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Strongly correlated magnetic phases of the spin orbit coupled spin-1 Bose-Hubbard chain JEDEDIAH PIXLEY, WILLIAM COLE, Condensed Matter Theory Center and Joint Quantum Institute, Department of Physics, University of Maryland, College Park, MATTEO RIZZI, University of Mainz, Institute of Physics, IAN SPIELMAN, Joint Quantum Institute, National Institute of Standards and Technology, and University of Maryland — Motivated by the ability to engineer artificial gauge fields in ultra cold atomic gases we consider the strong coupling phases of the one-dimensional spin-1 Bose-Hubbard model in the presence of a spin orbit coupling. We determine the low energy magnetic Hamiltonian that describes the bosonic Mott insulating phases with an odd integer filling, which is a spin-1 ferromagnetic bilinear-biquadratic model in a spiral magnetic field. We solve the effective spin Hamiltonian using the density matrix renormalization group and determine the zero temperature quantum phase diagram.

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