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Protocols for probing topological edge modes and dimerization with atomic fermions in optical potentials MEKENA METCALF, CHEN-YEN LAI, CHIH-CHUN CHIEN, Univ of California - Merced — We propose protocols to probe localized edge states in a dimerized chain using cold Fermi gases. Standard trapping methods impose a confining harmonic potential preventing detection of edge states because addition of the trapping potential fuses zero-energy eigenstates into the bulk energy spectrum. An alternative trapping method with atoms confined in ring lattice, whose boundary conditions are transformed from periodic to open using an off resonant laser sheet, will induce topological modes under suitable conditions. Addition of a time-dependent artificial gauge field along the circumference of the ring results in mass transport mainly from bulk modes; measurement of the density demonstrates the remaining edge state. Signatures of dimerization in the presence of onsite interactions can be found in correlations as the system transforms from periodic to open boundary conditions. Persistence of finite correlations when the system undergoes a boundary transformation reveals a memory effect of the dimerized, initial structure.

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