

Elke Fasshauer

Electron Dynamics
with MCTDHF: Few Fermion Tunneling

The tunneling of one electron through a potential is analytically solvable and a quantum mechanics textbook example. But what happens, if not only one electron is involved, but several electrons are trapped? To answer this basic question, the quantum dynamics of two electrons were studied using the Multi-Configurational Time-Dependent Hartree for Fermions (MCTDHF) method [1] implemented in the MCTDH-X program package [2]. This method allows for a numerically exact description. We show that the fermions tunnel through the barrier individually, while they escape over the barrier collectively [3].

[1] O. E. Alon, A. I. Streltsov, L. S. Cederbaum, J. Chem. Phys. 127, 154103 (2007).

[2] A. U. J. Lode, M. C. Tsatsos, E. Fasshauer, The Multiconfigurational Time-Dependent Hartree for Indistinguishable Particles X package (2015),

<http://ultracold.org>. [3] E. Fasshauer, A. U. J. Lode, J. Phys. Rev. A 93, 033635 (2016).