Threshold: $Q_g = \frac{\kappa a}{\pi G \Sigma_g} \approx 1;\ \dot{\Sigma}_* = \alpha \frac{\Sigma_g}{\tau} \propto \Sigma_g{}^n,\ n \approx 1.4$

How to Sew the Buttons on the Coat that is the K-S Law

Panel Discussion

K-S Workshop

UCSD

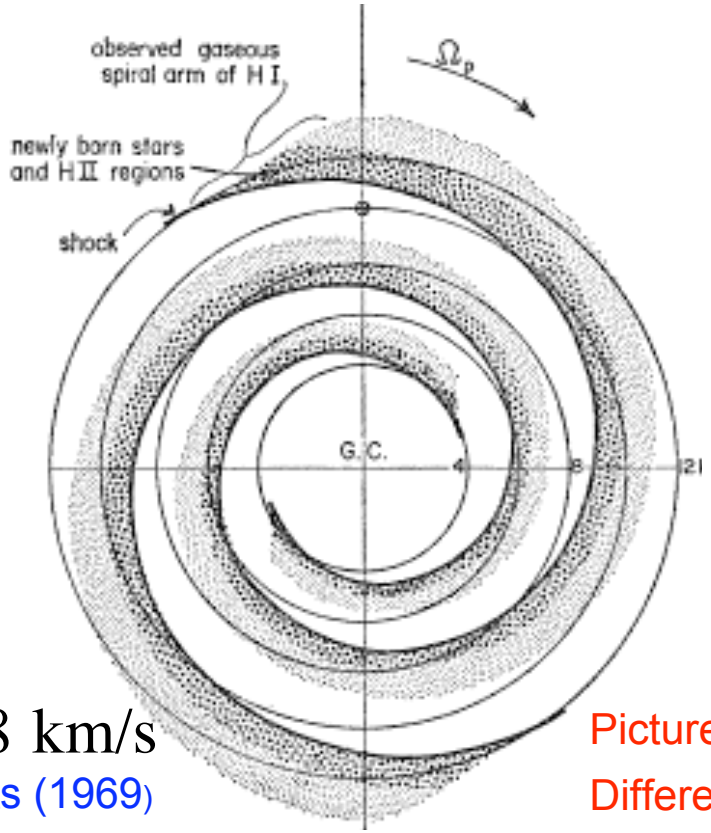
Dec 19, 2006

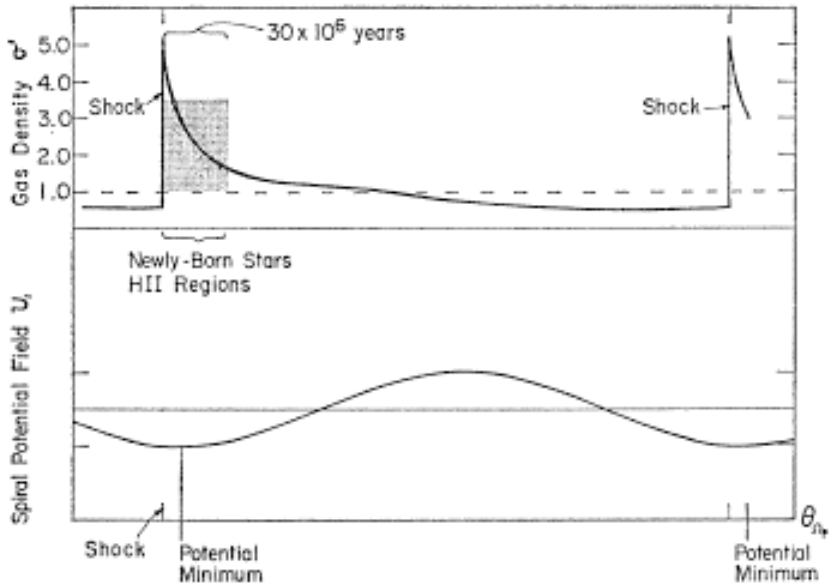
Rules for Panel Discussion

- Each panelist can give a short presentation (~ 5 min) with no more than 3 slides to set scene for debate.
- Afterwards, we will have a discussion that is open to everyone.
- Goal: to set agenda that can make meaningful future progress.

