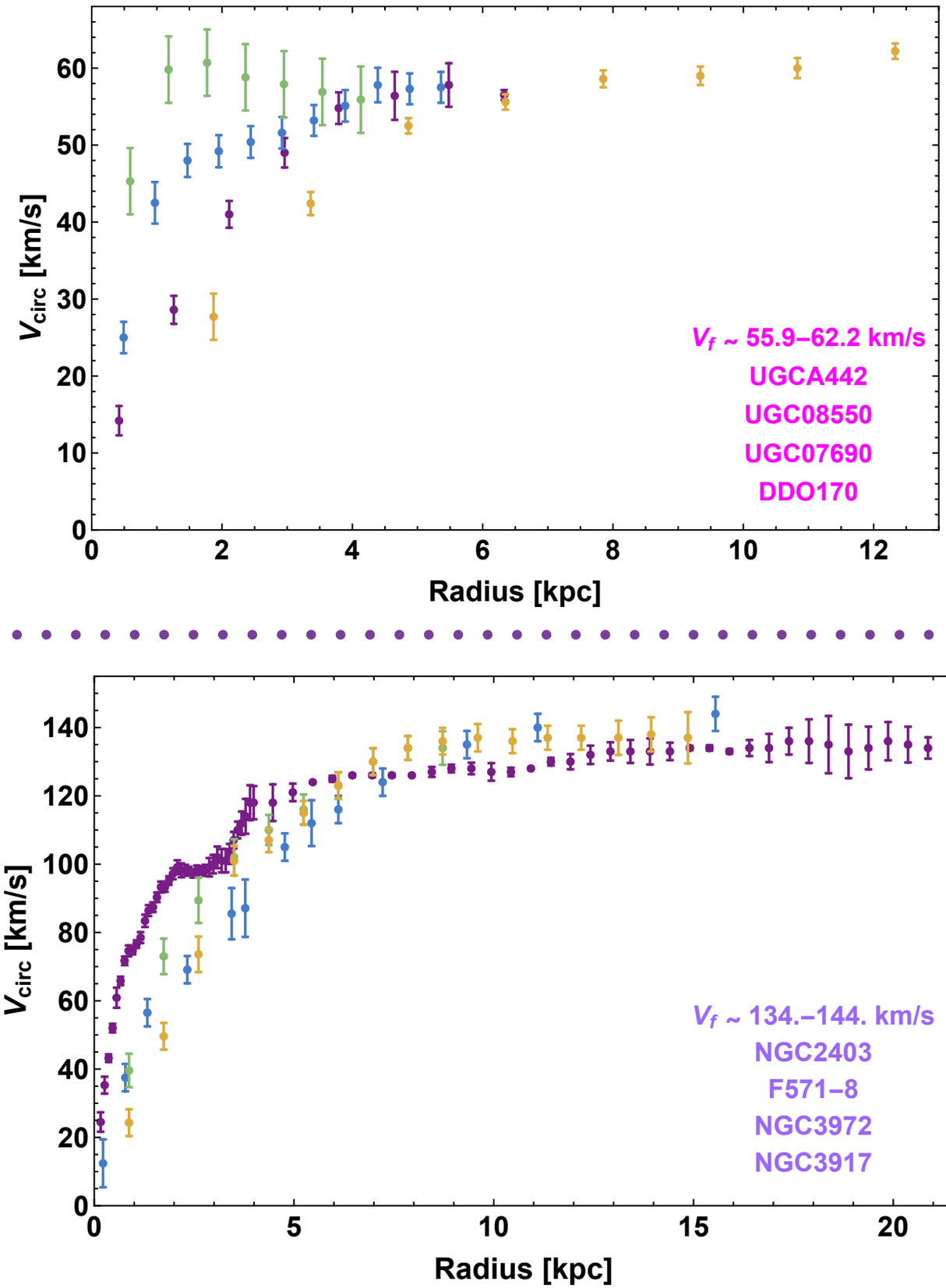
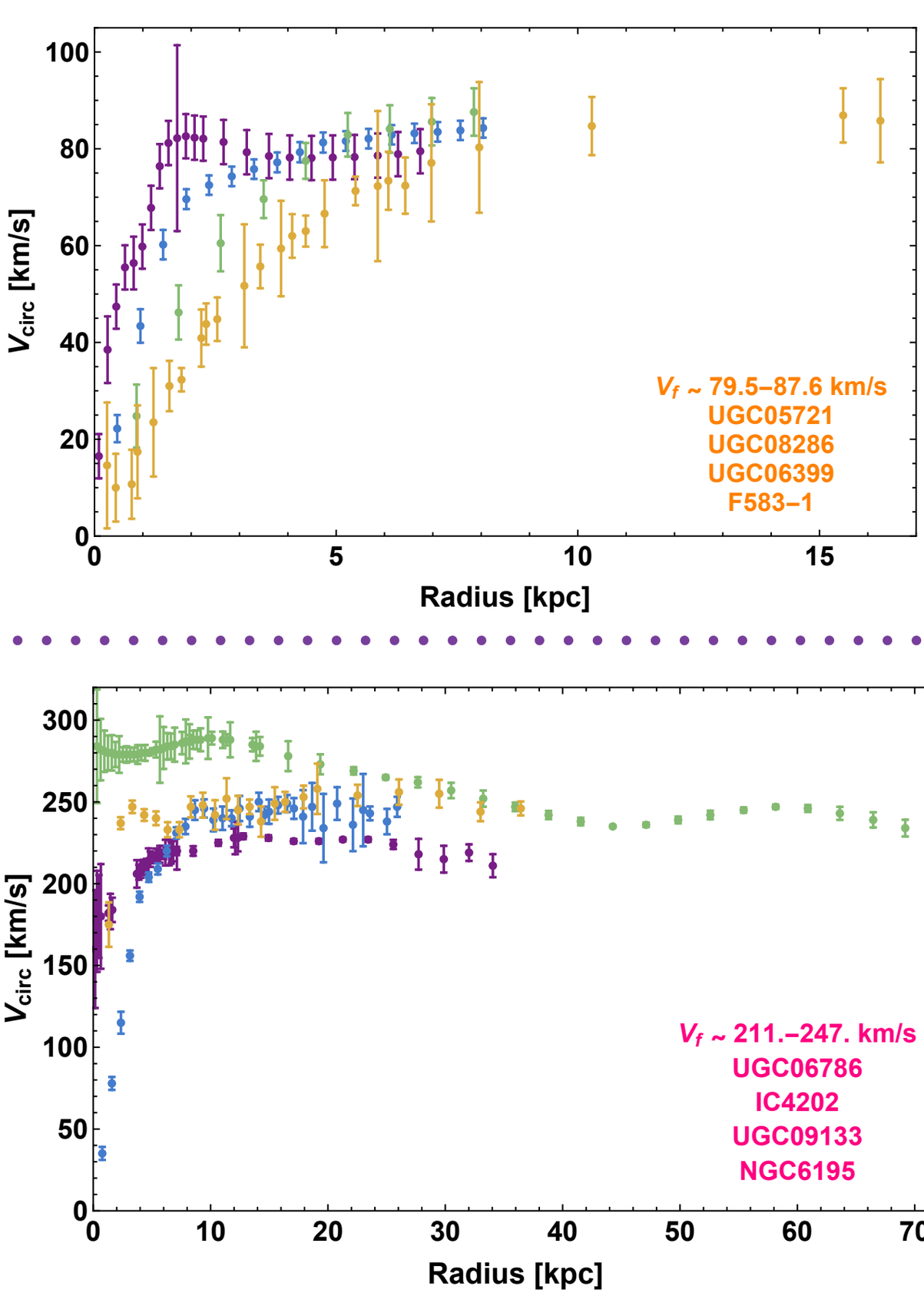
Explaining Diverse Rotation Curves of Spiral Galaxies with Self-Interacting Dark Matter (SIDM)

