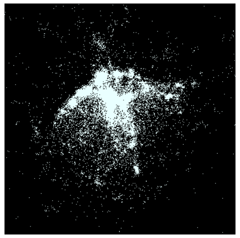
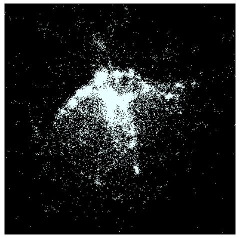


Central Profiles of Dark Matter Halos

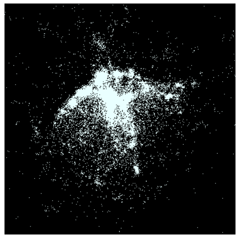
1. Introduction
   a. Motivation
   b. Assumptions
2. Simulations
3. Results and Interpretation



Motivation

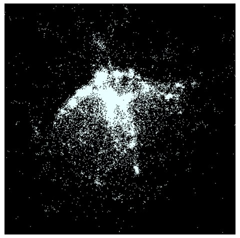
astro-ph 9903164

- Standard CDM simulation
- Extract 6 halos at z = 0 and $V_c = 130 - 230 km/s$
- Re-simulate the halo with higher resolution
- Navarro, Frenk and White(1996)
  - Systematic study of the CDM halo structure
  - Found universal form for the density profiles of halo

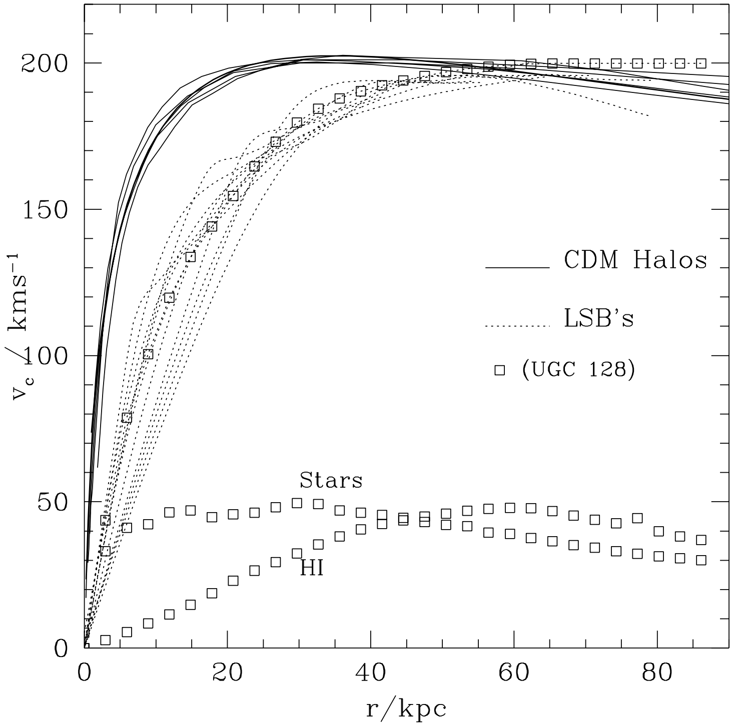


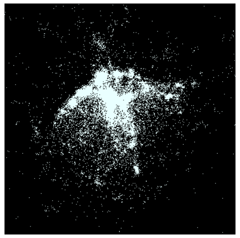
Our Simulations

- We want to reproduce the observational data
- Assumptions
  - Supernova explosions!!
    1. instantaneous removal of baryonic matter
    2. gradual removal

