Minicolloque n° PMQ32 • **Oral**

Probing the BCS-BEC crossover with persistent currents

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We study the persistent currents of an attractive Fermi gas confined in a tightly-confining ring trap and subjected to an artificial gauge field all through the BCS-BEC crossover. At weak attractions, on the BCS side, fermions display a parity effect in the persistent currents, ie their response to the gauge field is paramagnetic or diamagnetic depending on the number of pairs on the ring. At resonance and on the BEC side of the crossover we find a doubling of the periodicity of the ground-state energy as a function of the artificial gauge field and disappearance of the parity effect, indicating that persistent currents can be used to infer the formation of tightly-bound bosonic pairs. Our predictions can be accessed in ultracold atoms experiments through noise interferograms.

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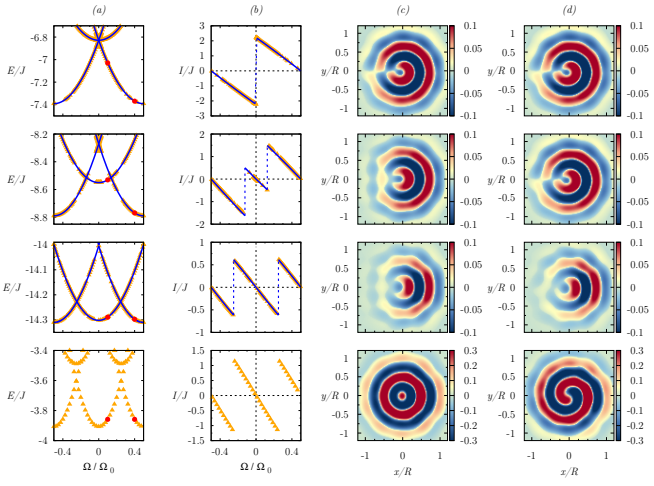

Figure 1 : Columns (a) and (b) energies and current vs flux for N/2 even number of particles. Columns (c) and (d) the noise correlator for two different values of flux. A circulating state is characterised by a spiral-like correlator, not symmetric by inversion with respect to the y=0 axis. We observe the parity effect to disappear at strong interactions.