

Model galaxies. Complicated because large and small scale. Big **Motivating question?** (and then smaller motivating questions for each individual article that contribute to solving big motivating question)

The point of firebox simulation is that it is the largest particle count of a galaxy simulation ever done. It really balances small scale focus and high resolution with high scale. Now that we have simulation and respective data, (i) This allows us to pinpoint in theory why the observations we see are happening? (ii) it allows us to compare the simulation to real world observations to see how accurate the firebox is? It is a blackbox, thesis is to pose conception explanations and more non-numerical explanations (analytical) for the results of numerical experiment.

For example, numerical we can calculate the trajectory, use to say parabola, extrapolate, we want to find reason and the analytical formula. Aim: Come up with analytical and conceptual explanation for the galaxies I'm studying.

Literature Review: It helps learn how simulation works and what the issue? Hot topic! watch out. Profe Moreno Explaining existence and or non-existence of dark matter deficient galaxies. Marckie's thesis is about ultra-diffuse galaxies (what are they, baby language). interesting to study because simulation data disagrees with observational data and simulations. Lates firebox result, how many galaxies do we expect, are we seeing the right amount relative to observations, posing why they even exist? Smaller galaxies are important, the more simulations line up with reality the more we can trust the explanations. We want galaxy simulation to line up with real observations, the formulas and math behind simulation is the correct math for the real world, explain dark matter.

We make assumptions: which **assumptions** do the papers use? Specifically, *relevant!*

1. Cold dark matter (reference which ones), essentially this means dark matter doesn't exert pressure on itself, nor pressure on normal matter- accumulates.
2. Fire 2 physics model: physics formula to calculate state of gas, assuming those forces
3. Star formation, each particle of simulation is so large that it would contain multitude of stars; cutoff which says if density of gas meets certain criteria then it would create stars

### **Ultra-diffuse galaxies**

Find papers that have researched them, and what they say about

Chronological topics:

When, where, how, who contributed,  
Observations started, simulations

introduce

this suggests that the cluster environment strips the gas from the galaxies, while allowing them to populate the cluster the same as more luminous galaxies. The similar distribution in the higher tidal force zones suggests a larger dark matter fraction to hold the galaxies together under the higher stres

interesting disagreements between various different courses: using correlation of proximity and stripping of gas and found...