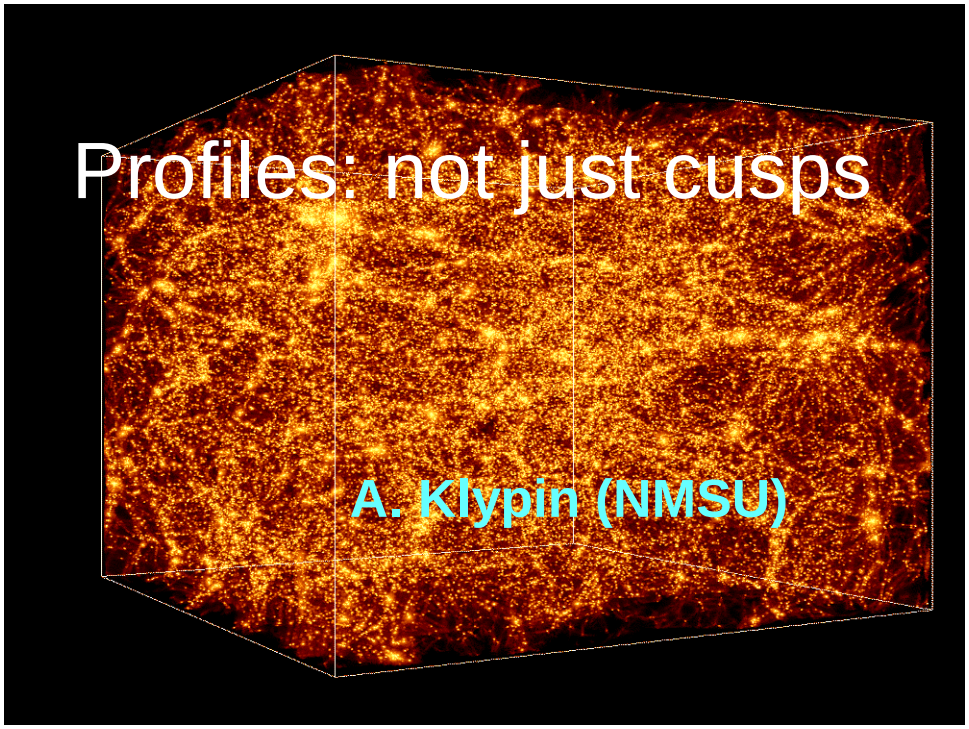
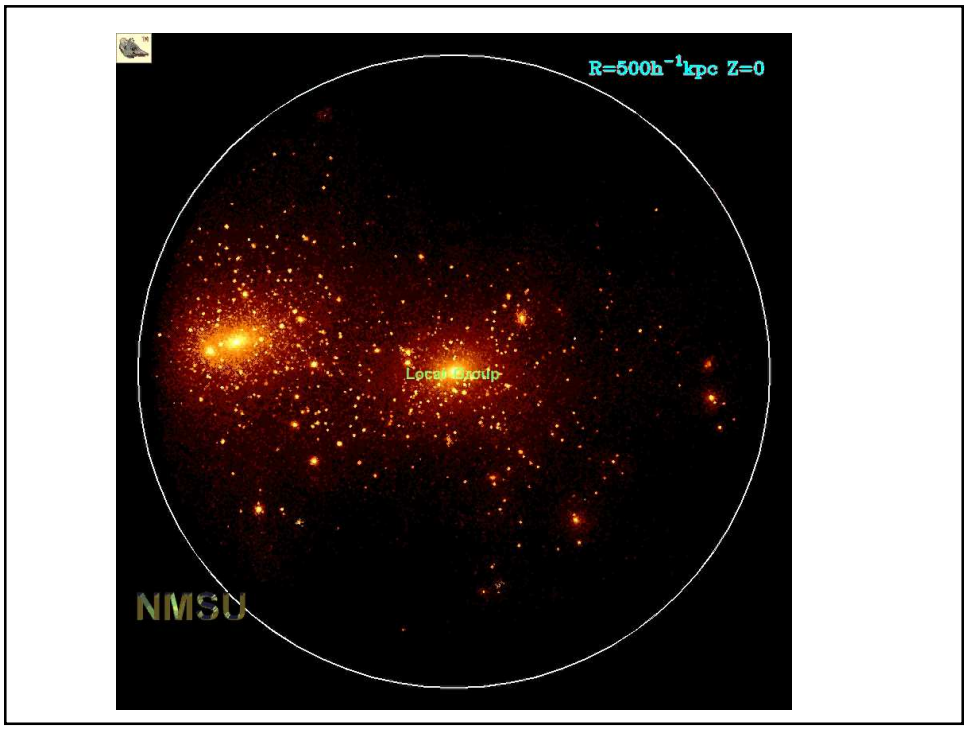
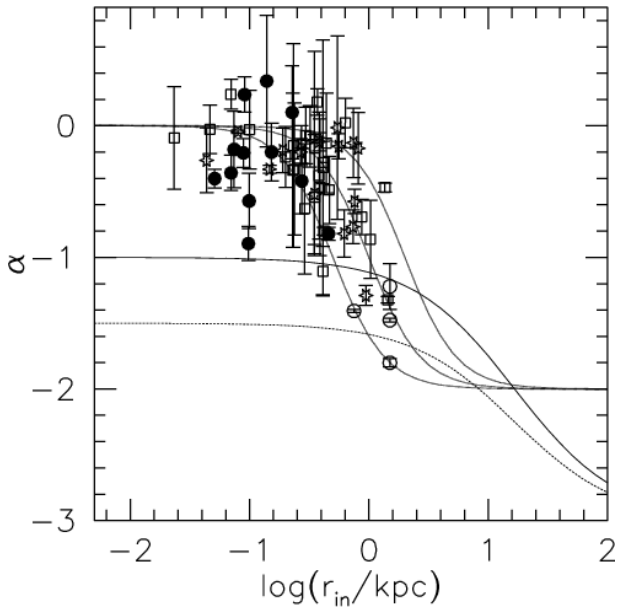

