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Bound and scattering properties in waveguides around free-space Feshbach resonance[1] GAOREN WANG, Center for Optical Quantum Technologies, University of Hamburg, Hamburg, Germany, PANOGIOTIS GIANNAKEAS, Department of Physics and Astronomy, Purdue University, Indiana, USA, PETER SCHMELCHER, Center for Optical Quantum Technologies, University of Hamburg, Hamburg, Germany; The Hamburg Centre for Ultrafast Imaging, Hamburg, Germany — The two-body bound and scattering properties in an one-dimensional (1D) harmonic waveguide in the vicinity of free-space magnetic Feshbach resonances are investigated based on the local frame transformation approach. The multichannel characteristics of the interatomic interaction is taken into account. We examine the crossing between the bound state in the waveguide and the ground level of the transverse confinement, i.e. when the bound state crosses the scattering threshold in the waveguide and turns into a continuum state. For s-wave collision, the crossing occurs at the magnetic field where the effective 1D interaction strength g_{1D} vanishes, and the effective 1D scattering length a_{1D} diverges. This observation indicates that the molecular formation or atom loss signal in a harmonic waveguide is expected at the magnetic field where a_{1D} is infinite. Molecule formation is absent at position of the confinement induced resonance which is characterized by the divergence of g_{1D}.

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