DEEP-UV CAVITY RING DOWN SPECTROSCOPY

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The sensitive optical detection technique of cavity ring-down spectroscopy is extended to wavelengths in the range 197–204 nm, hence into the domain of the deep ultraviolet. A novel design narrow-band Fourier transform limited laser delivering laser pulses of 15 ns duration and a bandwidth of 50 MHz in the near-infrared is constructed, based on a passive Ti:Sa pulsed oscillator injection-seeded by a continuous-wave Ti:sa laser. Three stages of type-I frequency mixing produce effectively tunable radiation naar 200 nm at pulse energies of 0.1 mJ. The system is tested in a generic pulsed cavity-ring down setup to measure quantitatively the Rayleigh scattering cross section in $SF_6$ and broadband extinction in $CO_2$. Resonant absorption was measured in the atmospheric Schumann-Runge (0,0), (1,0) and (2,0) bands of both $^{16}O_2$ and $^{18}O_2$. Besides an accurate determination of the molecular constants of the excited states this work also result in determination of vibrational and spin-dependent predissociation widths.