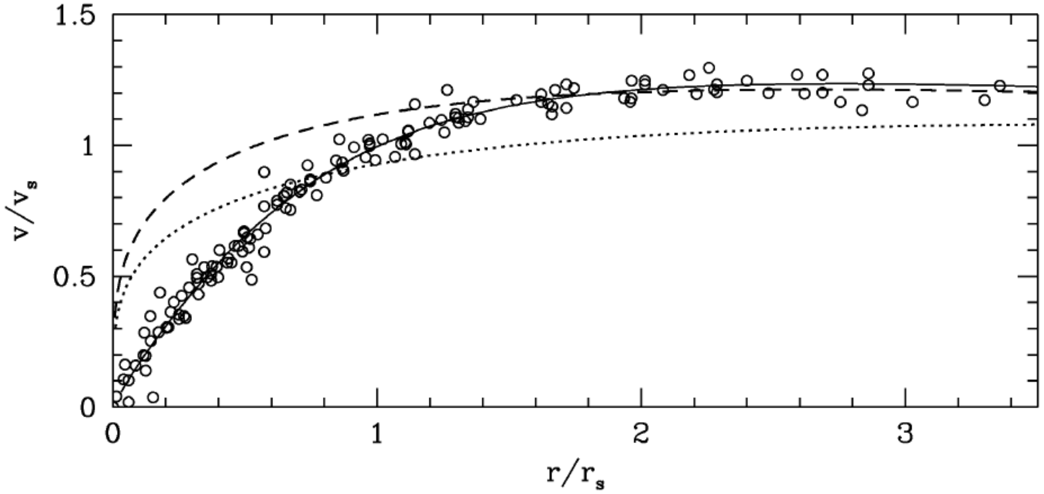


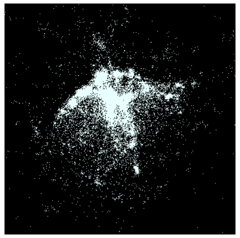
Rotation Curve I



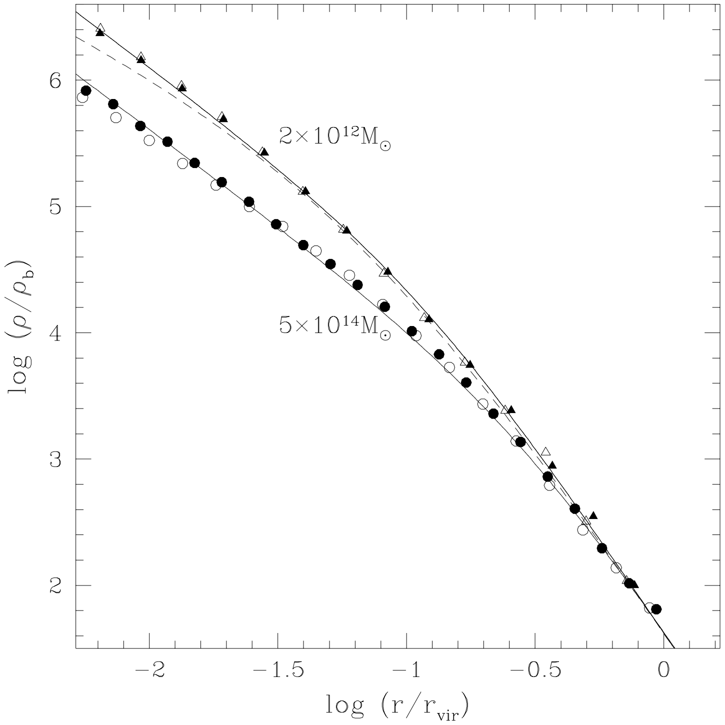


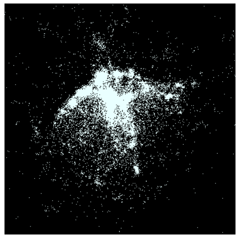
Rotation Curve II





Density Profile



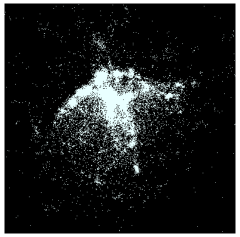


Density Profile

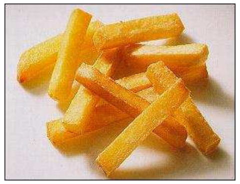
- The density profile
  - $->$ independent of cosmological parameters
  - $->$ has a universal form for dark matter dominated galaxies

$$\rho(r) = \frac{\rho_o}{(r/r_s)^{\gamma}[1+(r/r_s)^{\alpha}]^{(\beta-\gamma)/\alpha}}$$

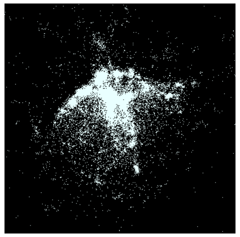
$$\rho(r) = \frac{\rho_o}{[(r/r_s)^{1.5}(1+(r/r_s)^{1.5})]}$$



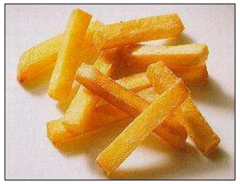
Outline

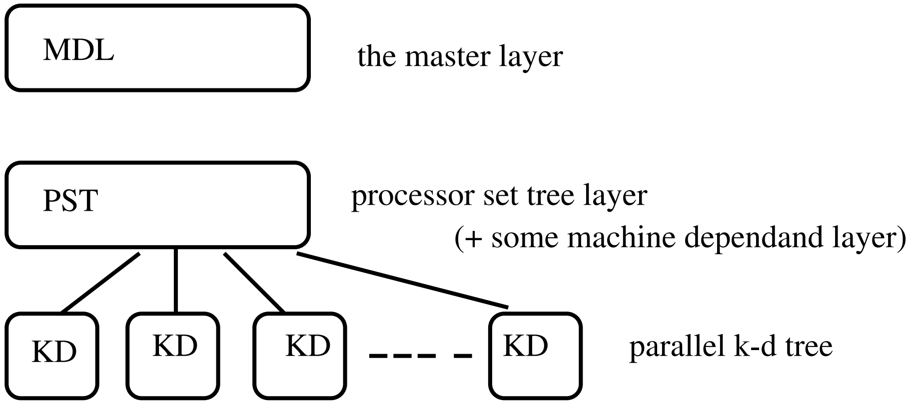


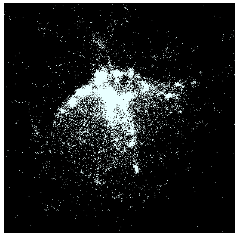
- It slices ; it dices ; it Juilenne fries !
- A Big Box
- An interesting result
- Simulation Results



