THE APPLICATION OF A VUV-FT SPECTROMETER AND SYNCHROTRON RADIATION SOURCE TO MEASUREMENTS OF: I. PREDISSOCIATED LINE WIDTHS OF THE SCHUMANN-RUNGE BANDS OF O_2

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The Imperial College VUV-FT spectrometer has been equipped with optically contacted, beam splitters made from single crystals of MgF_2 and the short wavelength performance has been demonstrated down to $\sim$139 nm. To make ultrahigh resolution VUV photoabsorption cross section measurements with the VUV-FTS require a pure continuum source below 190 nm and the best choice: is synchrotron radiation from a storage ring facility. Moreover a suitable zero-dispersion predisperser is available on beam line 12-B of the synchrotron radiation source at the Photon Factory. We therefore moved the IC VUV FT spectrometer from Imperial College, London to the Photon Factory, Japan to exploit the bandwidth-limited synchrotron radiation as a background source for FT absorption spectroscopy. With resolution of 0.06 or 0.12 cm^{-1}, we extended the linewidth measurements of the Schumann-Runge (S-R) bands with $v' \geq 12$ in the wavelength range 181 to 175 nm. The observed line widths consist of the instrumental, Doppler, and predissociation widths. The line profiles resulting from the convolution of the first two of these contributions are very closely Gaussian with widths of 0.12 and 0.15 cm^{-1} for spectra recorded with resolutions of 0.06 and 0.12 cm^{-1}, respectively. The observed linewidths of the S-R bands with $v' \geq 12$ will be presented.

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