# Bars in FIRE-3

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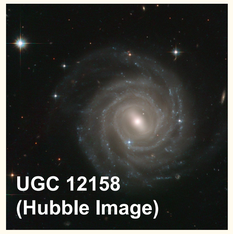
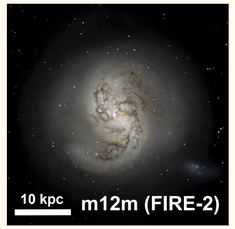
## Background




Via https://esahubble.org/images/potw1035a/




Via http://www.tapir.caltech.edu/~phopkins/Site/animations/gallery-of-simulated-galaxi/m12m_ref13_s0545_t000_star_.html

- Galactic bars have implications for evolution of galaxies
- Insights from FIRE-3, an update to FIRE cosmological simulations with new stellar feedback inputs, optional black holes, and more[1]

1 Hopkins P. F., et al., 2022, arXiv e-prints, p. arXiv:2203.00040

## Methods

We compare FIRE-3 galaxies (with and without black holes) with FIRE-2 galaxies using:

- **Bar strength:** Second mode of the Fourier transform of the stellar surface density in a face-on disk orientation
- **Disk properties:** Stellar mass, stellar dispersion, circular velocity curves
- **Star formation:** Mass of newly formed stars normalized over total stellar mass

## Acknowledgements

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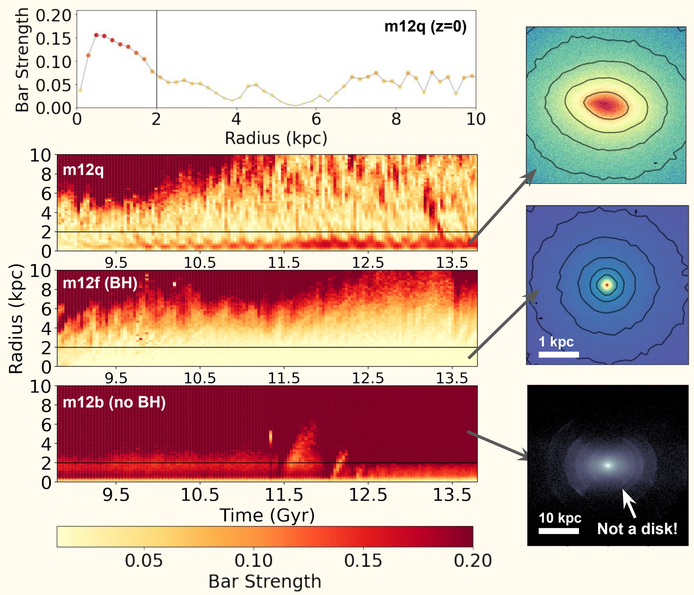
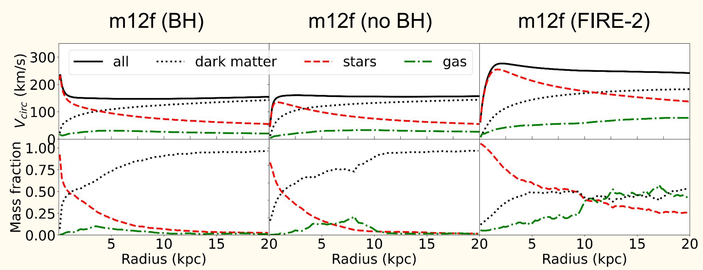
## Results

### Bar Strength

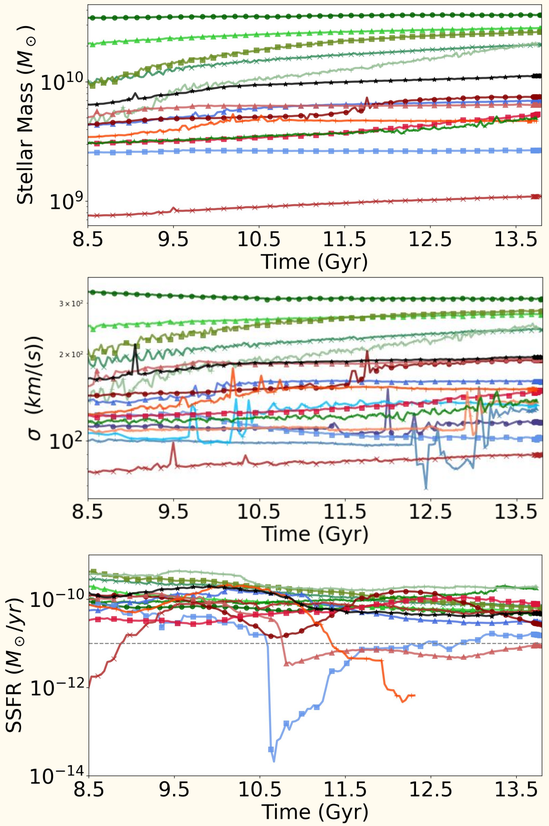



- **1 of 12** galaxies in FIRE-3 is weakly barred, compared to **6 of 13** in FIRE-2
- Some FIRE-3 galaxies are not disks at z=0

### Rotation Curves




- Dark matter dominates more in FIRE-3
- Simulations with BHs can have more concentrated centers




### Stellar Mass

- FIRE-2 galaxies are more massive than FIRE-3

### Stellar Dispersion

- Higher stellar dispersion in FIRE-2 is fully explained by greater mass

### SSFR

- Specific star formation rates (SSFR) fluctuate more in FIRE-3 than in FIRE-2

## Conclusions & Future Work

- Less galaxies are barred in FIRE-3 than in FIRE-2
- FIRE-3 galaxies are less massive than FIRE-2 galaxies, and have greater fluctuation in their SSFR
- More measurements: verifying mass concentrations, tracking mergers, calculating disk stability and halo angular momentum
- Determining key simulation mechanisms that affect bars