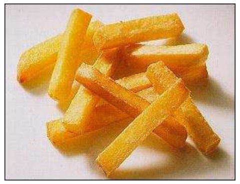
PKDGRAV structure

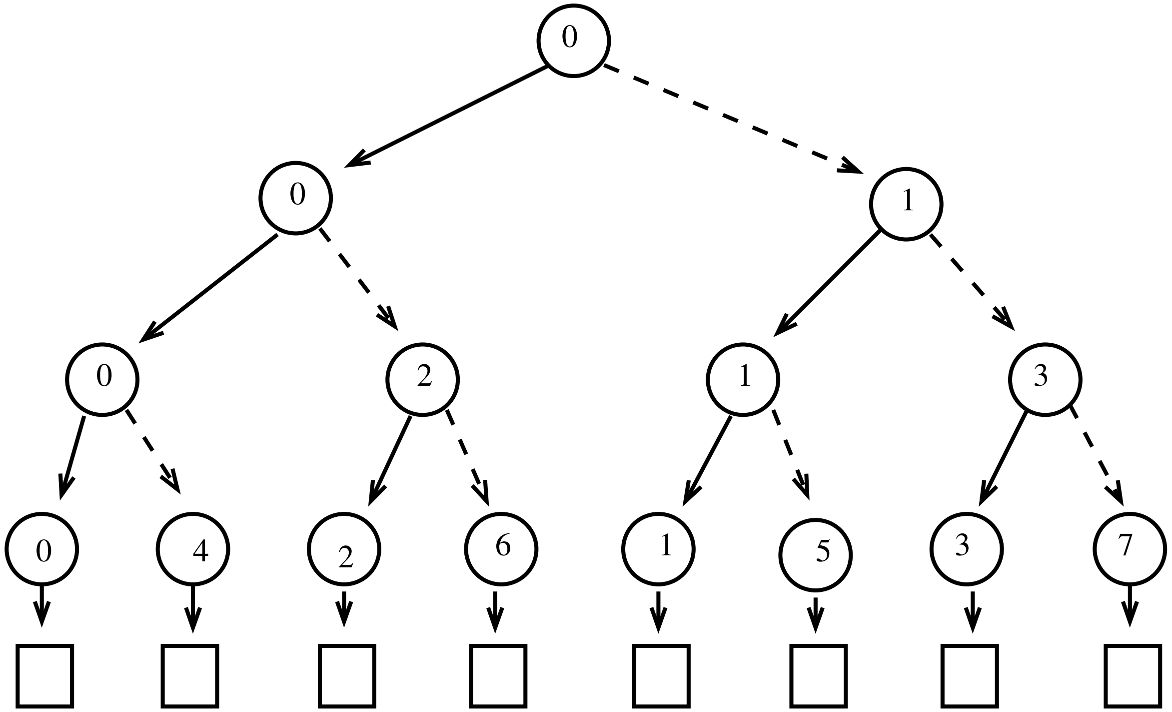




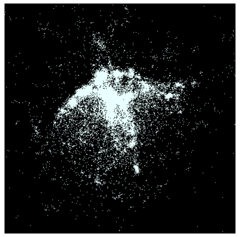


Binary Tree

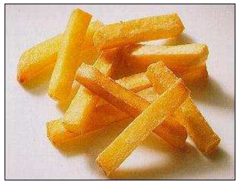




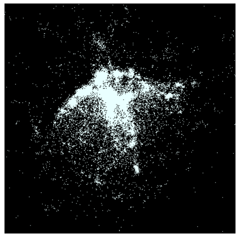
The Structure of the PST



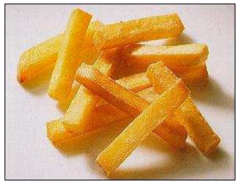
Implementation



- PKDGRAV has function GROW_MASS
  - orginally designed to add mass to system
- Negative argument removes mass !!!



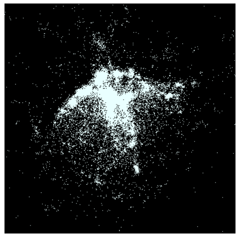
Box Size



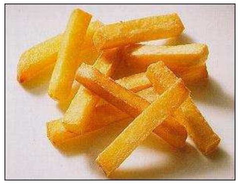
item	commoving size	in system units
Box Size	100 Mpc	1
Box ρ	$6.94 \times 10^{10} M_{\odot} Mpc^{-3}$	1
Box time	56Gy	1
v	1728 kms^{-1}	

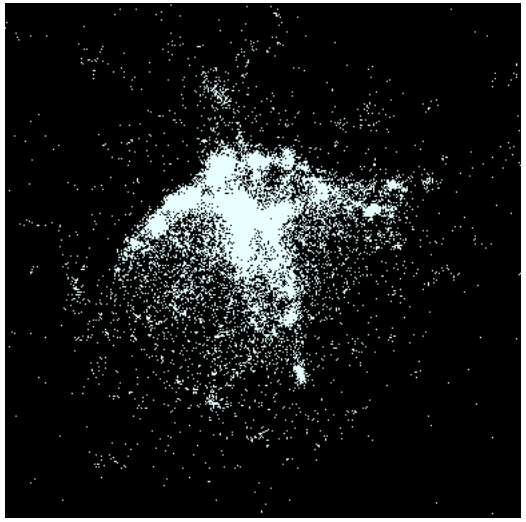
$G = 1$

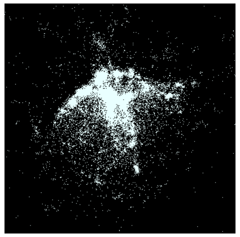
$H_0 = 50$



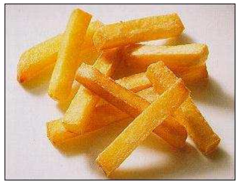
Cluster & Boundry

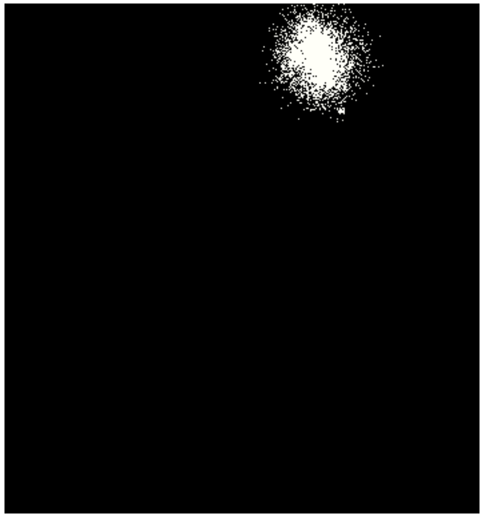


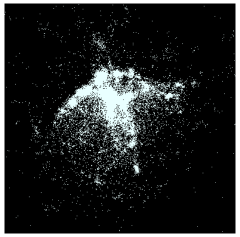




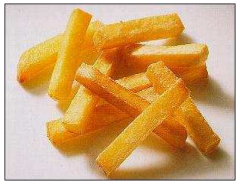
Cluster & ??

