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Phase Diagram of Spin-1/2 Triangular Antiferromagnet in a Magnetic Field RU CHEN, HYEJIN JU, Department of Physics, University of California, Santa Barbara, CA-93106-9530, HONGCHEN JIANG, Kavli Institute for Theoretical Physics, University of California, Santa Barbara, CA-93106-9530, OLEG STARYKH, Department of Physics, University of Utah, Salt Lake City, Utah 84112, LEON BALENTS, Kavli Institute for Theoretical Physics, University of California, Santa Barbara, CA-93106-9530 — We investigate the spin-1/2 quantum Heisenberg antiferromagnet on both two-dimensional triangular lattice and N-leg triangular ladder. The model describes isotropic Heisenberg chains (exchange constant J) coupled antiferromagnetically through interchain diagonal bonds (exchange constant J'). We study different regions using various controlled theoretical methods. Primarily we focus on the region slightly below saturation field. We show that the cone-coplanar state transition is absent, while commensurate-incommensurate transition emerges right below the saturation field for two-dimensional triangular lattice. We also determine the ground states in the limit $J' \ll J$, using one-dimensional bosonization, renormalization group methods and current algebra. Finally, we compare our theoretical result with DMRG result for N-leg ladder.

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