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Topological quantum paramagnet in a quantum spin ladder DARSHAN JOSHI, ANDREAS SCHNYDER, Max-Planck-Institute for Solid State Research, Stuttgart — Recently, it has been shown that analogs of quantum Hall systems could be realized in quantum magnets. Most of these works have focused on the symmetry broken phases in magnetic systems. In this work, we consider the dimer-quantum-paramagnetic phase of a S= 1/2 quantum spin ladder, which does not break any symmetry of the parent Hamiltonian. We show that in the presence of Dzyaloshinskii-Moriya interaction and external magnetic field the paramagnetic phase is actually split into a topologically trivial and a topologically non-trivial phase. We calculate the winding number and the end-states in this topologically non-trivial phase. The topological aspect is a consequence of the reflection symmetries present in the model and other models with similar properties may also realize the same physics.

Darshan Joshi
Max-Planck-Institute for Solid State Research, Stuttgart

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