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Classification of spin liquids in materials with strong spin-orbit coupling JOHANNES REUTHER, SHU-PING LEE, JASON ALICEA, California Institute of Technology — The investigation of spin liquids is a fascinating field in condensed matter physics that is increasingly motivated by experiments. Exhaustive classifications of spin liquids have been carried out in several systems, particularly when full SU(2) spin-rotation symmetry is present. Systematic studies that explore strongly spin-orbit-coupled magnetic compounds (for which there are many experimental examples) are, however, relatively scarce. We report on a classification of Z_2 spin liquids on the square lattice when SU(2) spin symmetry is maximally lifted. Using projective symmetry group methods, we find that, surprisingly, the lifting of spin symmetry yields vastly more spin liquid states compared to SU(2)-invariant systems. Many of these spin liquids possess gapless edge states protected by lattice symmetries and, hence, constitute magnetic analogues of topological crystalline superconductors.

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