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Quantum dynamics of H + LiF and Li + HF collisions at ultracold temperatures[1] PHILIPPE WECK, BALAKRISHNAN NADUVALATH, University of Nevada Las Vegas, Las Vegas, NV 89154 — The rapid progress in experimental methods such as photoassociation and Feshbach resonance methods led recently to the creation of Bose-Einstein condensates of molecules. This technical breakthrough opens new perspectives in the study of intermolecular interactions and offers new opportunites for the study of rovibrational relaxation and chemical reactivity in ultracold gases. In this work, we present quantum scattering calculations of H + LiF and Li + HF collisions at cold and ultracold temperatures for which the reactions proceed by quantum tunneling of the relatively heavy F atom through a barrier along the reaction path. Particular effort is made here to assign resonances due to the decay of metastable states of the Li$\cdots$FH and H$\cdots$LiF van der Waals complexes. The unusually deep van der Waals wells give rise to long-lived collision complexes and narrow scattering resonances in the energy dependence of reaction cross sections. The effect of vibrational excitation on the reactivity is also explored.

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