Quasiparticle Berry curvature and Chern numbers in spin-orbit-coupled bosonic Mott insulators CLEMENT WONG, University of Wisconsin, Madison, REMBERT DUINE, Utrecht University — We study the ground-state topology and quasiparticle properties in bosonic Mott insulators with two-dimensional spin-orbit couplings in cold atomic optical lattices. We show that the many-body Chern and spin-Chern number can be expressed as an integral of the quasihole Berry curvatures over the Brillouin zone. Using a strong-coupling perturbation theory, for an experimentally feasible spin-orbit coupling, we compute the Berry curvature and the spin Chern number and find that these quantities can be generated purely by interactions. We also compute the quasiparticle dispersions, spectral weights, and the quasimomentum space distribution of particle and spin density, which can be accessed in cold-atom experiments and used to deduce the Berry curvature and Chern numbers. Physical Review A **88**, 053631 (2013)

Clement Wong
University of Wisconsin, Madison

Date submitted: 14 Nov 2013

Electronic form version 1.4