ELECTRONIC SPECTRA OF TRIPLET Rb_2 MOLECULES ON HELIUM NANODROPLETS. EFFECTS ON THE SPIN-ORBIT STATES.

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A beam of cold (0.4 K) superfluid helium droplets, each consisting of several thousand He atoms, is used for production and spectroscopic investigation of cold Rb_2 molecules in their lowest triplet state.
We have investigated the $^3\Pi_g \leftarrow {}^3\Sigma_u^+$ electronic absorption spectrum of Rb_2 at $\approx$13500 cm^{-1}, as well as its dispersed emission spectra. The absorption spectrum only shows two unstructured peaks separated by $\approx$200 cm^{-1}, and is well modeled with gas-phase potentials if an overall droplet-induced blue shift is included ($\approx$53 cm^{-1}). Of three accessible spin-orbit components the one with $\Omega = 1$ seems to be missing. This is confirmed by the emission spectra: The latter are sharp (confirming that emission occurs from the gas phase after separation from the droplet) and consequently much more detailed. We observe that such spectra can be modeled with emission from the $\Omega = 0, 2$ components alone and, for any given excitation frequency, only one component is needed.
Vibrational populations in the excited states are more evenly distributed ($v' = 0..9$) when emission occurs from $\Omega = 2$. In contrast, emission from $v' = 0$ is predominant in the $\Omega = 0$ state, where the vibrational relaxation rate must therefore be higher.
Atomic emission, corresponding to dissociation, is also present. Unlike the case of KRb, presented in the companion talk, no blue-shifted (singlet) emission is observed.