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Strongly Correlated Few-Boson Dynamics in Waveguides PETER SCHMELCHER, Physikalisches Institut, University of Heidelberg, SASCHA ZOELLNER, Theoretische Chemie, University of Heidelberg, VLADIMIR MELEZHIK, Bogoliubov Laboratory of Theoretical Physics — The transition of a one-dimensional trapped few-boson system from weak to strong correlations including the fermionized limit is investigated. Our numerically exact analysis, based on the Multi-Configuration Time-Dependent Hartree method, explores the interplay between different shapes of external trapping and inter-particle forces by analyzing the one-particle density and density matrix as well as the two-particle correlation function. The main focus is the exploration of few-boson tunneling in multi-well systems. As we pass from weak interactions to the fermionization limit, the Rabi oscillations first give way to highly delayed correlated pair tunneling, whereas for very strong correlations multi-band Rabi oscillations include fragmented pair tunneling. Finally we briefly discuss the recently found effect of confinement induced transparency of ultracold scattering in a strongly confining waveguide. The underlying mechanism is the interference of the gerade and ungerade scattering contributions leading to transparency in the cold collisions This is the dual effect to the well-known confinement-induced resonance.

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