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Hidden order in one dimensional Bose insulators EMANUELE DALLA TORRE, Department of Condensed Matter Physics, The Weizmann Institute of Science, EREZ BERG, Department of Physics, Stanford University, EHUD ALTMAN, Department of Condensed Matter Physics, The Weizmann Institute of Science — We investigate the phase diagram of spinless bosons with long range ($\propto 1/r^3$) repulsive interactions, relevant to ultracold polarized atoms or molecules, using DMRG. Between the two conventional insulating phases, the Mott and density wave phases, we find a new phase possessing hidden order revealed by non local string correlations analogous to those characterizing the Haldane gapped phase of integer spin chains. We develop a mean field theory that describes the low energy excitations in all three insulating phases. This is used to calculate the absorption spectrum due to oscillatory lattice modulation. We predict a sharp resonance in the spectrum due to a collective excitation of the new phase that would provide clear evidence for the existence of this phase.

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