INTERSTELLAR N$_2$ IN THE DIFFUSE ISM TOWARD 20 AQUILAE

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Molecular nitrogen (N$_2$) is the most abundant molecule in the Earth’s atmosphere and in the less chemically-processed atmosphere of Titan. N$_2$ is also of considerable interest for studies of the interstellar medium because both models of steady-state gas-phase chemistry (Viala 1986) and millimeter wave observations of N$_2$H$^+$ (Womack, Ziruys, & Wyckoff 1992) predict that N$_2$ should be the dominant nitrogen-bearing molecule in interstellar space. We previously presented the first detection of interstellar N$_2$ toward HD 124314 with an observed fractional abundance of N$_2$/H$_2$ = x(N$_2$) = 3.3 $\times$ 10$^{-7}$ (Knauth et al. 2004). Here we report on the second detection of interstellar N$_2$ based on Far Ultraviolet Spectroscopic Explorer (FUSE) observations of the moderately-reddened star 20 Aql (Knauth et al. 2005) with x(N$_2$) $\sim$ 4.7 $\times$ 10$^{-8}$. This fractional abundance is surprisingly low given that 20 Aql has a factor-of-4 higher CN abundance than that found toward HD 124314. Is this possible anti-correlation caused by differences in the predictions of diffuse and dark cloud chemistry? Recent work (Herbst 2004, private communication; Roueff 2005) show that a single homogeneous cloud chemical model cannot reproduce the observations. Further observations of interstellar N$_2$ and other nitrogen-bearing species (e.g., NH) toward lines of sight with different physical conditions are required to understand the implications for interstellar nitrogen chemistry.