MAGNETIC CIRCULAR DICHROISM STUDY OF SPIN-ORBIT SPLITTING IN ALKALI DIMERS IN THE PRESENCE OF A HELIUM SURFACE

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We present the application of Magnetic Circular Dichroism (MCD) to the determination of the level structure of orbitally-degenerate electronic levels of molecules under the perturbation of a He droplet, which had so far escaped assignment. Our target system is the $(1)\ ^3\Pi_g$ [$(2)\ ^3\Pi$ if heteronuclear] manifold of alkali dimers.[a] The perturbation due to the droplet breaks the rotational symmetry around the internuclear axis of the diatom and causes a splitting of this orbitally-degenerate manifold. We extend to He droplets a model previously used to interpret the matrix spectra of the NH radical.[b] With a small number of physically reasonable parameters the model accounts for the essential features of laser-induced fluorescence (LIF) and magnetic circular dichroism (MCD) spectra of Rb_2 and K_2. MCD spectra are not only essential to the correct assignment of the observed structure, but also allow a determination of the populations of Zeeman sublevels in the ground state and thus a measurement of the surface temperature of the droplet. The latter agrees with the accepted temperature, 0.37 K, measured in the interior of a droplet.

[a] G. Auböck, J. Nagl, C. Callegari, and W. E. Ernst, *J. Phys. Chem. A* **111,** 7404 (2007).
[b] V. S. Langford and B. E. Williamson *J. Phys. Chem. A* **2415,** 102 (1998).