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Dipolar gases in two coupled one-dimensional lattices MARIANNE BAUER, Cambridge University, MEERA PARISH, University College London — We consider dipolar bosons in two tubes of one-dimensional lattices, where the boson filling fraction is the same in each tube and the dipoles are aligned to be maximally repulsive. In the classical limit of zero inter-site hopping, the bosons arrange themselves into an ordered crystal for any rational filling fraction, forming a complete devil's staircase like in the single tube case [1]. When we turn on hopping within each tube, we obtain a competition between the crystalline Mott phases and a superfluid of defects or solitons. However, in contrast to the single tube case [2], we find that solitons in different tubes can bind into pairs for certain topologies of the filling fraction. This provides an intriguing example of pairing that is purely driven by correlations close to a Mott insulator.

[1] P. Bak and P. Bruinsma, Phys. Rev. Lett. 49, 249 (1982)
[2] F. J. Burnell, M. M. Parish, N. R. Cooper and S. L. Sondhi, Phys. Rev. B, 80, 174519 (2009)

Marianne Bauer
Cambridge University

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