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Emergence of Quantum Liquid Crystals of Bosons in Kagome Lattices with Synthetic Gauge Fields GUANYU ZHU, JENS KOCH, Northwestern University, IVAR MARTIN, Argonne National Laboratory — We consider a family of tight-binding models based on a kagome lattice with local synthetic gauge flux, which have a lowest flat band in the single particle spectrum. The flat band is spanned by eigenstates forming localized loops on the lattice, with the maximally compact loop states typically breaking the discrete rotational symmetry of the lattice. When populated by locally-interacting particles, the close packing of such maximally compact loop states leads to a nematic loop crystal ground state. If the particles are bosons, we show that mean field theory predicts that increasing filling beyond the close packing filling fraction leads to the formation of quantum liquid crystals including a nematic supersolid and a nematic superfluid phase with broken lattice rotation and $U(1)$ symmetry.

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