Physics 224: Paper Discussion 4
Spring 2018

Goodman et al. 2009:

- How exactly is the dust-to-gas ratio determined? Is there a way to differentiate if the dust and gas are intermixed or if they are separated by some distance like it is shown in Figure 4?
- Is dust optically thin at the IR wavelengths they use? My concern is how to determine the extinction if it is too pronounced to see any background stars; How do you ensure that the light received is all the light generated by the dust, and that none/appreciably little has been lost to extinction in the wavelength being observed?
- What exactly are isotopologues? What is a Mach number?
- How do you directly measure the Alfven + Sonic Mach numbers in MCs? How much do they bias their analysis by masking out the regions they mention?
- 1) Does the emission/extinction map assume any distribution of grain sizes? 2) How does unresolved binary/multi-star system affect the NICER code? 3) What is an intrinsic color of a star?

Larson 1981:

- Has the cause for molecular cloud formation been determined? Also, are molecular clouds resolvable in the the Magellanic clouds or Andromeda, and if so have the same findings been observed? Also, it's pretty cool that we can see Kolmogorov's law in the interstellar medium and at such a large scale.
- I am curious what drives these super-mach flows within the clouds. Are they driven by internal processes related to the gas, or are they more the rersult of external environment? – Really, given time, would the gas reach some sort of equilibrium, or is there some input maintaining the turbulence and inhomogeneous flows?
- Why is the distinction between sub-sonic and super-sonic velocities so important? How do we know whether a gas is sub or super sonic (i.e. how do we know what the wave speed/index is)? How is one or the other better at distributing pressure/velocity on different length scales?

- It's important to note that his work revealed the lower limit for protostellar masses (*sim* 0.01 Msun). He also leaves us with future research needed to understand the formation of molecular clouds with systematic turbulent motions - has this been understood further?

- How does the magnetic field come into play, compared to turbulence, since we have observed filamentary structures from observations in low mass star formation (this is a little bit out of scope, though)?

- 1) What would create an ideal (like no turbulence, ideal jeans mass collapse) gas cloud in low redshift regime? 2) How is substructure like filaments observed? 3) Do studies like reliability of different metal tracers (e.g. 13CO) challenge the results in this paper? 4) What fuels turbulence in a molecular gas cloud?