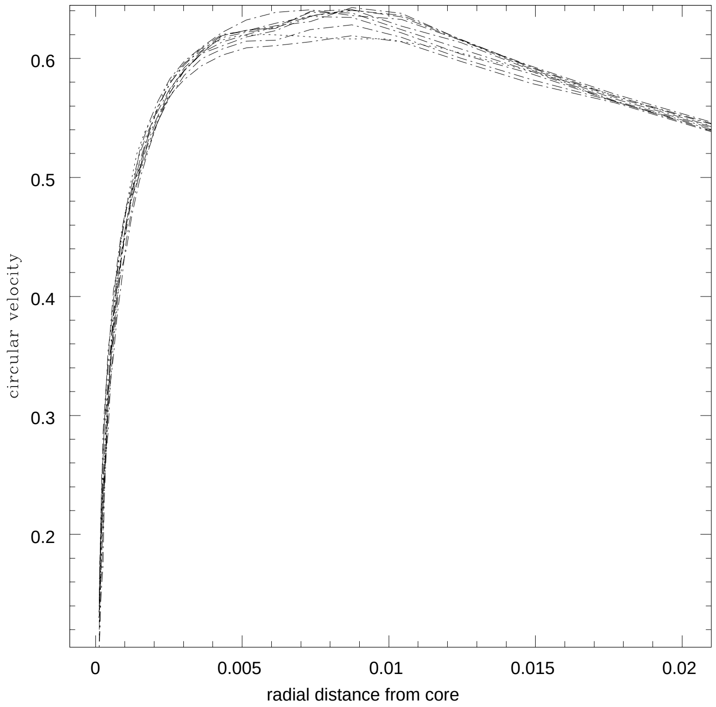




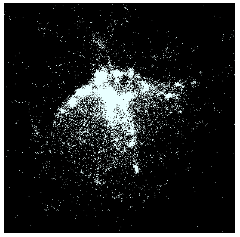


Test bed

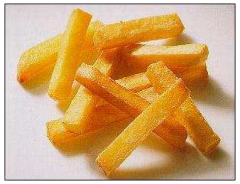


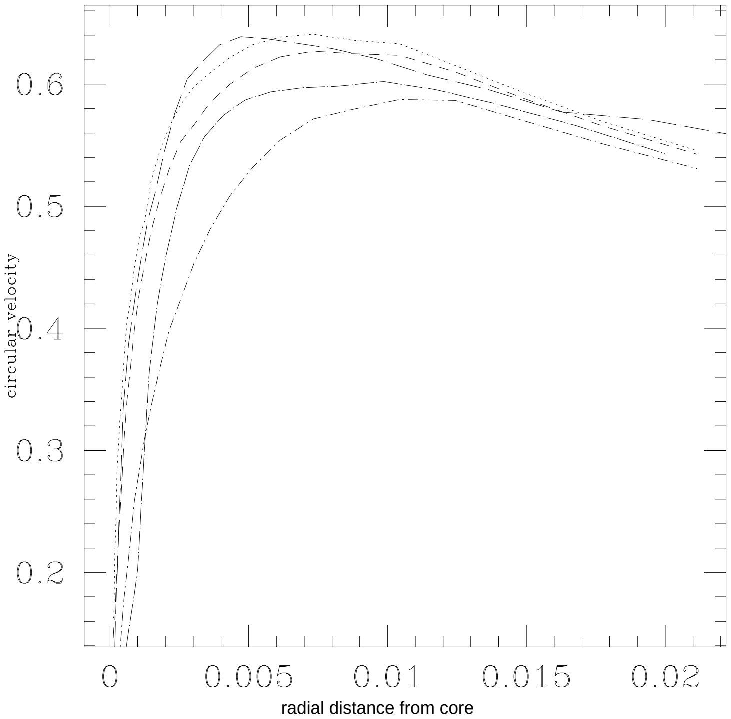


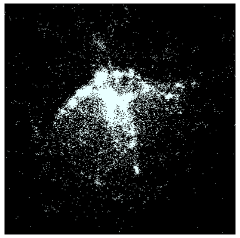
0.6
0.5
0.4
0.3
0.2
circular velocity
0
0.005
0.01
0.015
0.02
radial distance from core



