RECENT INSTRUMENTAL DEVELOPMENTS IN SELECTIVE AND TIME-RESOLVED FTS

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Selective detection techniques in FTS have already been demonstrated[a] with step-scan interferometers and have produced original results with rapid-scan[b] interferometers. We report recent high resolution double modulation FT emission spectra of molecular ions, created in a glow discharge, with velocity modulation[c] as a source modulation. Solutions to perform a fast high resolution diagnostic, based on the double-modulation FTS approach, are developped. They consist of recording, in a few minutes, only a portion of the high path difference set of selective and nonselective interferograms. The Fourier transform of this limited part of the interferogram, with no care of the phase, can provide useful information on the species present in the plasma.

The interferometer of the LPPM has already produced, under rudimentary instrumental conditions, nice high resolution time-resolved results[d]. It has been improved, so that 10^3 high resolution spectra each made of 10^6 samples may be recorded in 5 hours with a time resolution up to 2 ns. Experimental solutions to overcome the difficulties related to the dynamic range and the time-resolution as well as time-resolved observations of electrical discharge in argon/hydrogen or nitrogen/helium mixtures are described.

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[b] X. Hong, and T.A. Miller, Determination of concentrations via the diminution of Doppler shifts by radiation trapping, Chemical Physics **228**, 131-144, 1998, and references therein.

[c] C.S. Gudeman, M.H. Begeman, J.Pfaff, and R.J. Saykally, Velocity modulated infrared laser spectroscopy of molecular ions: the ν_1 band of HCO^+, Physical Review Letters **50**, 727-731, 1983.

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