Renzo’s Rule: “For any feature in the luminosity profile there is a corresponding feature in the rotation curve and vice versa.” (Sancisi 2004, IAU 220, 233)
Spiral Galaxies (Dark Matter Only)

McGaugh et al. (2007) Enclosed dark matter mass

\( M_h \quad (M_\odot) \)

\( 10^5 \, 10^6 \, 10^7 \, 10^8 \, 10^9 \, 10^{10} \, 10^{11} \, 10^{12} \)

\( R \quad (kpc) \)

\( 10^{-1} \quad 10^0 \quad 10^1 \quad 10^2 \quad 10^3 \)

Line fit to \( R > 1 \) kpc only

Spiral Galaxies (Dark Matter Only)
Strigari et al. (2008)

Line from preceding plot evaluated at 300 pc

Enclosed dark matter mass

$M_h (M_\odot)$ vs. $R$ (kpc)

- M31 dwarfs
- MW dwarfs
- LSB galaxies (Kuzio de Naray)

Tuesday, February 28, 2012

Stacy McGaugh, Univ. Maryland
Estimate the circular velocity as \( V_c = \sqrt{3} \sigma r_{1/2} \).

After lengthy, necessary, and gratuitously excessive modeling of orbital anisotropy...

With Joe Wolf (UC Irvine)

Leo T unique among these satellite systems in having gas.
deviations correlate with...

- Luminosity
- Effective radius
- Surface brightness
- Metallicity
deviations correlate with...

**Distance (or $\Delta^{-1}$)**

- $F_b$ vs. Galactocentric distance (kpc)
- $F_b$ vs. $|M_v| + 6.4 \log(D)$

**Ellipticity**

- $F_b$ vs. $\epsilon$
- $F_b$ vs. $F_{T,D}$

**M$_v$+6.4log(D)**

**Tidal susceptibility**

Bellazzini et al. (2008)
Stars safely within tidal radius. Should be no tidal effects, assuming equilibrium and pericenter ~ distance (1).

Deviations set in about where the size of the satellite becomes comparable to the tidal radius. Should be no tidal effects, assuming equilibrium and pericenter ~ distance (1).
\[ \gamma = \left(\frac{D}{r}\right)^{3/2} \left(\frac{m}{M}\right)^{1/2} \]

Tidal susceptibility depends on what you use for \( m \).

If \( L \) is your estimator, \( F_b \) & \( \epsilon \) correlate with susceptibility.
feedback

use metallicity to predict amount of baryonic mass loss
(assumes SF goes to completion; all gas expelled)

\[ f_d = \frac{M_b}{f_b M_{vir}} \left( 1 + 0.4 \times 10^{-[\text{Fe}/\text{H}]} \right) \]

(Wyse, private communication)
reionization

Solid line: Crain et al. (2007)
Dashed lines: Gnedin (2011)
$\alpha = 1$ (left); $\alpha = 2$ (right)