg model with SU(4) symmetry. We propose that quantum spin-orbital liquids with that symmetry can be engineered in artificial Coulomb impurity lattices on the surface of MoS₂ monolayer. We discuss possible experiments to detect those states.

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