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Transport Properties of a Mott-like State of Molecules STEPHAN DUERR, NIELS SYASSEN, DOMINIK BAUER, THOMAS VOLZ, MATTHIAS LETTNER, DANIEL DIETZE, GERHARD REMPE, Max-Planck-Institute for Quantum Optics, Hans-Kopfermann-Str. 1, 85748 Garching, Germany — In Ref. [1] we showed the preparation of a Mott-like state of molecules. This state is a quantum state with exactly one molecule at each site of an optical lattice. We now study the transport properties in the Mott-like state. A molecule can tunnel with an amplitude J_m to an adjacent site. If there is already another molecule at that site the molecules can collide inelastically [2], leading to loss of both molecules from the sample. This loss occurs with a rate coefficient Γ which is typically much faster than $J_m/\hbar$. The fast on-site loss leads to a suppression of tunneling. Loss from the initial state effectively occurs with a rate $\Gamma_{\text{eff}} \propto J_m^2/\Gamma$. This effect is studied experimentally at different lattice depths and the results are compared with theoretical predictions.

[1] T. Volz et al. Nature Physics **2**, 692 (2006).
[2] N. Syassen et al. Phys. Rev. A **74**, 062706 (2006).

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