Tao Ren @ Pheno 2017

Diversity in Rotation Curves

Data Source: SPARC
1606.09251



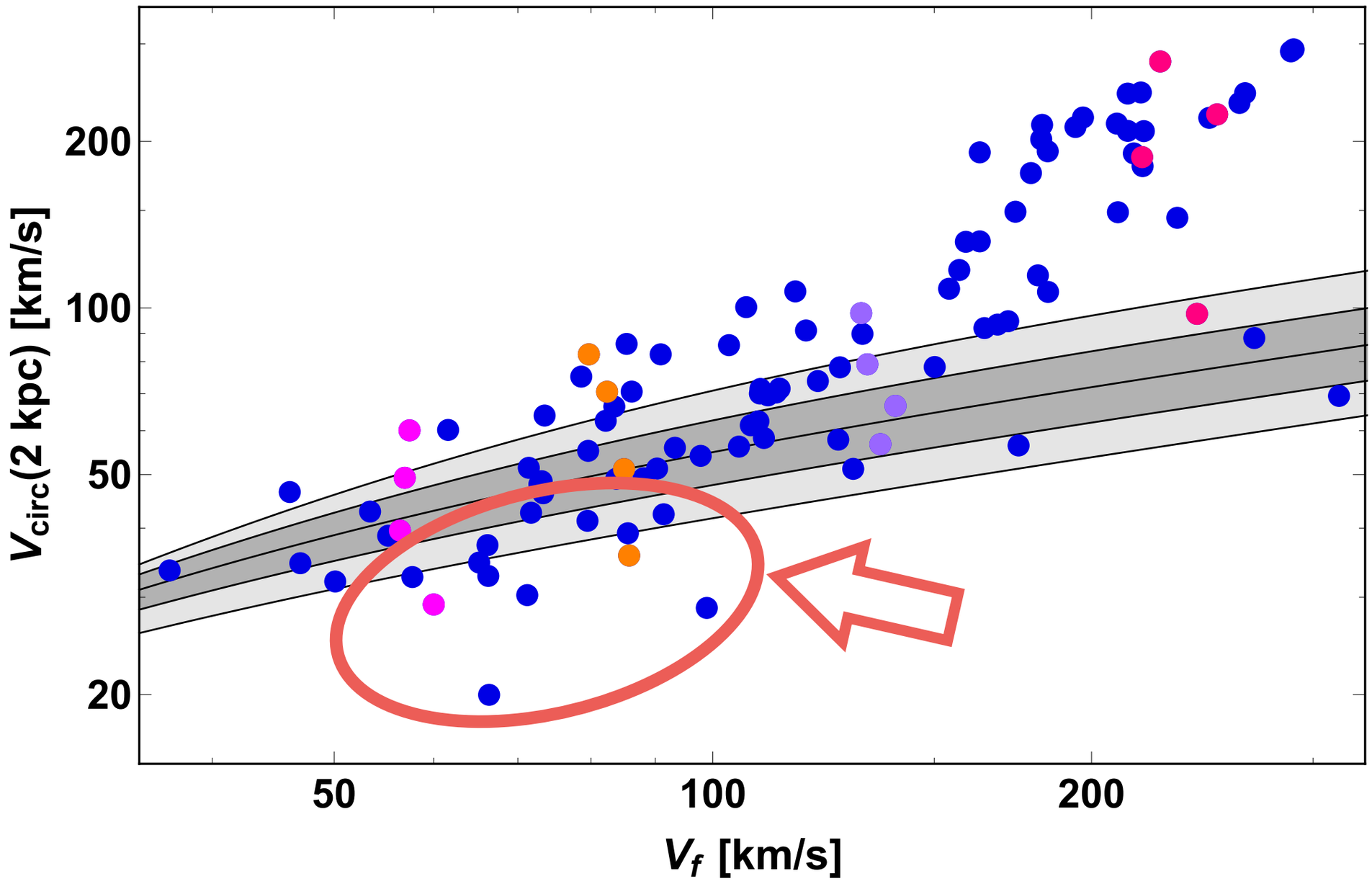


Headache for Cold Dark Matter (CDM)

