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Dynamic dipole polarizabilities of alkali dimers OLIVIER DULIEU, ROMAIN VÉXIAU, MIREILLE AYMAR, NADIA BOULOUFA, Laboratoire Aimé Cotton, CNRS, Université de Paris Sud, Orsay, France — Experiments aiming at trapping ultracold molecules and at manipulating their internal quantum state rely on their interaction with far-detuned laser fields. Using accurate potential energy curves and transition dipole moments from advanced quantum chemistry computations [1], we calculate the dynamic dipole polarizability of homonuclear and heteronuclear alkali dimers via a summation over a large number of excited electronic states. We identified ranges of "magic" wavelengths where the ac Stark shift for the dimer in its lowest vibrational level of the ground state is the same than for a pair of non-interacting atoms. We use the same formalism to evaluate dipole polarizabilities at imaginary frequencies which are relevant for computing long range interactions between atoms and molecules [2].

[1] M. Aymar and O. Dulieu, Mol. Phys. 105, 1733 (2007)
[2] A. Derevianko , S. G. Porsev, and J. F. Babb, arXiv:0902.3929v1 [physics.atom-ph] 23 Feb 2009

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