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Biaxial nematic phase of two dimensional disordered rotor models and spin-one bosons in optical lattices JEAN-SEBASTIEN BERNIER, University of Toronto, KRISHNENDU SENGUPTA, Saha Institute of Nuclear Physics, YONG BAEK KIM[1], University of Toronto — We show that the ground state of disordered rotor models with quadrupolar interactions can exhibit biaxial nematic ordering in the disorder-averaged sense. We present a mean-field analysis of the model and demonstrate that the biaxial phase is stable against small quantum fluctuations. We point out the possibility of experimental realization of such rotor models using ultracold spin-one Bose atoms in a spin-dependent and disordered optical lattice in the limit of a large number of atoms per site and also suggest an imaging experiment to detect the biaxial nematicity in such systems.

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