DM

+

Baryon

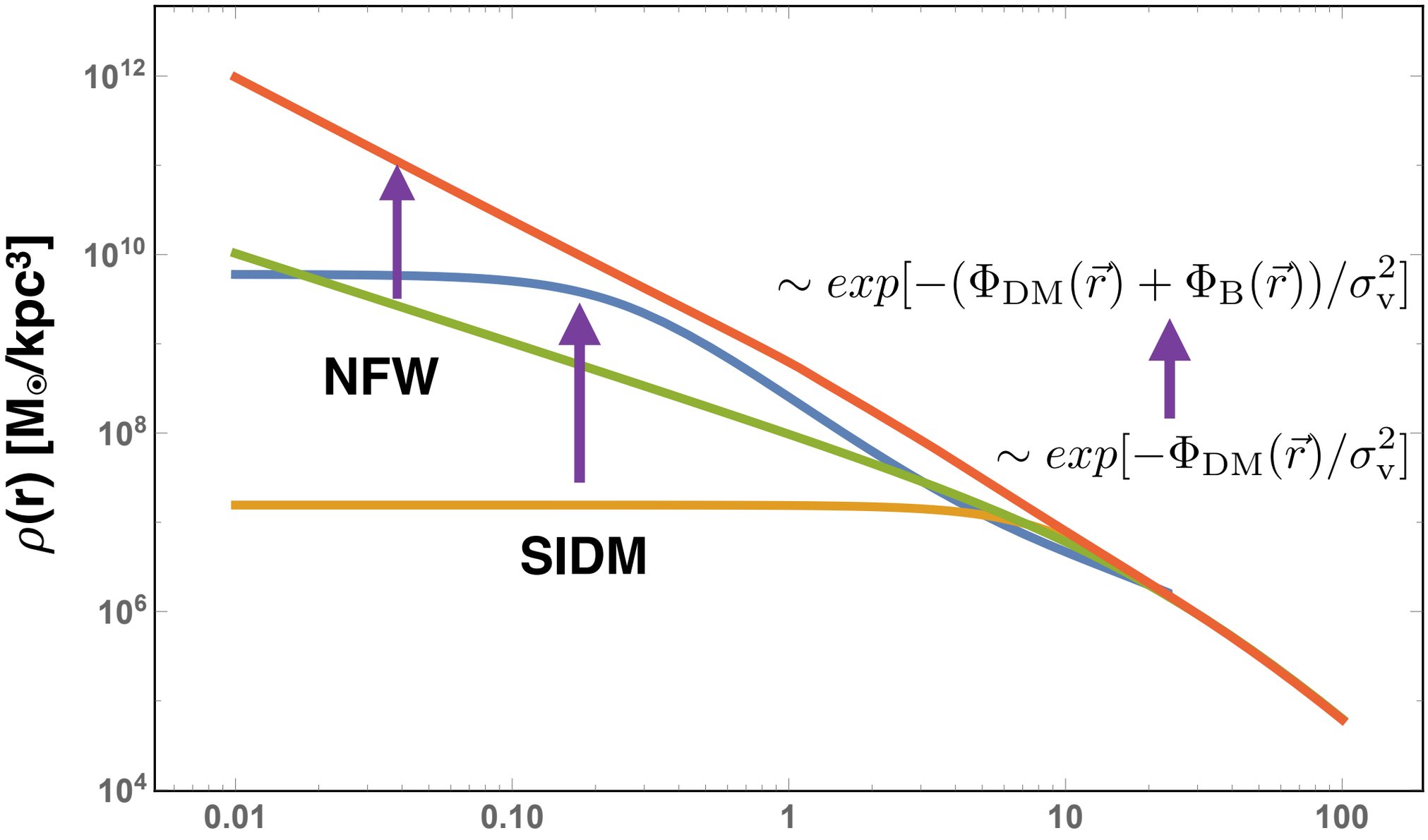


Halo Mass (M200)
&
Concentration (c200)

$$c_{200} = (10^{0.905+\delta*0.11})(\frac{M_{200}}{10^{12} * h^{-1} M_{\odot}})^{-0.101}$$

(Dutton et al.)