Profiles: not just cusps
A. Klypin (NMSU)

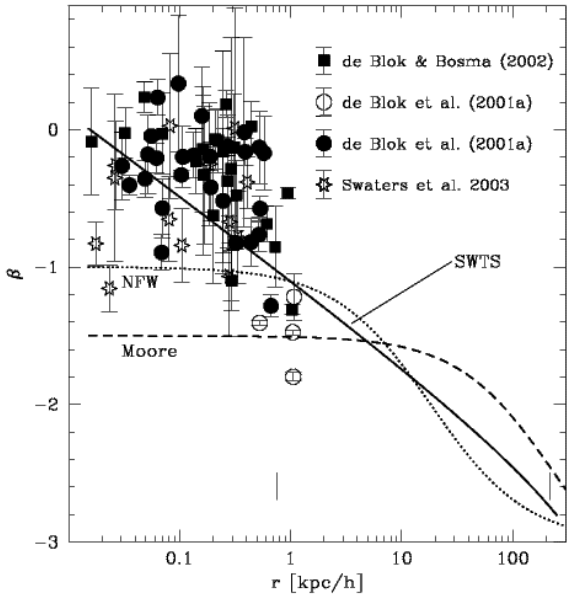

R=500h^{-1}kpc Z=0
Local Group
NMSU

Halo Profiles: Not Just Cusps

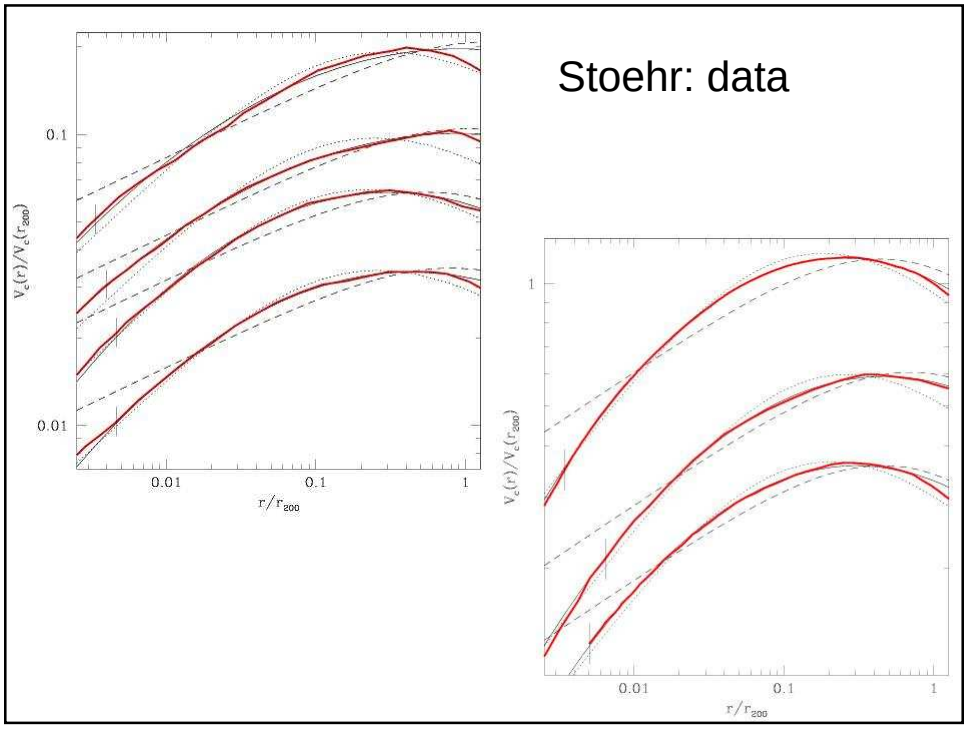
