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Building a Quantum Defect Theory model for Ultracold collisions of Lithium atoms. ALYSON LASKOWSKI, NIRAV MEHTA, Trinity University — For small separation distances, the atom-atom interaction is characterized by a deep potential well on the order of a few thousand Kelvin, while at larger separations distances, the interaction is modeled by a shallow attractive tail with energies on the order of μK or mK. We are building a QDT model to describe the collisions of ultracold lithium atoms. We use the Morse/long-range potential model of Le Roy [J.Chem.Phys. 131,204309 (2009)], which accurately represents the short-range, deep potential well, and reduces to the Van der Waals C_6/r^6 (with higher order corrections) at long range. For these calculations, we have used a numerical variant of QDT based on Milne phase amplitude method that is capable of treating higher partial waves[PRA 87,032706 (2013)], which we have tested previously using square wells at short range against exact numerical solutions. We are now extending calculations of bound state energies, phase shifts and cross sections to incorporate multichannel effects within the lowest manifold of $X^1\Sigma_g^+$ potentials.

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