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Deviation from Universality in Collisions of Ultracold $^6Li_2$ Molecules[1] TOUT T. WANG, MYOUNG-SUN HEO, TIMUR M. RVACHOV, DYLAN A. COTTA, WOLFGANG KETTERLE, MIT-Harvard Center for Ultracold Atoms — Collisions of $^6Li_2$ molecules reveal a striking deviation from universal predictions based on long-range van der Waals interactions. Li_2 closed-channel molecules are formed in the highest vibrational state near a narrow Feshbach resonance, and decay via two-body collisions with Li_2, Li, and Na. For Li_2+Li_2 and Li_2+Na, the decay rates agree with the universal predictions of the quantum Langevin model. In contrast, the rate for Li_2+Li is exceptionally small, with an upper bound ten times smaller than the universal prediction. This can be explained by the low density of available decay states in systems of light atoms [G. Quéméner, J.-M. Launay, and P. Honvault, Phys. Rev. A **75**, 050701 (2007)], for which such collisions have not been studied before.

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