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Wigner-crystallization of Rydberg-Polaritons in the lowest Landau level FABIAN GRUSDT, MICHAEL FLEISCHHAUER, Department of Physics and Research Center OPTIMAS, TU Kaiserslautern — For electrons and dipolar fermions in the lowest Landau level the critical filling for Wigner-crystallization was shown to be $\nu_c \approx 1/7$ [Baranov et. al., Phys. Rev. Lett. 100 (2008)]. We investigate the fractional quantum Hall effect for Van-der-Waals interacting bosons as realized e.g. by stationary-light polaritons in a Rydberg gas and find no transition to the Wigner crystal (WC). Our numerical studies suggest a crystalline groundstate below $\nu = 1/6$ which is expected to be described by a correlated WC of composite quasiparticles. Taking into account a cut-off in the Van-der-Waals interaction we find the WC to be favorable for large cut-offs. Numerical results for different geometries are presented and realistic implementations are discussed.

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