Cusps vs. Cores

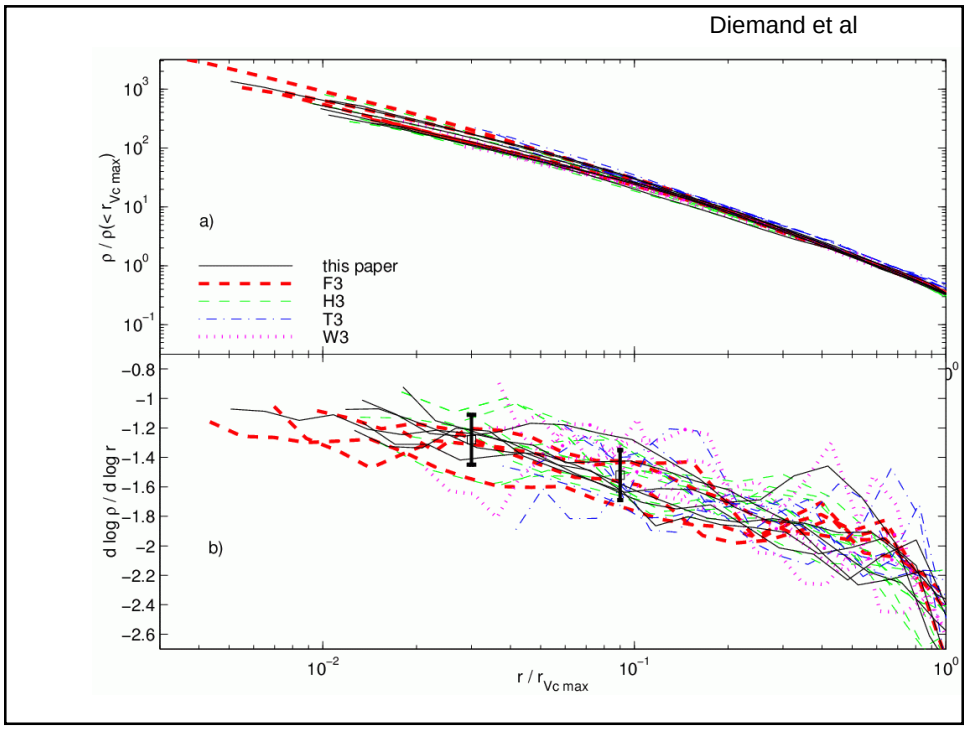


4 *F. Stoehr* No problemo: there are no cusps



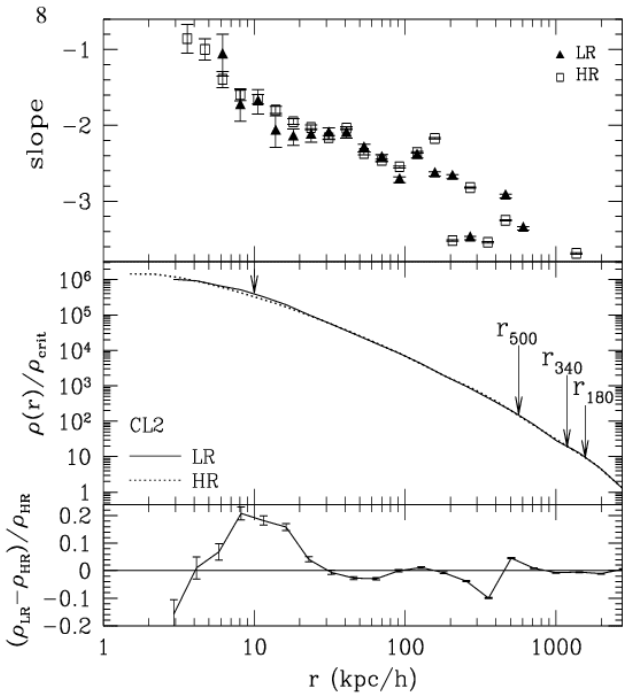
Halo Profiles: Not Just Cusps





