Superfluid and supersolid phases of dipolar Bose gases in an optical lattice[1] IPPEI DANSHITA, Department of Physics, Waseda University, Tokyo, Japan, CARLOS A.R. SA DE MELO, School of Physics, Georgia Institute of Technology, Atlanta, GA — We study a superfluid (SF) phase and supersolid (SS) phases of a dipolar Bose gas at zero temperature in a two-dimensional (2D) optical lattice. We consider the situation in which the dipoles are polarized by an additional external field and the anisotropy of the long-range dipolar interaction is tunable by varying the direction of the polarization. In this situation, two types of supersolid ordering can occur: not only checkerboard ordering but also stripe one. We apply a mean-field approximation to the extended Bose-Hubbard model and determine the phase boundaries between a SF, a checkerboard SS, a striped SS, and collapse. We find a direct phase transition between a checkerboard SS and a striped SS. We also find that this transition is a first-order one and is characterized by a hysteretic behavior.

Ippei Danshita
Department of Physics, Waseda University, Tokyo, Japan

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