

Abstract Submitted
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Multiscale quantum defect theory for two atoms in a trap YU-JUN CHEN, BO GAO¹, University of Toledo — We present a multiscale quantum defect theory (QDT) for two atoms in a trap that combines the quantum defect theory for the Van der Waals interaction² at short distances with a QDT for the harmonic trapping potential at large distances. The theory provides a systematic understanding of not only how the trap states are effected by atomic interaction, but also how the molecular states are effected by trapping. The theory is applicable to arbitrary scattering lengths, and gives a simultaneous understanding of different angular momentum states by taking advantage of the angular-momentum insensitivities of short-range QDT parameters. In one sample application, we show that two atoms in a trap have a shape-dependent long-range correlation that becomes important for large scattering lengths.

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²B. Gao, Phys. Rev. A **64**, 010701 (R) (2001).

Bo Gao
University of Toledo

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