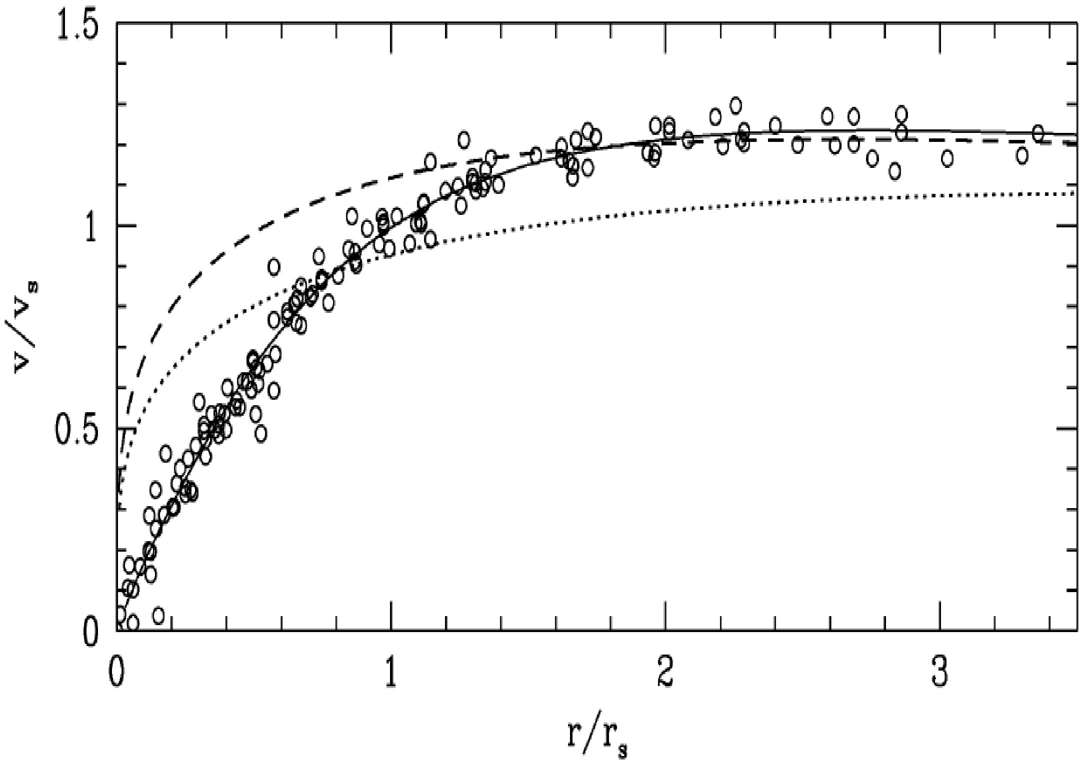
Assorted Results

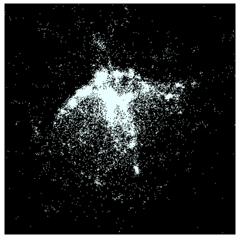




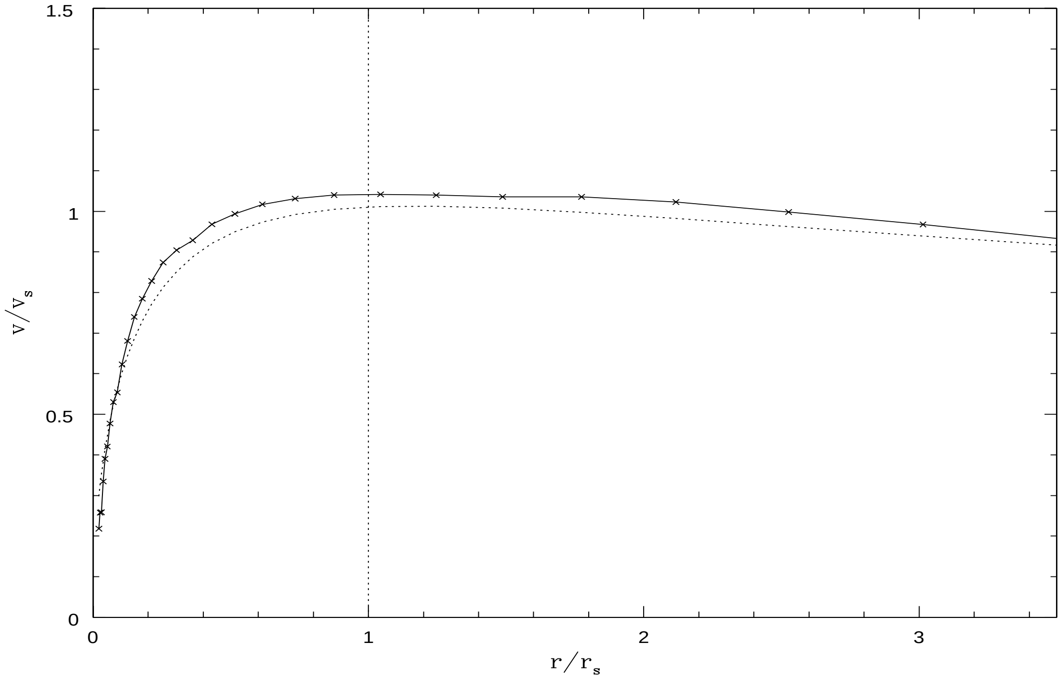


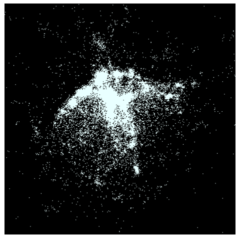
Moore *et al.* Result



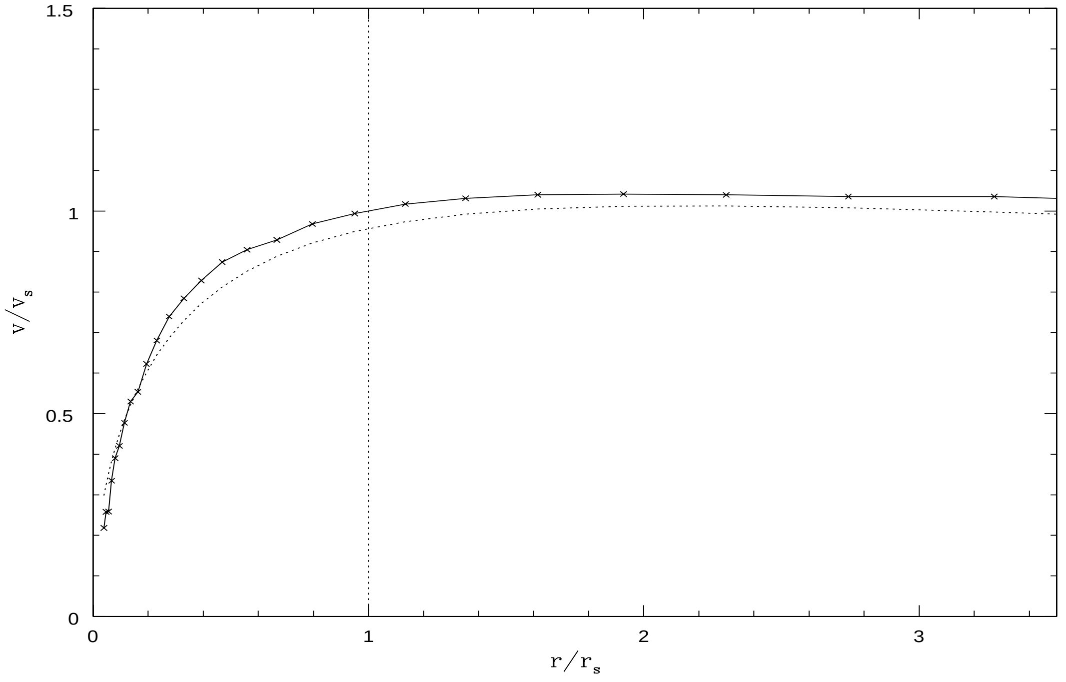


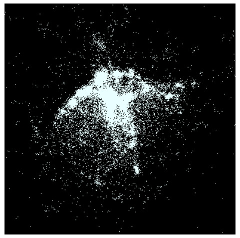
