The Effect of Improved Feedback Recipes on a GASOLINE Galaxy Simulation

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Cosmological Galaxy Simulations in GASOLINE

Dwarf Galaxy h603
$M_{\text{vir}} = 3 \times 10^{11} M_{\odot}$
What’s New in the Newest Run?

- Increased $N_p$ so better mass/spatial res.
- Metal line cooling
- Improved SF Recipe:
  - Increase density requirement, lower max $T$
  - Increase SF efficiency $C^*$ locally
- Stronger Feedback:
  - Energy injection into ISM more efficient, disrupts star formation globally
- Stars form in “star forming regions” in disk, don’t just form in bulge
So... What happened?
Did these refinements generate more realistic galaxies?
With improved recipe, stars form in 
**localized** “star forming regions”!
Bulge/Disk Ratio

![Graph showing the relationship between Bulge to Disk Ratio and Wavelength (nm). The graph includes data points for 'Med. Res.' and 'High Res.' categories.](image)
Gas-to-Dust vs. Mass

Rotation Curve

![Graph showing rotational velocity vs radius (kpc) for different components: Total, DM, and Baryons. The graph includes curves for Med. Res. and High Res.](image-url)
Baryonic Tully-Fisher

\[ P = 1.6 \]

McGaugh 2009
Improved Dust
Conclusions

With new and improved SF/SN recipe, h603 has:

– Higher gas-to-star ratio
– Shallower DM profile
– Bulge-to-disk ratio lowered
– Dust content in line with what’s expected for a galaxy of that mass

All in all, a better match to observations
References

• F. Governato et al. 2010, *Nature*, 463, 203L
• Sunrise Documentation: http://code.google.com/p/sunrise/w/list

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