SIDM & CDM Density Profile

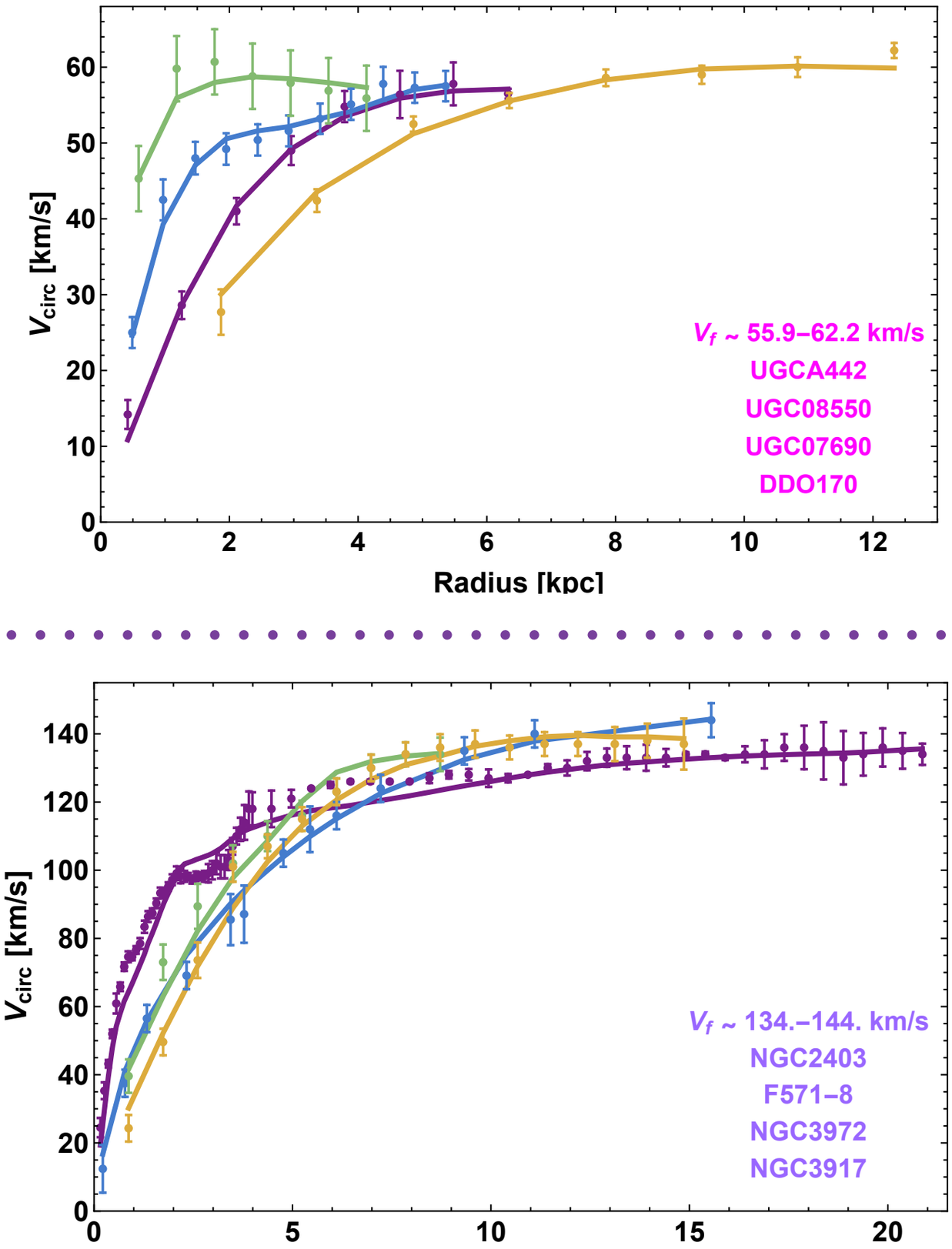