Profile of our Original Galaxy: Eq 2 normalized



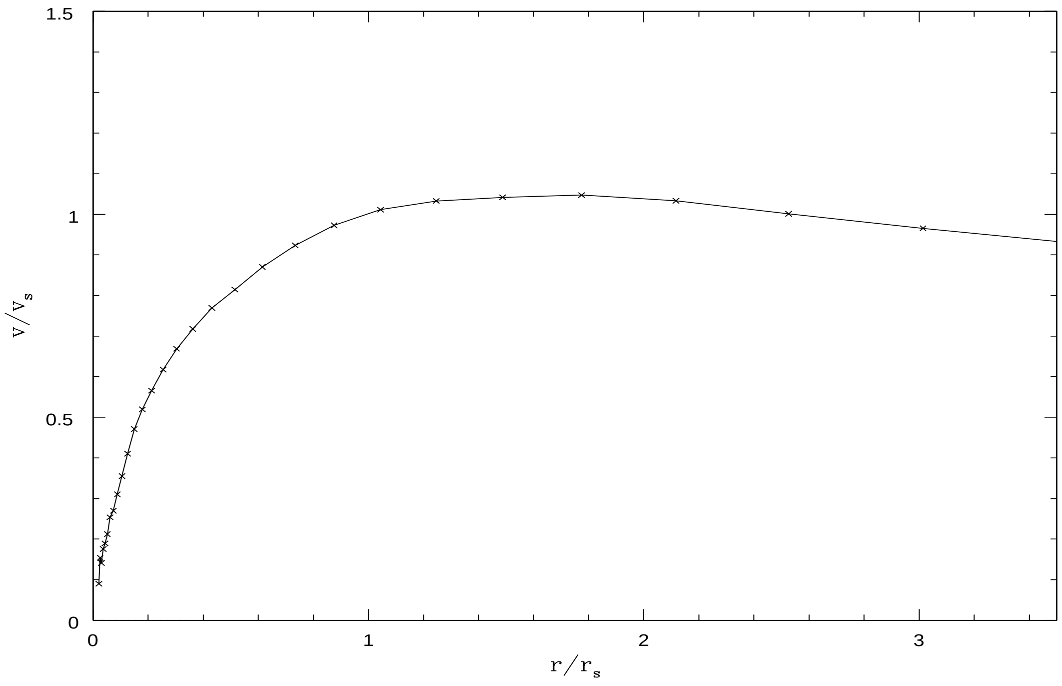


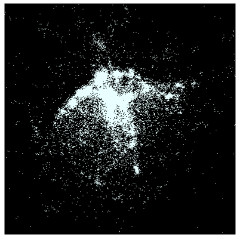
Profile of our Original Galaxy: NFW normalized



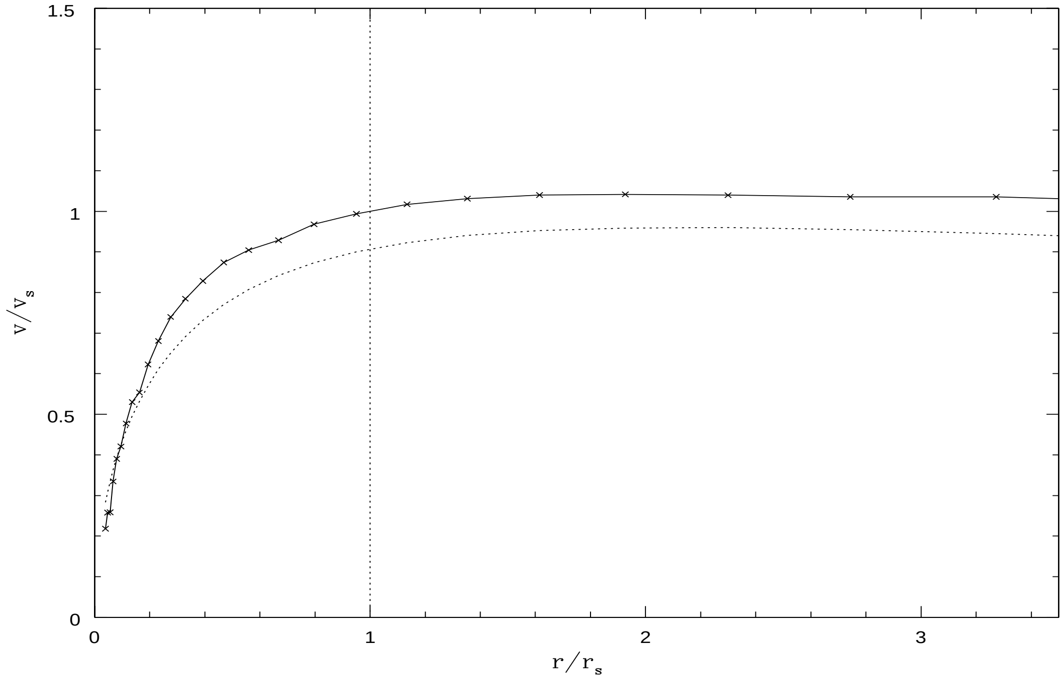


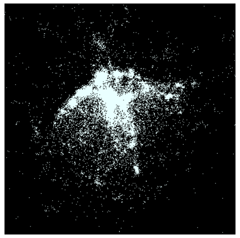
50% Mass Removed Adiabatically: NFW normalized



