Bosons with Artificial Gauge Fields and Mott Physics on the Honeycomb Lattice IVANA VIDANOVIC, Scientific Computing Laboratory, Institute of Physics Belgrade, University of Belgrade, Serbia and ITP, Goethe-Universität, Frankfurt/Main, Germany, ALEXANDRU PETRESCU, Yale University, New Haven, CT, USA and CPHT, Ecole Polytechnique, Palaiseau, France, KARYN LE HUR, CPHT, Ecole Polytechnique, Palaiseau, France, WALTER HOFSTETTER, Institut für Theoretische Physik, Johann Wolfgang Goethe-Universität, Frankfurt/Main, Germany — We study bosons in the tight-binding model on the honeycomb lattice introduced by Haldane. We analyze the ground state topology and quasiparticle properties in the Mott phase by applying bosonic dynamical mean field theory, strong-coupling perturbation theory, exact diagonalization and numerical evaluations of sample Hall conductivity. The phase diagram also contains two different superfluid phases. The quasiparticle dynamics, number fluctuations, and local currents are measurable in cold atom experiments.

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