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Multichannel quantum defect theory model of Feshbach resonances THOMAS HANNA, National Institute of Standards and Technology, EITE TIESINGA, PAUL JULIENNE, Joint Quantum Institute, NIST and University of Maryland — Multichannel quantum defect theory (MQDT) has a large number of applications in atomic physics, including the properties of collisions near threshold. The key concept is that the short range physics can be accounted for very simply and then matched to the asymptotic long range interaction. We have developed a model of Feshbach resonances based on the ideas of MQDT. This model allows calculation of the magnetic fields at which resonances occur, as well as properties such as the resonance width and background scattering length. Apart from known atomic properties, only three input parameters are required: the singlet and triplet scattering lengths, and the coefficient of the long range van der Waals potential. Analytic reference functions defined by the potential [1] are used to calculate the long range properties, which are linked to the short range physics through a frame transformation. We apply our theory to ^{6}Li-^{40}K scattering, and obtain good agreement with experimental data and full coupled channels calculations, but with far less computational effort. This makes MQDT a useful tool for investigating collisions of new combinations of species. [1] B. Gao *et al.*, Phys. Rev. A **72**, 042719 (2005).

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