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Critical theory of the topological quantum phase transition in the AKLT–SZH chain HONG-CHEN JIANG, Microsoft Research, Station Q, University of California, Santa Barbara, CA 93106, STEPHAN RACHEL, Yale University, Department of Physics, New Haven, CT 06520, ZHENG-YU WENG, Institute for Advanced Study, Tsinghua University, Beijing, 100084, P. R. China, SHOU-CHENG ZHANG, Department of Physics, McCullough Building, Stanford University, Stanford, CA 94305, ZHENGHAN WANG, Microsoft Research, Station Q, University of California, Santa Barbara, CA 93106 — We systematically study the phase diagram of $S = 2$ spin chain by means of density-matrix renormalization group and exact diagonalization. We find two gapped phases which are topologically distinct: the AKLT phase is characterized by $S = 1$ edge spins while the SZH phase by $S = 3/2$ edge spins. Except from a multicritical point where a direct topological quantum phase transition occurs, we identify a dimer phase between both gapped phases. The whole phase boundary between dimer and SZH phases, including the multicritical point, is a critical line with central charge $c = 5/2$. Finally, we propose and confirm that this line corresponds to $SO(5)_1$ Wess–Zumino–Witten conformal field theory.

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