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Bosonic and Fermionic Cold atoms in optical lattices. MIGUEL A. CAZALILLA, Donostia International Physics Center, ANDREW F. HO, University of Birmingham, THIERRY GIAMARCHI, University of Geneva — We examine the properties of coupled one dimensional tubes of Bosons or Fermions, in an optical lattice. For bosons, we find that the intertube coupling induces a deconfinement transition where the system goes from a one dimensional Mott insulator to a three dimensional superfluid. We compute the phase diagram and physical properties and discuss the results in connection with experiments on cold atoms. For fermions, the presence of the optical lattice allows for a richer phase diagram than for standard interacting fermions in one dimension. We analyse the resulting phases and discuss how to observe them for cold atoms

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