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Quantum antiferromagnetic Heisenberg half-odd integer spin model as the entanglement Hamiltonian of the Affleck-Kennedy-Lieb-Tasaki valence bond solid states GUANG-MING ZHANG, Tsinghua University, Beijing — Applying a symmetric bulk bipartition to the one-dimensional Affleck-Kennedy-Lieb-Tasaki valence bond solid (VBS) states for the integer spin-S Haldane gapped phase, we can create an array of fractionalized spin-S/2 edge states with the super unit cell l in the reduced bulk system, and the topological properties encoded in the VBS wave functions can be revealed. The entanglement Hamiltonian (EH) with $l = even$ corresponds to the quantum antiferromagnetic Heisenberg spin-S/2 model. For the even integer spins, the EH still describes the Haldane gapped phase. For the odd integer spins, however, the EH just corresponds to the quantum antiferromagnetic Heisenberg half-odd integer spin model with spinon excitations, characterizing the critical point separating the topological Haldane phase from the trivial gapped phase. Our results thus demonstrate that the topological bulk property not only determines its fractionalized edge states, but also the quantum criticality associated with the topological phase, where the elementary excitations are precisely those fractionalized edge degrees of freedom *confined* in the bulk of the topological phase.

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