Bosonic Mixtures in one-dimensional optical lattices I. LUDWIG MATHEY, NIST, Gaithersburg, and JQI, UMD, ANZI HU, JQI, UMD, and NIST, Gaithersburg, IPPEI DANSHITA, JQI, UMD, and Waseda University, Tokyo , CARL WILLIAMS, JQI, UMD, and NIST, Gaithersburg, CHARLES CLARK, NIST, Gaithersburg, and JQI, UMD — We study binary bosonic mixtures of ultracold atoms, confined to one dimension in an optical lattice, for various densities. Within a Luttinger liquid description, using renormalization group equations at second order, we determine both ordered and quasi-ordered phases of these mixtures. At commensurate filling, e.g. unit-filling and half-filling, we find different types of localized phases, whereas for densities that are incommensurate to the lattice, but equal for the two species, we find the behavior of a spin gap transition. We discuss the properties of the various phases, and how they could be detected in experiment.

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