

Sulfur Dimers in the Spectra of Comet Hyakutake (C/1996 B2)

Sang J. Kim and Yong S. Lee
Kyung Hee University

A line-by-line fluorescence model has been constructed for the ro-vibrational bands of the B-X system of sulfur dimers (S₂). The detailed rotational structures of the bands are clearly resolved for the first time in the high-resolution Echelle spectra of comet Hyakutake (C/1996 B2), which was observed at the Kitt Peak 4-m telescope on 1996 March 26.4 (UT). In order to construct the ro-vibrational band models of the S₂ (B-X) system, we first compared model intensities to laboratory spectra available on hardcopies in literature, and next compared the fluorescence models including Swings effects to the spectra of Hyakutake. We derived a rotational temperature of ~70 K from the model fits. It is concluded that the ~70 K represents a temperature of a coma region close to the nucleus where S₂ is formed. This may indicate that S₂ is formed from a short-lived parent molecules near the surface of the nucleus, and may not directly come from the nucleus. We present discussions on plausible scenarios for the origin of S₂ in cometary comae.