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The Efimov effect for three dipoles[1] YUJUN WANG, J. P. D'INCAO, CHRIS H. GREENE, JILA and Department of Physics, University of Colorado at Boulder — The hyperspherical adiabatic representation is used to numerically solve the three-dipole problem. We show that this gives the characteristic Efimov potential in the limit of a zero-energy two-body bound state. Near such a dipole-dipole resonance, the infinite series of three-dipole Efimov states can strongly affect three-dipole collisions. A major finding is that the long-range dipolar interaction is particularly beneficial for the study of Efimov physics, in the following sense: In contrast to the usual Efimov effect, the 3-body bound and scattering properties are found to be universally determined by the s-wave scattering length and by the dipole length, i.e. they are insensitive to any three-body parameter. Moreover, the lifetime of Efimov states is found to increase with dipole moment. The universal scaling of the adiabatic hyperspherical potentials further implies scaling laws for the three-body recombination rates. Another result is that an effective repulsive interaction appears between a deeply-bound two-dipole molecule and a free dipole, which can stabilize an ultracold two-dipole dimer against collisional decay.

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