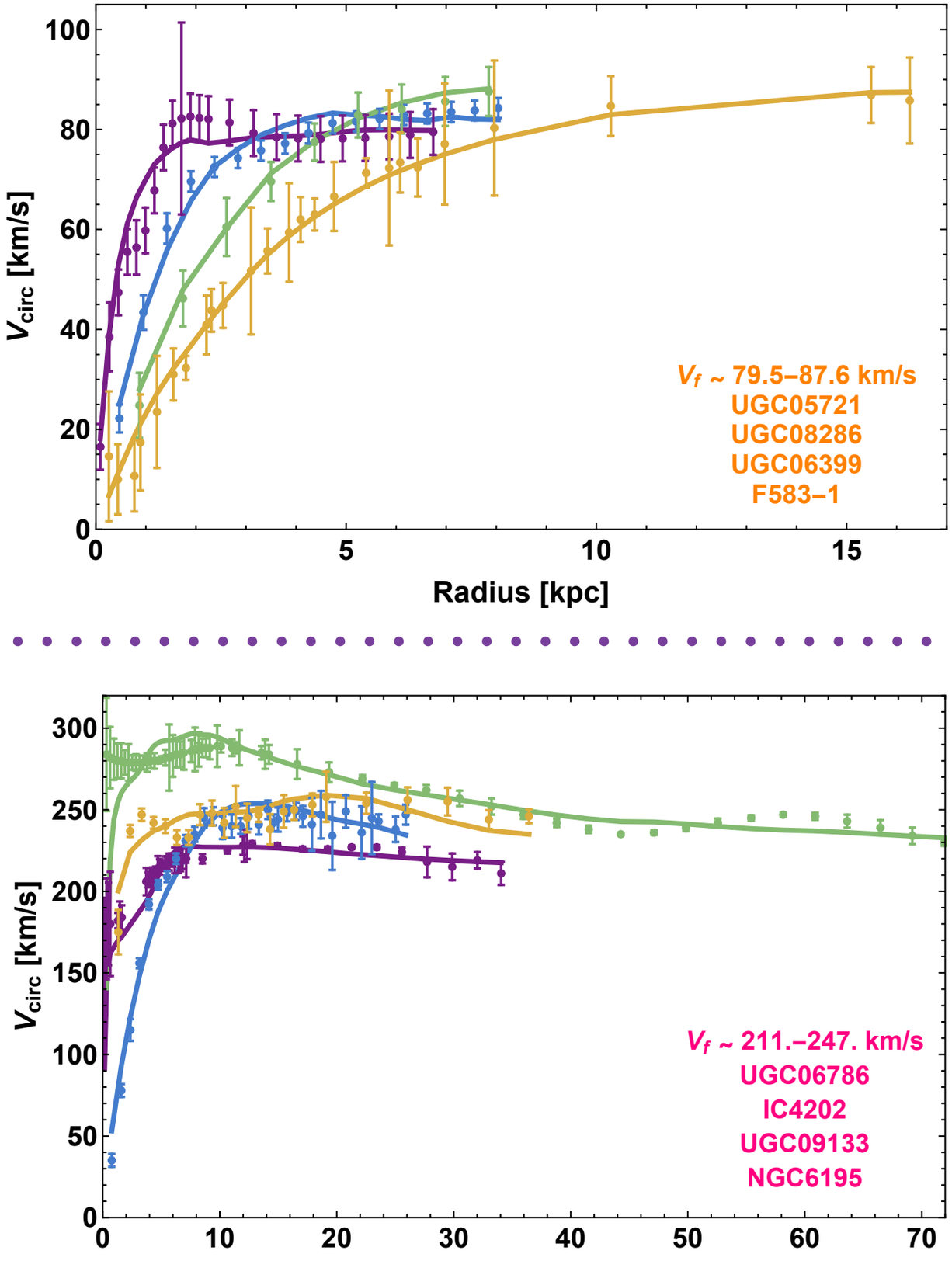
How SIDM works:

