Laser Spectroscopy of Proton Transfer Systems in Supercooled Helium Droplets

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In the last decade, mainly due to the works of Scoles [1], Vilesov and Toennies [2] helium droplets have become the ultimate matrix for the molecular spectroscopy. Very low temperatures, down to 0.38 K for $^4$He or 0.15 K for $^3$He [3], and weak interactions with the doped molecules do determine the importance of superfluid phase.

We have set the pulsed helium beam apparatus as an intensive source of very large helium clusters. Our solution is similar to this proposed recently by Apkarian [4] and Vilesov [5]. The commercial pulsed valve (GV 99, Parker) has been cooled down by an APD helium refrigerator. Laser induced fluorescence (LIF) excitation spectra of selected proton transfer systems doped into supercooled helium droplets will be compared and discussed with our previous results for the same systems seeded in the supersonic molecular beams.