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Quantum crystallography of Rydberg-dressed Bose gases on a square lattice[1] WEN-CHIN WU, CHE-HSIU HSUEH, National Taiwan Normal University, MAKOTO TSUBOTA, Osaka City University — We numerically investigate the quantum crystallographic phases of a Rydberg-dressed Bose gas loaded on a square lattice by using the mean-field Gross–Pitaevskii model. For a relatively weak lattice confinement, the phases of ground state undergo amorphism, polycrystal, and polymorphism following the increase of the blockade radius, and if the confinement is stronger, a single crystal with a specific filling factor will be formed. In order to distinctively characterize these phases, the structure function is also studied. In such an anisotropic system, we show that the superfluid-fraction tensor should be a measurable quantity, and an anisotropy parameter can be defined. In addition, for such crystallographic phases, the interaction potential can manifest where the grain boundaries appear.

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