Self-Interaction + Baryon Effect + M200-c200 Relation

CDM : 1504.01437

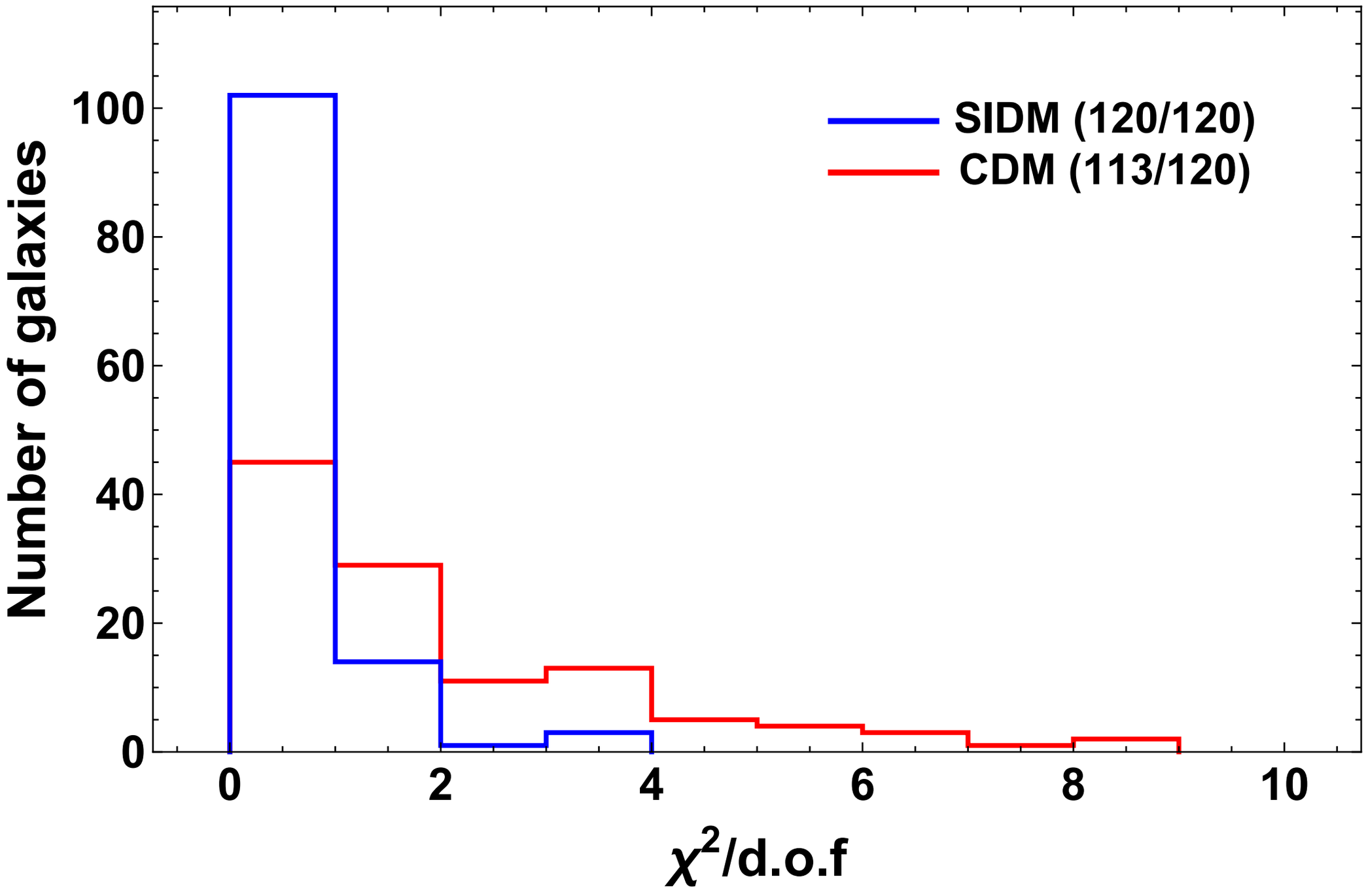
SIDM fitting examples



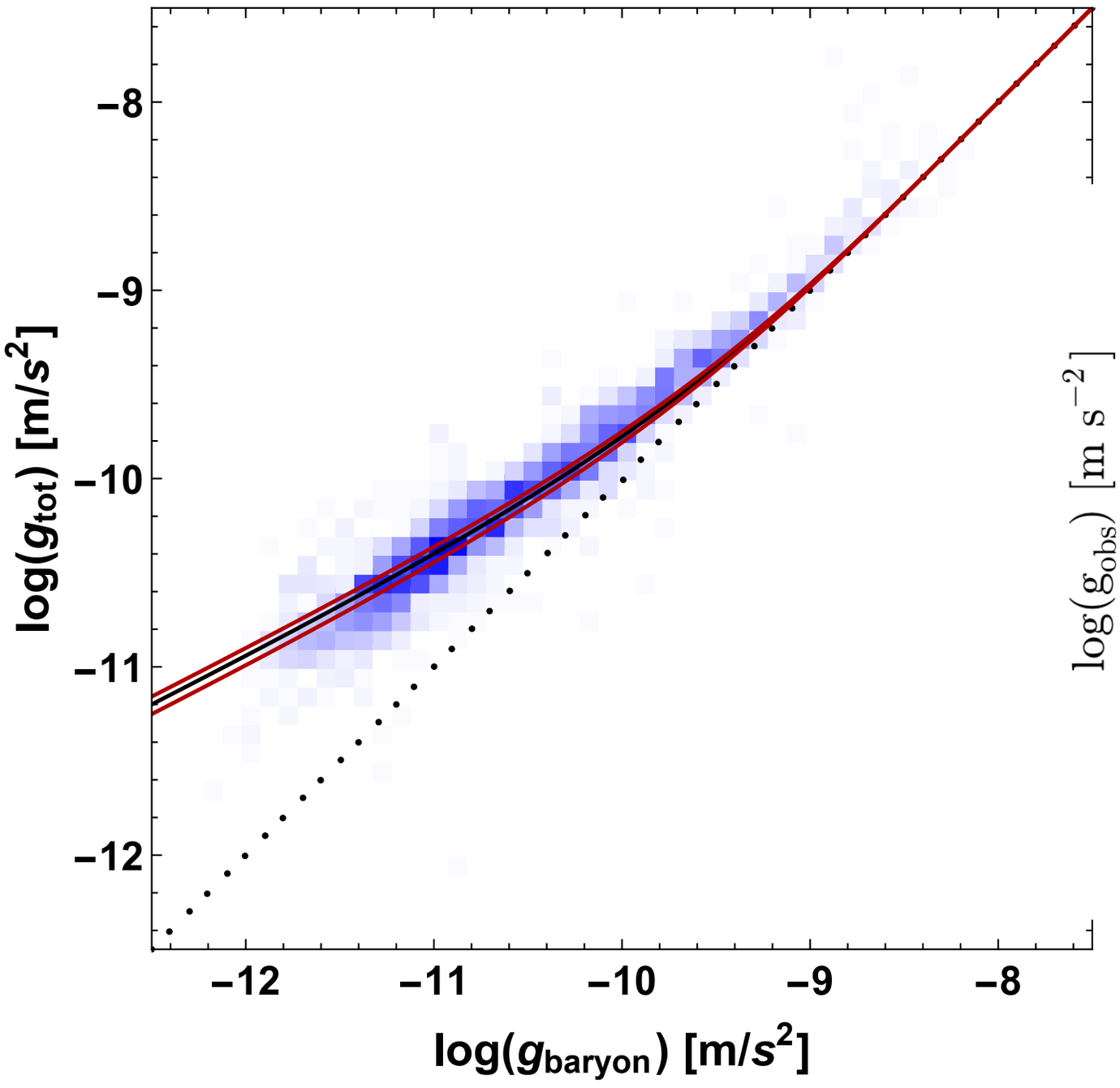


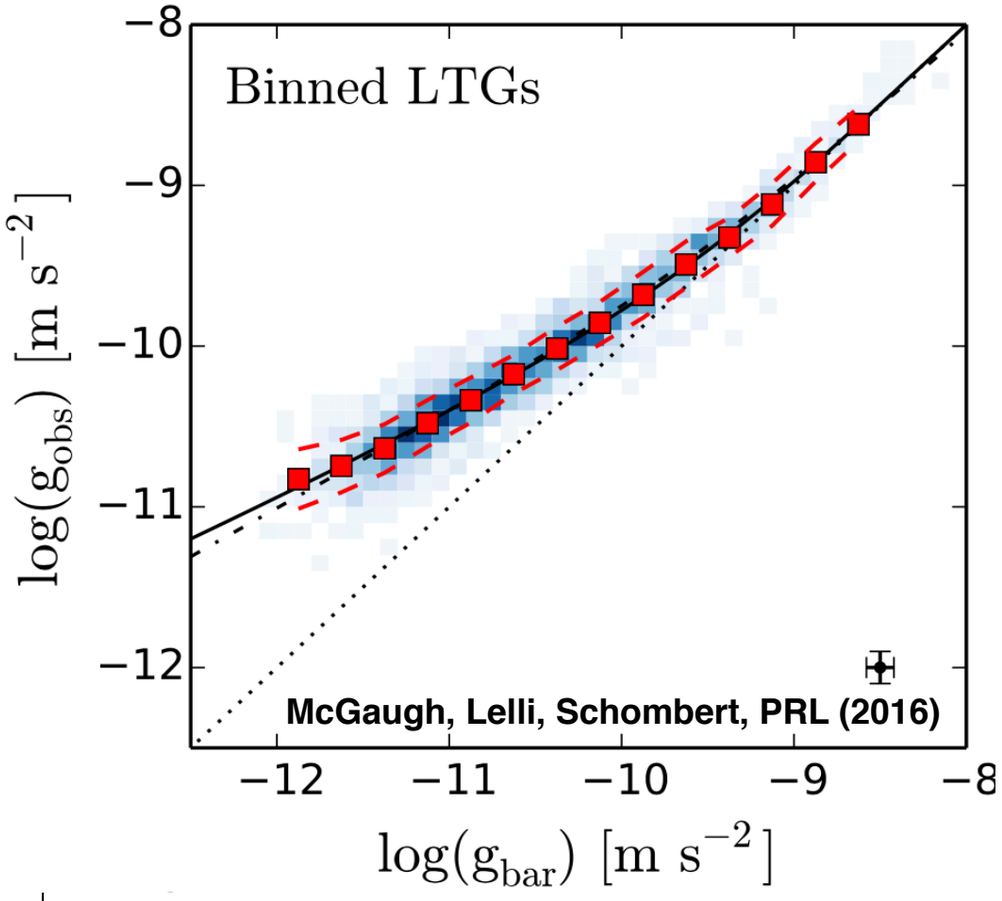
Kamada, Kaplinhat, Pace, Yu, (2016)

Fitting to 120 galaxies



Radial acceleration relation





From diversity to uniformity

Summary

Diversity in rotation curves of spirals;

Trouble of CDM;

How SIDM works :

Self-Interaction+Baryon effect+M200-c200;

Fitting results for 120 galaxies;

Radial acceleration relation;