A FOURIER TRANSFORM CAVITY ENHANCED ABSORPTION SPECTROMETER

R. ZIJLMANS, J.H. VAN HELDEN, D.C. SCHRAM, and R. ENGELN, *Department of Applied Physics, Centre for Plasma Physics and Radiation Technology (CPS), Eindhoven University of Technology, P.O. Box 513, NL-5600 MB Eindhoven, The Netherlands*; E. HAMERS, *AKZO-NOBEL Chemicals, Department CSO, P.O. Box 9300, 6800 SB Arnhem, The Netherlands*.

In this contribution a Fourier Transform (FT) spectrometer will be presented which combines the sensitivity of the cavity ring down technique with the multiplex advantage of a FT spectrometer. The first time this FTCRD detection scheme was successfully applied, a broadband *pulsed* dye laser was used as excitation source for the high Q-factor optical cavity [a]. In other cavity ring down spectrometers also cw narrow band lasers have been employed as excitation source for the optical cavity. In the FTCRD spectrometer that will be presented a *continuous wave incoherent* light source is used [b]. The cw light source is a 2 kW cascaded arc, operating on xenon at a pressure of 3.3 bar, producing emission of continuum radiation on which atomic Xe lines are superimposed. The time integrated intensity leaking out of the optical cavity is recorded as function of the optical path length difference introduced by the two mirrors in the Michelson interferometer in the FT spectrometer. This so-called cavity enhanced absorption (CEA) detection scheme has been shown to be applicable for highly sensitive absorption spectroscopy with cw narrow band diode lasers. The absorption of methane around 850 nm is used to show the working principle of the spectrometer. We will show that the sensitivity of a standard FT spectrometer can be increased by an order of magnitude by using this CEA detection scheme.

[a] R. Engeln, G. Meijer, *Rev. Sci. Instrum.* **67**(1996) 2708

[b] E. Hamers, D. C. Schram, R. Engeln, *Chem. Phys. Lett.* **365** (2002) 237