Physics 224: Paper Discussion 4
Spring 2018

McKee & Ostriker 1977:

- In the Conclusion, they state that we are in a SNR. Can we place limits on the dynamics of that supernova, so that our sun could still form, or can we say that the cloud that formed our sun must be external to the original SNR, i.e., figure 2?
- Comment: As I was reading the paper, I was thinking it would be great if there was a figure or something to help picture the HIM, WNM, WIM, and CNM structure and then there were Figures 1-3. I really like these pictures. Question: Has there been more study on the cold but not self-gravitating clouds?
- Supernovae are known to occur outside the disk of the galaxy, which then significantly affect the halo. Do those outer supernovae also affect the disk? Also, they mention galactic winds are sometimes necessary to balance out the heating from SNRs, but what are they assuming generates these winds?
- Observationally how do you trace Shocks/SNR's? The authors address this but I didn't really follow why is pressure balance a good assumption in the presence of SNR/Shocks? Is there a way to be more quantitative about the effects of non-equilibrium clouds on the averaged results?
- Does the SNR in the paper take into account the compact objects that could from during SNe? How would the compact object change the pressure balance?

Ostriker, McKee & Leroy 2010:

- When they compare their model with observation and show the plots of multiple galaxies (Fig 5 and 6), they give explanations for most of their plots except for NGC3521. The model seems to fit perfectly up to a certain radius. And between Figure 5 and 6, it gets slightly better when they use a different stellar thickness. So I wonder if this is just a tweaking of initial parameters used in the model to make the two curves fit better? Also it's interesting that the observed curve is lower than the model where in most of the other plots, if there's a discrepancy, the model is lower than observed.
- With their conclusion that this model could be used in sub-grid star formation recipes, it seems like it would be necessary to determine a separate model for each galaxy morphology-metallicity combination. How far can this model be

pushed before the results are too inaccurate? (i.e., is there a smooth transition from using a mid-plane disk pressure to a general spherical pressure as we transition from disky to elliptical galaxies, and how will this apply to early type galaxies that are too young to be disky or elliptical?)

- Does their model agree with dwarf galaxies as well, or does it only pertain to spiral galaxies? Over what range of metallicities if their model accurate for?
- The Wolfire 1995 paper suggested that WNM may take a long time to reach thermal equilibrium, how does this thermal timescale for warm gas compare to the timescale for the local ISM system to reach equilibrium (balance in thermal and vertical force)?
- Is there enough confidence in these models from the models matching data well in some galaxies that we could believe fits of the models to observation to learn things about the galaxy such as alpha, f_w, etc. or is does it point to missing physics?