ROTATIONALLY RESOLVED ELECTRONIC SPECTROSCOPY OF MEDIUM SIZED AROMATIC MOLECULES[a]

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We report the setup and testing of a new apparatus for high resolution laser induced fluorescence (HRLIF) spectroscopy.
The homemade machine consists of three vacuum chambers, differentially pumped by a oil-diffusion pump and two turbo-molecular pumps, each backed by a rotary pump. An Ar^+ ion laser pumped ring dye laser is frequency doubled in an external ring cavity and crosses the molecular beam at right angle.
Fluorescence is collected perpendicular to the plane of the molecular and the laser beam and collected by an photon multiplier tube and registered by an discrimination/counting unit. The signal of three photodiodes is processed by a standard A/D converter to obtain the laser power, used for intensity normalization, the iodine spectrum at the laser fundamental, and the transmission of a confocal pseudo-Fabry-Perot interferometer, used for absolute and relativ frequency calibration of the spectrum, respectively.
The data acquisition is steered and all signals are acquired by a standard personal computer system running the Real-Time Linux[b] operating system and a homemade data acquisition package, consisting of several small *hard* real time tasks and a graphical user interface. Assignment and interpretation of the spectra is performed by means of a selfmade graphical user interface to established simulation/fitting programs[d].
After the description of the system we present first results of rotationally resolved electronic spectra of aromatic molecules.

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[b] http://luz.nmt.edu/~ rtlinux
V. Yodaiken, *Cheap operating system research and teaching with Linux*,New Mexico Institute of Mining and Technology, 1996
M. Barabanov, master thesis, New Mexico Institute of Mining and Technology, 1997

[d] B. B. Champaigne and D. W. Pratt, University of Pittsburgh, private communication, D. Plusquellic, NIST, Gaithersburg, private communication, A. Westphal, Diplomarbeit, Heinrich-Heine-Universität, 1994