



**International Conference on Multi-Condensate Superconductivity and
Superfluidity in Solids and Ultra-Cold Gases
14 - 18 May 2018 (Trieste, Italy)**

Two-Component Bosonic Chain in Artificial Gauge Field

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Abstract:

Two component bosons on a chain in artificial gauge field present a transition under flux between a one dimensional analog of the Meissner state and a one dimensional analog of the Vortex state [1]. With only interactions between the same kind of bosons, the Meissner-Vortex phase transition belongs to the commensurate-incommensurate universality class. As interactions between different kind of bosons are added, an intermediate phase density wave (DW) phase appears between the Meissner and the Vortex phase.

We discuss the effect of this attractive/repulsive interaction on the phase diagram of the system using DMRG estimates for various observables that allow the characterizations of the different phases [2].

[1] M. Atala, M. Aidelsburger, M. Lohse, JT. Barreiro, B. Paredes and I. Bloch, Nat Phys 10 588 (2014)

[2] E. Orignac, R. Citro, M. Di Dio and S. De Palo Phys. Rev. B 96 014518 (2017) and arXiv:1802.04997.