A BUILD-UP CAVITY FOR FOURIER TRANSFORM EMISSION EXPERIMENTS

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At this meeting last year (RI07), we claimed that resolved fluorescence spectra produced with intracavity excitation held great promise for the combination of Fourier transform and intracavity laser techniques, even when working with a very small source placed inside an active dye laser cavity.
The limitations imposed by the lack of space in the cavity, the instability of the laser when absorptions occur, plus the need to work with hot molecular sources, have led us to revise this system. We place the source in an external "build up" cavity (BUC), composed of three R_{max} mirrors and one input coupler, arranged in a ring configuration. The input coupler allows $\sim$4% of the incident beam to enter the cavity. The build-up cavity is spatially mode matched to the dye laser, and a servo-loop locks the resonant mode of the BUC to the injected mode. This step is critical; intensity variations can easily have a very adverse effect on the interferograms, resulting in a decrease in the expected signal/noise ratio. Test cases have nevertheless shown that the increase in laser power does allow weak signals to be observed. We discuss the possibilities and limitations of this combination of methods, in particular the choice of lock-in schemes.