

# Bosonic Double Ring Lattice Under Artificial Gauge Fields

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We consider a system of weakly interacting bosons confined on a planar double lattice ring subjected to two artificial gauge fields. We determine its ground state by solving coupled discrete non-linear Schrödinger equations at mean field level. At varying inter-ring tunnel coupling, flux and interactions we identify the vortex, Meissner and biased-ladder phases also predicted for a bosonic linear ladder by a variational Ansatz. We also find peculiar features associated to the ring geometry, in particular parity effects in the number of vortices, and the appearance of a single vortex in the Meissner phase. We show that the persistent currents on the rings carry precise information on the various phases. Finally, we propose a way of observing the Meissner and vortex phases via spiral interferogram techniques.

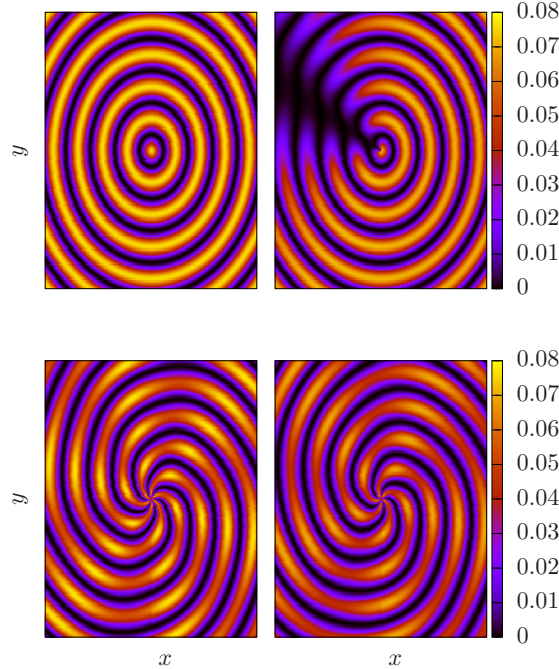


Figure 1: Spiral interferogram in the Meissner phase (upper panels), and in the vortex phase (lower panels) showing the parity effect of the total flux  $\Phi$  on the number of vortices.