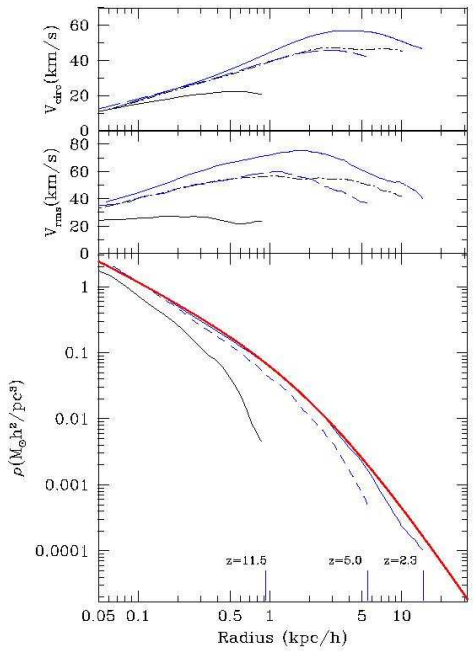
Halo Profiles: Not Just Cusps

Tatutsiomi: cluster profile



Center does nor evolve

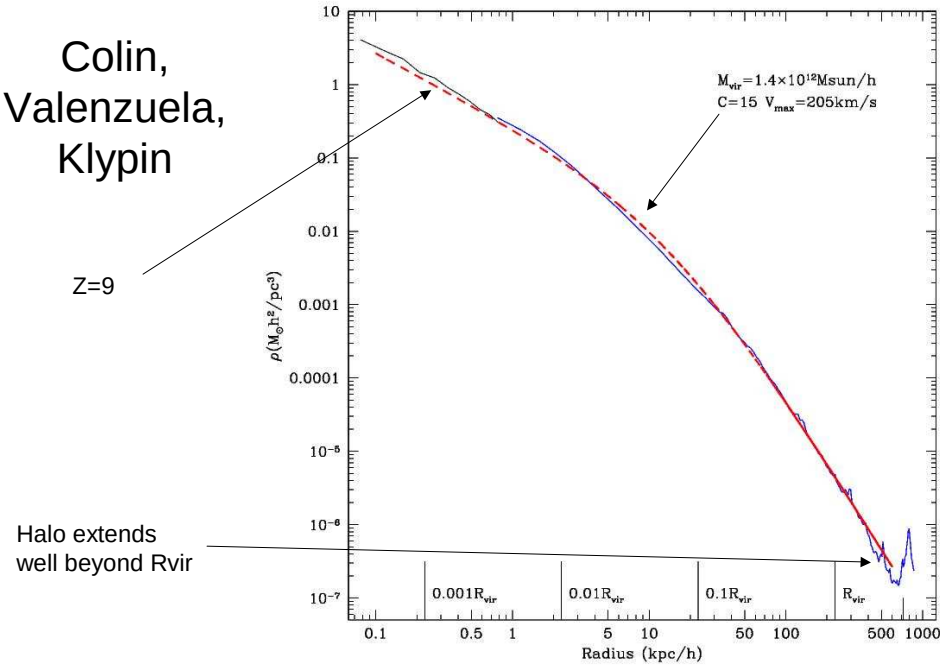
Colin et al (2004)



