Laser induced fluorescence and beam depletion spectroscopy of K atoms attached to large hydrogen clusters

C. Callegari, F. Stienkemeier [a], J. Higgins, and G. Scoles, *Department of Chemistry, Princeton University, Princeton, New Jersey 08544.*

Hydrogen clusters are produced in a supersonic expansion and are subsequently doped with K atoms by passing the beam through a pick-up cell containing K vapor at a pressure of about 10^{-2} Pa. Optical $4^2P_{\frac{3}{2},\frac{1}{2}} \leftarrow 4^2S_{\frac{1}{2}}$ spectra for K atoms are obtained in two different ways:

a) by Laser Induced Fluorescence (LIF)

b) by measuring the Beam Depletion (BD) induced by the laser using a hot wire surface ionization detector located downstream of the LIF collector

For hydrogen clusters the LIF spectra are two orders of magnitude lower in intensity as compared to those obtained using He clusters, due to quenching. The LIF spectra consist of several narrow features near the gas phase potassium doublet and a second series of very broad features located about 300-600 cm^{-1} to the blue. The BD spectrum shows surprising differences from the LIF. The blue-shifted features are still present, but most of the absorption is now located under a prominent envelope (about 200 cm^{-1} broad) centered on the gas phase doublet. These differences will be discussed at the meeting.

[a]Present address: Fakultät für Physik, Universität Bielefeld, D-33615 Bielefeld, Germany