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Quantum Phases of Bose-Einstein condensates in rotating optical lattice[1] SANKALPA GHOSH, RASHI SACHDEVA [2], SONIKA JOHRI[3], Physics Department, Indian Institute of Technology, Delhi — Ultra cold Bose-Eintstein condensate of alkali atoms loaded in a deep optical lattice shows transition from the Superfluid(SF) phase to Mott Insulator(MI) Phase as the depth of the lattice potential is varied. When these phases are exposed to the effect of a rotation which is equivalent to apply the effect of of a magnetic field to such neutral atomic condensate, novel vortex lattice phases arises. The nature of the such vortex lattice phases strongly depend upon the strength and range of the interaction as well as the strength of the rotation. Whether the system is in deep inside the superfluid phase or near the SF-MI transition boundary strongly influences the structure of the vortex lattice or nature of the vortex core. Using mean field Gutzwiller ansatz and imposing various type of boundary conditions that mimic a number of external applied potential we study such vortex and vortex lattice phase diagram for such Bose-Einestein condensates in such rotated optical lattice. We also point out how experimentally one should be able to identify such novel collective phases of vortices.

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