Halo Profiles: Not Just Cusps

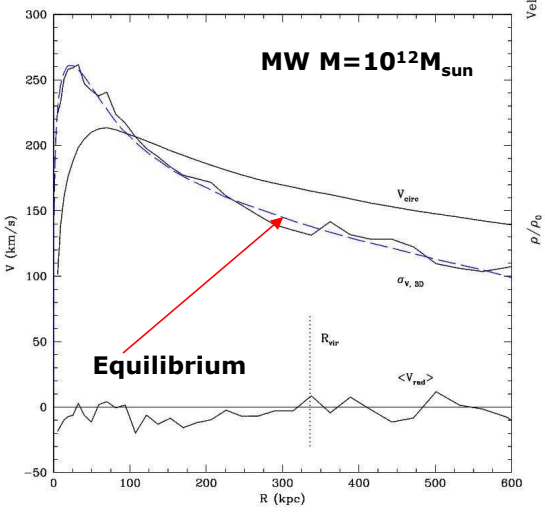
Colin, Valenzuela, Klypin

Z=9

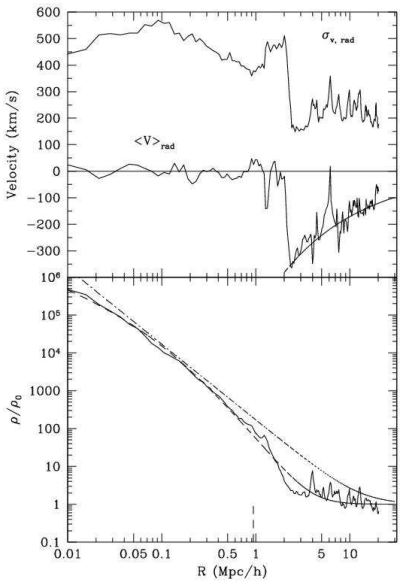


Halo extends well beyond Rvir

Equilibrium



Equilibrium



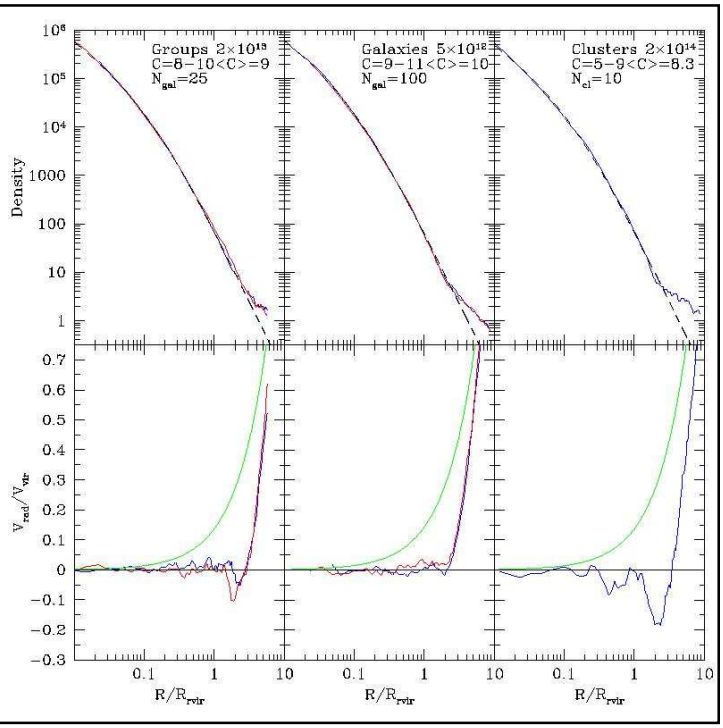
Virgo M=$10^{14}M_{sun}$

Halo Profiles: Not Just Cusps

What is going on large distances?

What is virial radius?

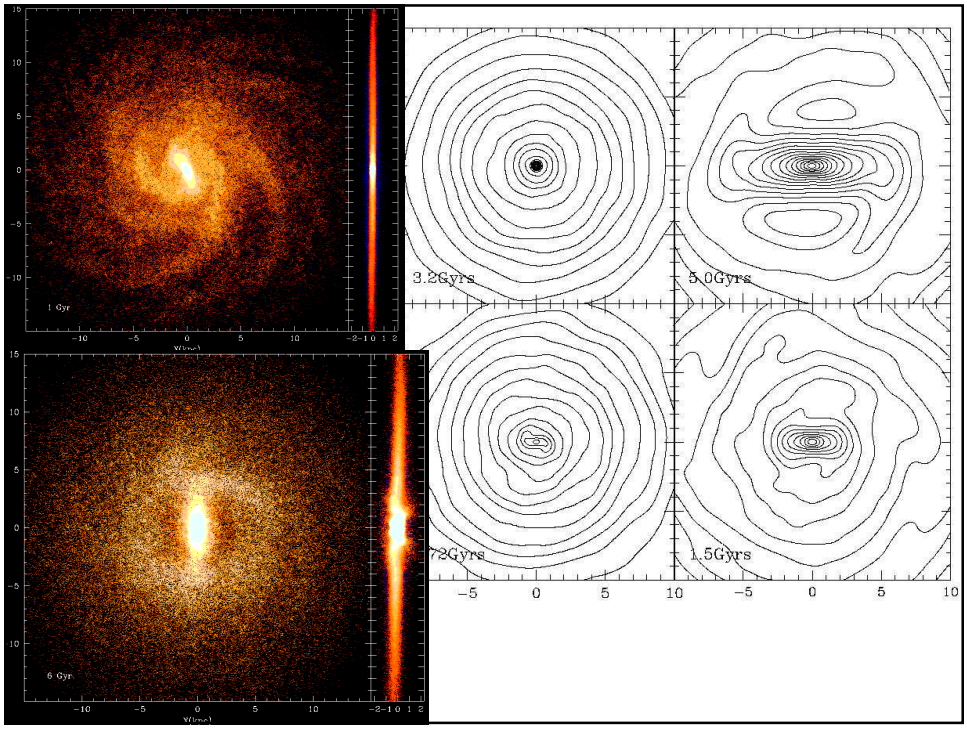
Infall velocity?

