220.10 – Bow-Shock Nebulae in the WISE All-Sky Survey: Around the Celestial Equator
This is a preliminary survey for bow-shock nebulae within one degree of the celestial equator using the WISE All-Sky Data Release. Bow-shock nebulae are clumps of gas and dust that have been condensed by the winds of stars moving through the interstellar medium. This survey has discovered twenty-four bow-shock nebula candidates and their candidate wind-blowing stars. Bow-shocks were preferentially found at low galactic latitudes and near the Galactic Center and Anti-Center, as expected. Intriguingly and contrary to previous assumptions, they were not found primarily around OB-runaway stars. A third of the bow-shock nebulae we discovered were around T Tauri stars or young stellar objects (YSOs). Even more unexpectedly, another third of the bow-shock nebulae we found are around A- and F-type stars, which seem too cool to excite the nebulae. This research was funded by a NASA California space grant.

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220.11 – The hydration dependence of CaCO$_3$ absorption lines in the Far IR
The far infrared (FIR) absorption lines of CaCO$_3$ have been measured at a range of relative humidities (RH) between 33 and 92% RH using a Bruker 66v/S spectrometer. Hydration measurements on CaCO$_3$ have been made in the mid-infrared (MIR) by [Al-Hosney, H.A. and Grassian, V.H., 2005, Phys. Chem. Chem. Phys., 7, 1266]. and astrophysically-motivated temperature-dependent FIR measurements of CaCO$_3$ in vacuum have also been reported [Posch, T., et al., 2007, Ap. J., 668, 993]. The custom sample cell constructed for these hydrated-FIR spectra is required because the 66v/S bench is under vacuum (3 mbar) during typical measurements. Briefly, the sample cell consists of two Thalium Bromoiodide (KRS-5) windows, four O-rings, a plastic ring for separating the windows and providing a volume for the saturated atmosphere. CaCO$_3$ was deposited on KRS-5 windows using doubly-distilled water as an intermediary. The KRS-5 window with sample and assembled sample cell were placed in a desiccator with the appropriated saturated salt solution [Washburn, E.W. (Ed.), International Critical Tables of Numerical Data, Physics Chemistry and Technology, Vol. 1, (McGraw-Hill, New York, 1926), p. 67-68] and allowed to hydrate for 23 hours. For spectroscopy the desiccator was quickly opened and the second KRS-5 window placed in the cell to seal the chamber. A spectrum was then taken of the sample at the appropriate RH. The spectra taken characterize the adsorption of water vapor and CaCO$_3$ that might occur in circumstellar environments [Melnick, G.J., et al. 2001, Nature, 412, 160]. The MIR and FIR reflectance spectra of calcite (CaCO$_3$) have been thoroughly studied by [Hellwege, K.H., et al., 1970, Z. Physik, 232, 61]. Five Lorentzian curves were fit to our data in the range from 378-222 cm$^{-1}$ and each was able to be assigned to a known mode of CaCO$_3$. The data does not support the conclusion of a hydration effect on these modes of CaCO$_3$, but it does suggest a possible broadening of three modes peaked at 281 cm$^{-1}$. The goal of this work is to bridge the body of work on CaCO$_3$ in physical chemistry and previous laboratory astrophysical observations to aid interpretation of FIR spectra obtained by observatories such as the Spitzer Space Telescope.

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220.12 – A Herschel-SPIRE Survey of the MonR2 Giant Molecular Cloud
We present a new survey of the MonR2 giant molecular cloud with SPIRE on the Herschel Space Observatory. We cross-calibrated SPIRE data with Planck-HFI and accounted for its absolute offset and zero point correction. We fixed emissivity with the help of flux-error and flux ratio plots. As the best representation of cold dusty molecular clouds, we did greybody fits of the SEDs. We studied the nature of distribution of column densities above and below certain critical limit, followed by the mass and temperature distributions for different regions. We isolated the filaments and studied radial column density profile in this cloud.

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