Assertion: Determination of SFR Has Both Global (10 kpc) and Local Aspects(1 pc)

- Threshold: $Q_g = \frac{\kappa a}{\pi G \Sigma_g} \approx 1;\ \dot{\Sigma}_* = \alpha \frac{\Sigma_g}{\tau},\ \alpha << 1$ (almost certainly local)
- H II regions strung like “pearls along spiral arms” (almost certainly global).





$\dot{\Sigma}_* = \alpha(\Omega - \Omega_p)\Sigma_g$ (Shu 1973)

$a = 8$ km/s

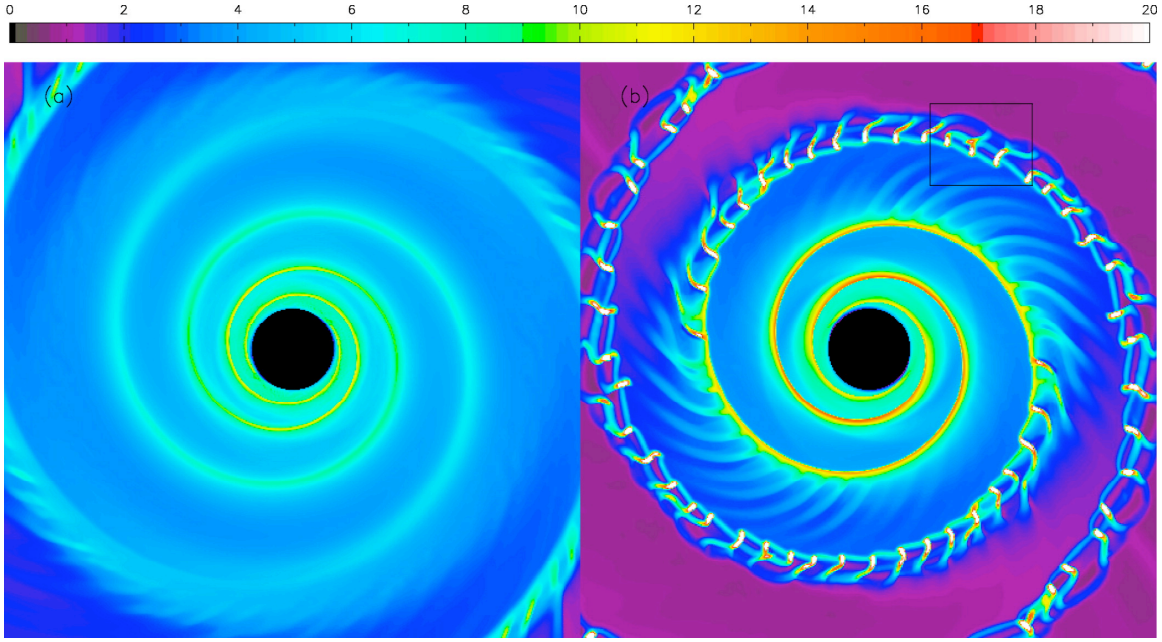
Roberts (1969)

Picture made stronger by GALEX results reported by Madore.

Difference: Driven versus self-excited spiral density waves?

Q >> 1 Q ~ 1 (azimuthal average)

