The benefit of interactions in the manifestation of topological edge states in spinor Bose systems with soft boundaries BOGDAN GALILO, Department of Mathematics, Imperial College London, DEREK K. K. LEE, Department of Physics, Imperial College London, RYAN BARNETT, Department of Mathematics, Imperial College London — We investigate the Kane-Mele model for spin 1 ultra-cold Bose atoms. We show that in the presence of a harmonic trap, interactions can facilitate the emergence of topological edge states by screening the effect of the trap. A sharpening of boundaries around the screening radius occurs. We find that for sufficiently weak harmonic traps the number of edge states is higher than in the commonly adopted case of hard-wall boundary conditions. Our calculations show that the number of edge states is determined by the ratio of the energy gap and the product of the Thomas-Fermi radius, harmonic frequency, atomic mass, and lattice constant. The latter determines the slope of the screened potential and forms a characteristic energy scale at the boundary. Our results can be extended to other lattice models of interacting spin-1 boson particles.

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