

HIGH-RESOLUTION MID-IR OBSERVATIONS OF SiO AND THE SEARCH FOR TiO IN THE CIRCUMSTELLAR ENVELOPE OF THE VARIABLE STAR χ Cyg

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The Mira-type variable χ Cyg is an old S-type asymptotic giant branch (AGB) star that expels large amounts of material into space. This material forms dust and small to intermediate sized molecules - especially molecules composed of refractory materials. It is assumed that molecules like TiO and other small metal oxides that are formed in the expanding stellar envelope play a key role in the darkening process during the stellar pulsation. At temperatures around 1000 K the maximum radiation is shifted to the mid-infrared region, where laboratory spectroscopic data of small metal oxide molecules are sparse. To overcome the lack of data we have recently studied the molecules TiO, Al₂O and VO in the Kassel laboratory for astrophysics at high spectral resolution in the mid-infrared (IR) region. In addition, new observations using the TEXES spectrograph on the NASA Infrared Telescope Facility (IRTF) have been performed to investigate this star at high spectral resolution around 8.3 and 10 μm , i.e., at wavelengths where SiO, TiO, and VO have strong vibrational bands. We performed spectral and line shape analysis of SiO to study the dynamical behavior of the molecular layer surrounding the star. Preliminary results concerning TiO in χ Cyg will be presented.