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Universal features for spin dipolar losses in atomic bose gases QI LIU, YUAN-GANG DENG, YI-QUAN ZOU, Department of Physics, Tsinghua University, SU YI, CAS Key Laboratory of Theoretical Physics, Institute of Theoretical Physics, Chinese Academy of Sciences, MENG KHOON TEY, LI YOU, State Key Laboratory of Low Dimensional Quantum Physics, Department of Physics, Tsinghua University;Collaborative Innovation Center of Quantum Matter — Like elastic collisions, inelastic collisions provide exquisite information on interaction potentials. In an external magnetic field (B), spatially confined atoms can gain sufficient kinetic energies to escape due to spin flip inelastic collisions from magnetic dipole-dipole interaction (MDDI). This work reports combined experimental and theoretical studies of B-dependent loss lineshapes for ground state (F=1) ^{87}Rb atoms in a Bose-Einstein condensate (BEC) with high atom number resolution. The measured loss rates are explained using wave functions from a semi-analytic quantum-defect theory (QDT) [1,2], which is consistent with numerical coupled-channel (CC) calculations. In the limit of large s-wave scattering length ($|a_s|$), the observed interesting features constitute a universal form with a "dip" $B_\vee$ (for positive a_s) and a "peak" $B_\wedge$ (for either positive or negative a_s) in the respective loss channels for one or two atom spin flips. The specific values of $B_\vee$ and $B_\wedge$ are determined predominantly by a_s and also by the d-wave centrifugal barrier height $V_{l=2}$.

[1] Gao, B, Phys. Rev. A 58, 1728 (1998); Phys. Rev. A 64, 010701(R) (2001); Phys. Rev. A 78, 012702 (2008).
[2] Gao, B et al., Phys. Rev. A 72 042719 (2005).

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