SPECTROSCOPY OF RUBIDIUM ATOMS AND MOLECULES ON COLD HELIUM NANODROPLETS

WOLFGANG E. ERNST, FRANK RUEDIGER BRUEHL AND RADU ALEX MIRON, *Departments of Physics and Chemistry, Penn State University, 104 Davey Laboratory, University Park, PA 16802*.

Rubidium atoms were deposited on helium nanodroplets containing 5000 to 10000 atoms and having 0.4 Kelvin internal temperature. Alkali atoms remain on the surface of the droplets and can react to form dimers and larger aggregates. Laser excitation spectra as well as the dispersed fluorescence after excitation were measured for Rb atoms on helium in the wavelength range of the Rb D lines, i.e. from 12,000 to 13,000 wavenumbers. The spectra are qualitatively similar to those of Na and K on He. The observed emission indicates the same alkali-helium exciplex formation as in the case of Na-He [a].

Absorption and emission spectra of triplet dimers of rubidium were found near 15,000 and 16,800 wavenumbers. They were attributed to absorption from the triplet sigma ground state to excited triplet sigma and triplet pi states, respectively. First conclusions about the excited state potentials and comparisons with previous ab-initio calculations will be reported.

[a] J. Reho, C. Callegari, J. Higgins, W.E. Ernst, K. K. Lehmann, and G. Scoles, Faraday Discussions 108, 161-174 (1997).