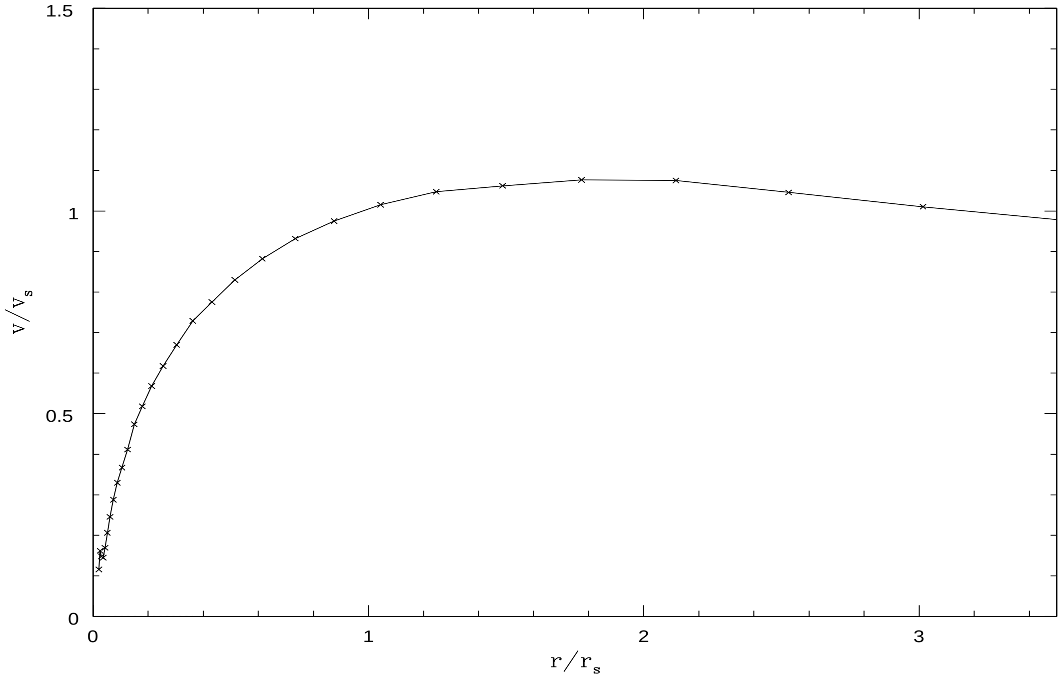


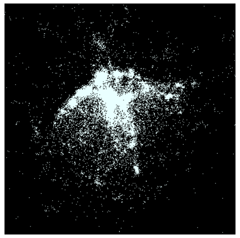
50% Mass Removed Adiabatically: Eq2 normalized



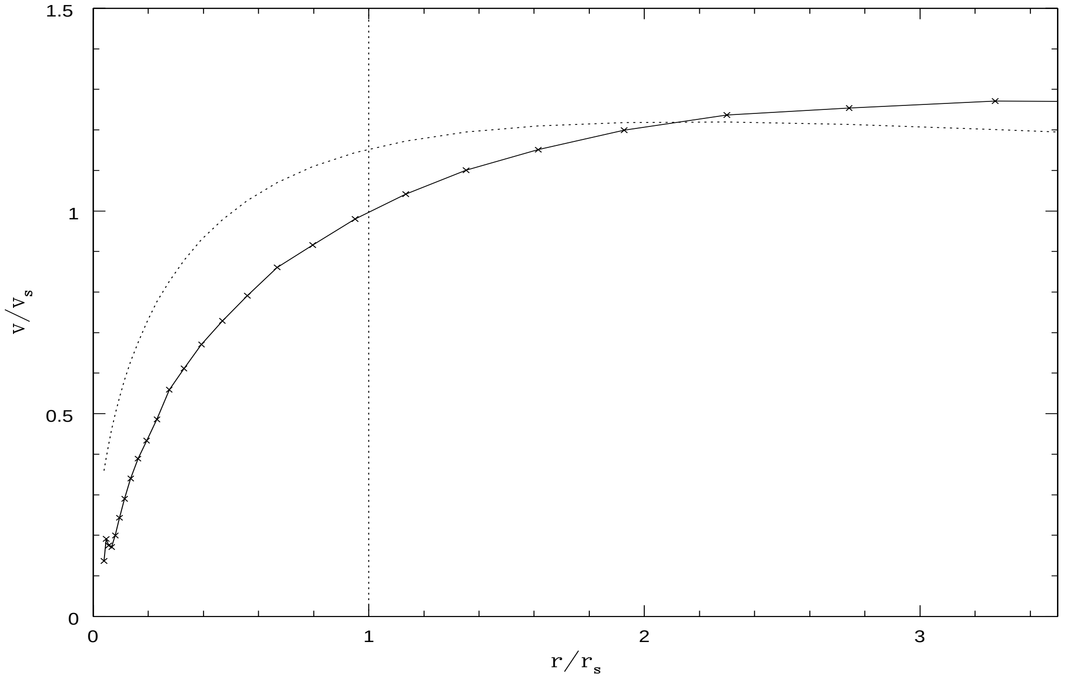


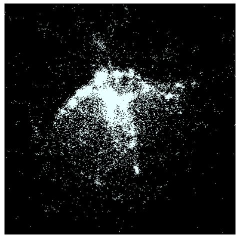
50% Mass Removed Immediately: NFW normalized