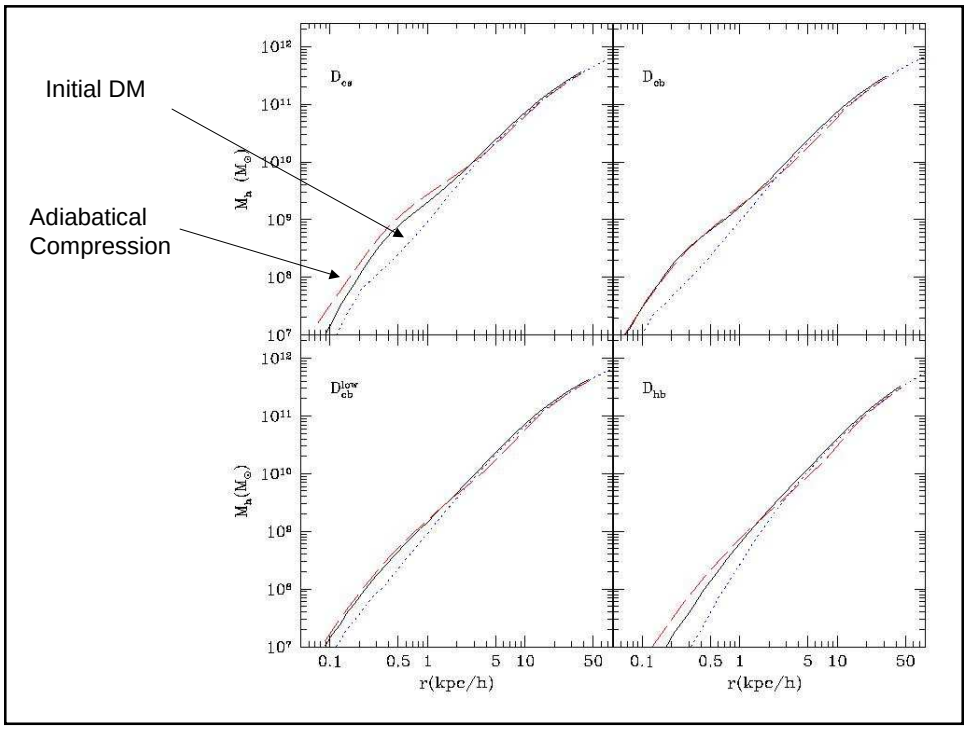


Bars

Will bars wipe out cusps?

Halo Profiles: Not Just Cusps





- Gao, Loeb, Peebles et al (2004): proposition: ”the inner cores of galaxies tend to approach, through multiple mergers, a universal density profile for their collisionless mixture of stars and dark matter … Lynden-Bell (67) introduced the idea that violent relaxation may drive it towards a universal structure … NFW demonstrated behavior of this kind”.
- In other words, stars replace DM in central cusp (still alpha =-1).
- **This seems to be not true for steep profiles r^{-2}**
- **Violent relaxation is a relatively unimportant process. Particles, which are initially close to the halo center, my be pushed away by infalling satellites. This is mostly done through dynamical friction, not violent relaxation.**

Conclusions

•NFW gives 20% errors over 3 orders of magnitude in radius.

•No direct indication of flattening below -1: no trustful simulation so far had it shallower than -1

•There is not much disagreement between different groups. There are disagreements in extrapolations.

•Do not just read abstracts of papers. Need to evaluate arguments.

•Bars do not flatten cusps.

•Small-mass halos extend well beyond their r_200 radii. Real virial radius depends on M/M*. It is not a radius at a constant average overdensity.