Spiral Substructure: Feathers

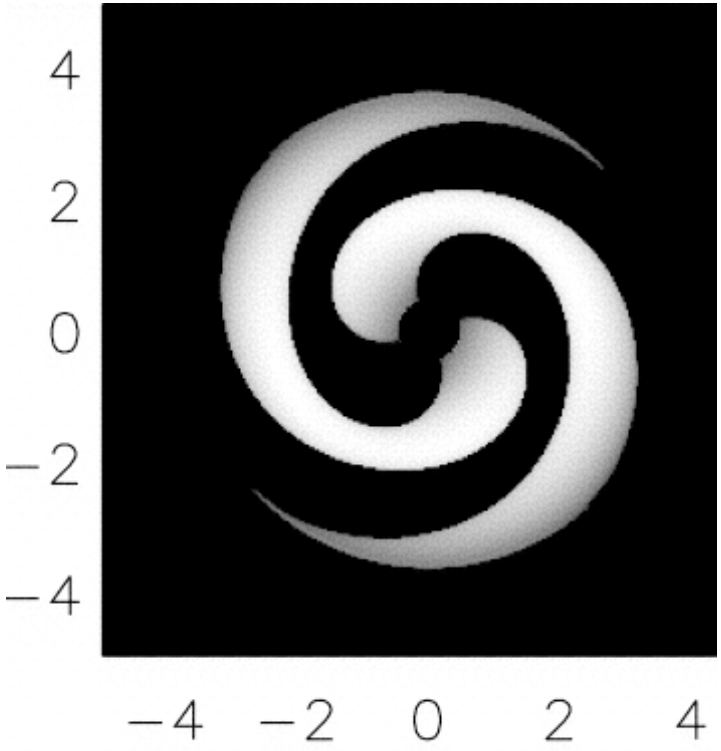


$a = 6$ km/s, include B and self-gravity of gas

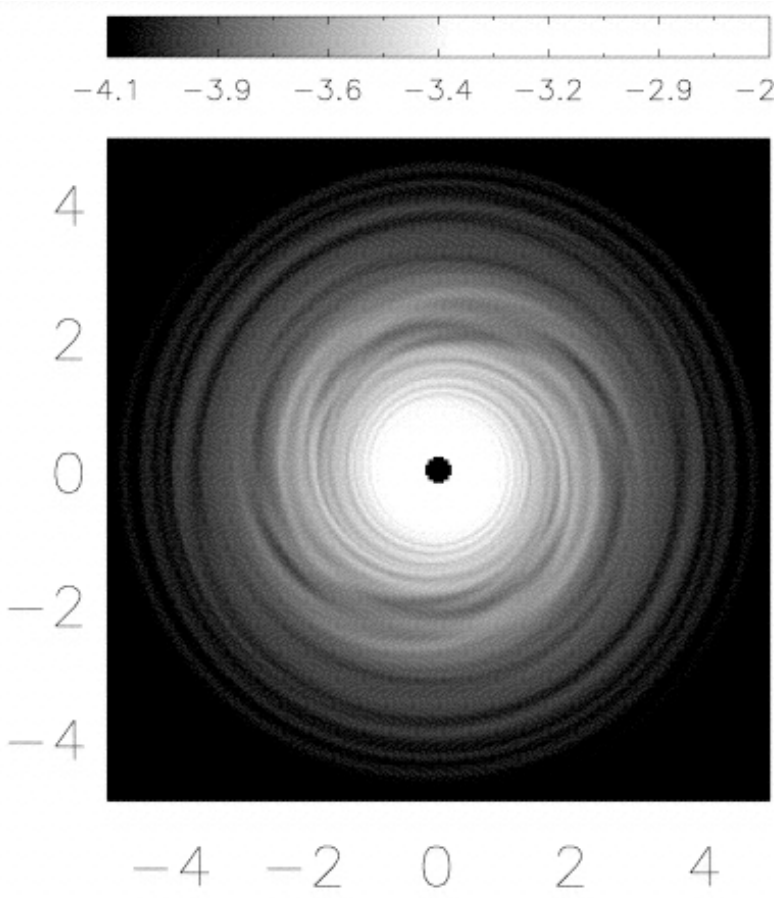
Local transient instability not characterizable by simple Q_g criterion, especially in presence of B.

Shetty & Ostriker (2006)

Spiral Substructure: Flocculence



Imposed background forcing



Nonlinear response after 2.87 Gyr

Chakrabarti, Laughlin, & Shu (2003)

Do we know how *a priori* to get from global picture to actual SFR? No, no honest EOS for ISM.