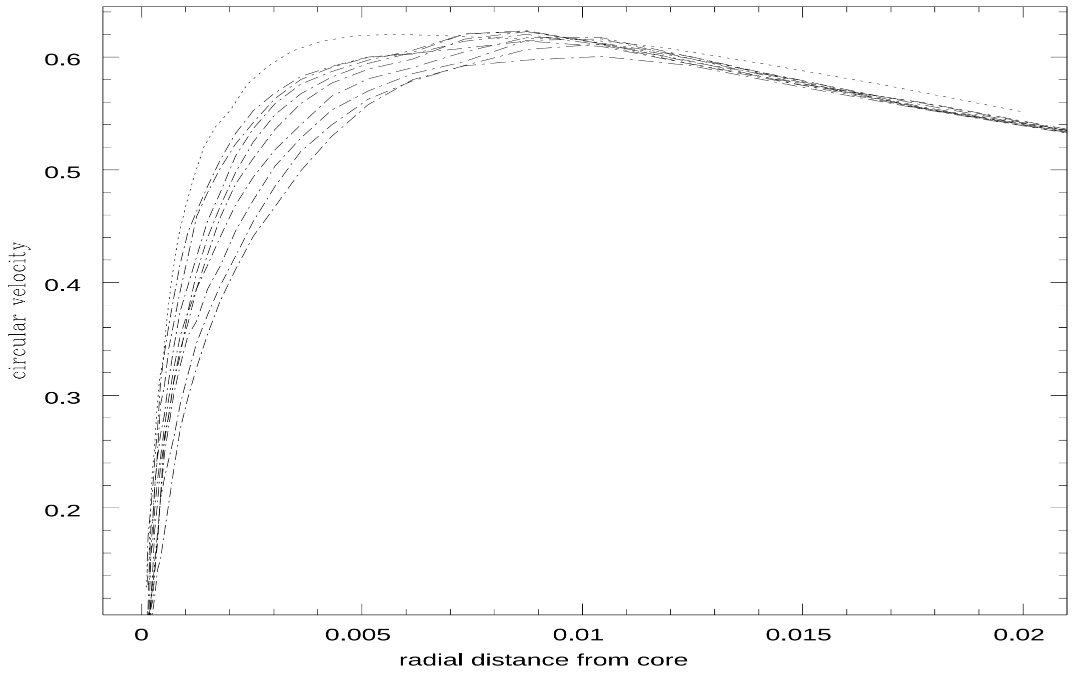


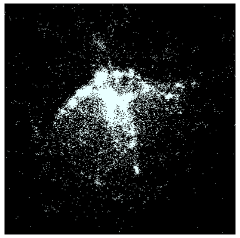
50% Mass Removed Immediately: Eq2 normalized



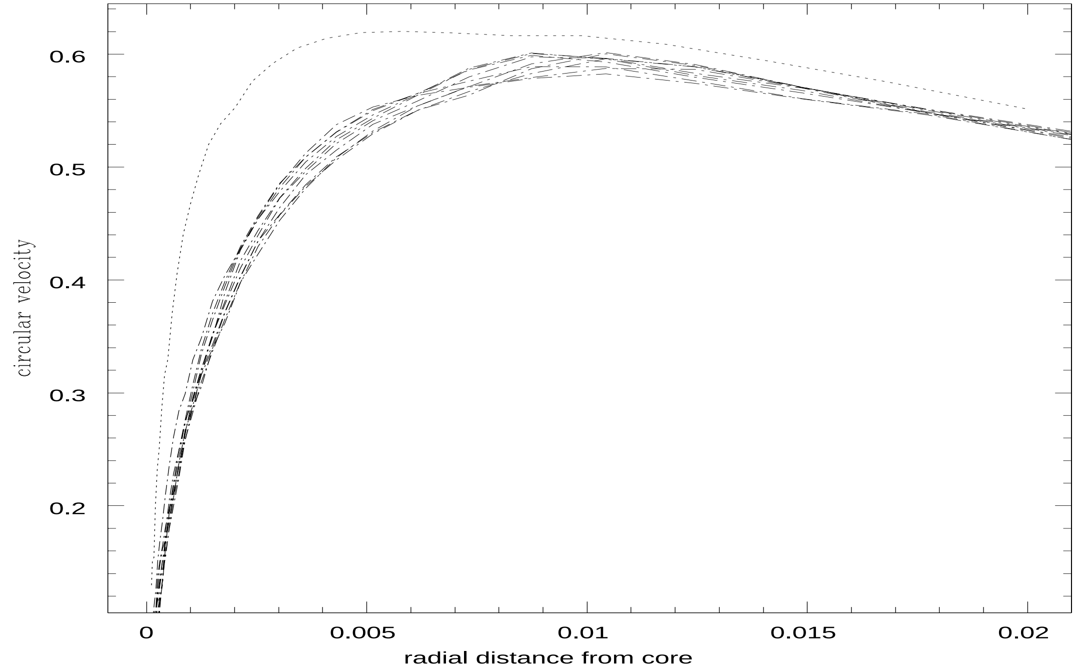


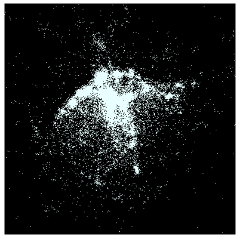
Settling Diagram: 50% Mass Removed Adiabatically





Settling Diagram: 50% Mass Removed Immediately





Starburst Supernovae: A Physical Scenario