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[88.03] Above Limb Imaging of the 4.7-Micron Fundamental Rotation-Vibration CO Lines

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Presented are results from trans-limb scans of the 4.67-micron (2143 cm-1) fundamental rotation-vibration CO lines. The scan sequences were used to produce 2-D maps of the CO emission above the solar limb. The data were collected on 08 August 2002 at the McMath-Pierce solar telescope using the infrared spectrometer, a 256 x 256 InSb array detector and an image stabilizing system - the predecessor to the telescope's current prototype adaptive optics system. The spectrograph slit was oriented parallel to the solar limb to minimize scattered photospheric light into the spectrograph for spectra taken above the limb. The image stabilizer was used to accurately step the solar limb in 0.149 arcsecond increments across the 0.5 arcsecond slit. Although the image stabilizer canceled image motion in the axis parallel to the solar limb, seeing still distorted and degraded the limb image. Scan sequences were taken at the solar south polar limb to avoid possible active regions in the mid-latitudes. Frame selection techniques were used to construct spectroheliogram images from the best seeing spectral frames resulting in 2-D images approaching 1 arcsecond resolution. Continuum images were subtracted from CO line center grams resulting in images that clearly show both bright and dark structures in the CO that extend into the above-limb emission. The features seen support a thermally bifurcated model of the solar atmosphere. Cross limb measurements indicate that the strongest of the CO lines extend to roughly 500 km (0.7 arcseconds) above the solar limb consistent with earlier studies.

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