Scaling relations for galaxies of all types with CALIFA and MaNGA surveys.

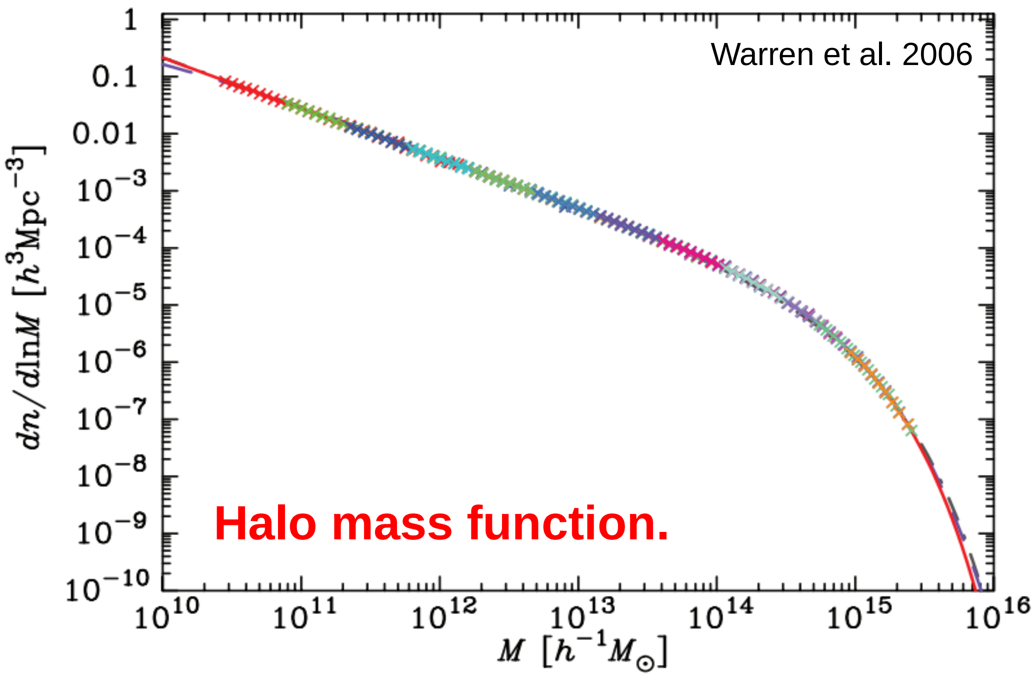
E. Aquino-Ortíz, S. F. Sánchez, O. Valenzuela, M. Cano-Díaz, H. Hernández-Toledo.
Institute of Astronomy, National Autonomous University of México

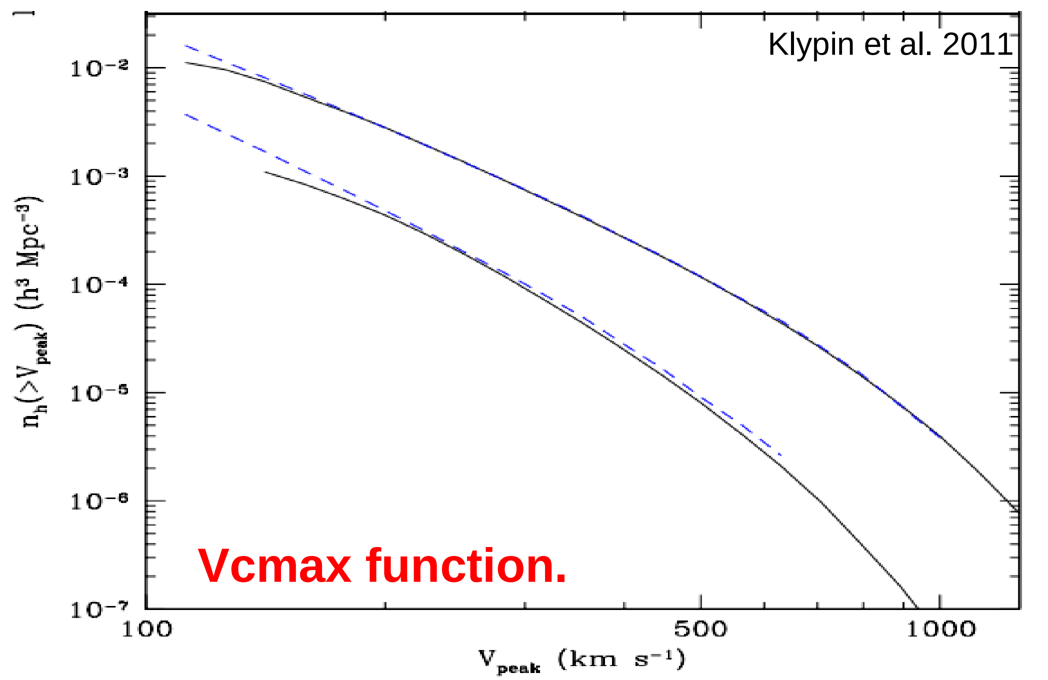
MSc. Erik Aquino Ortíz.

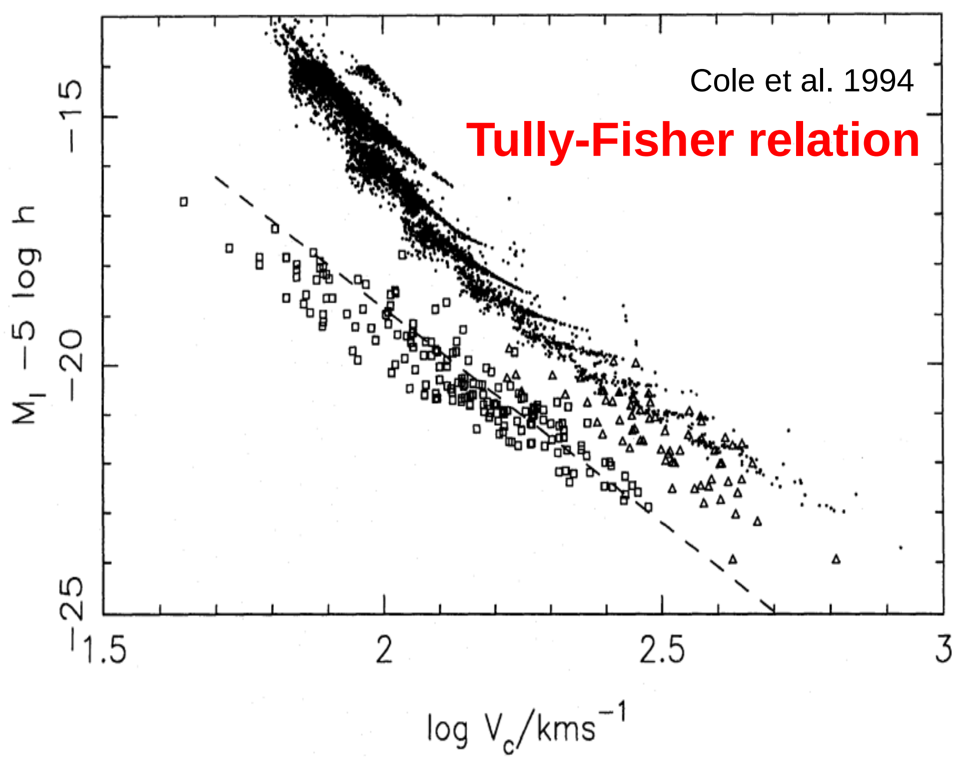
INSTITUTO DE ASTRONOMÍA, UNAM.

Cozumel, Q. Roo, 2016

Motivation: Structure formation in the LCDM.







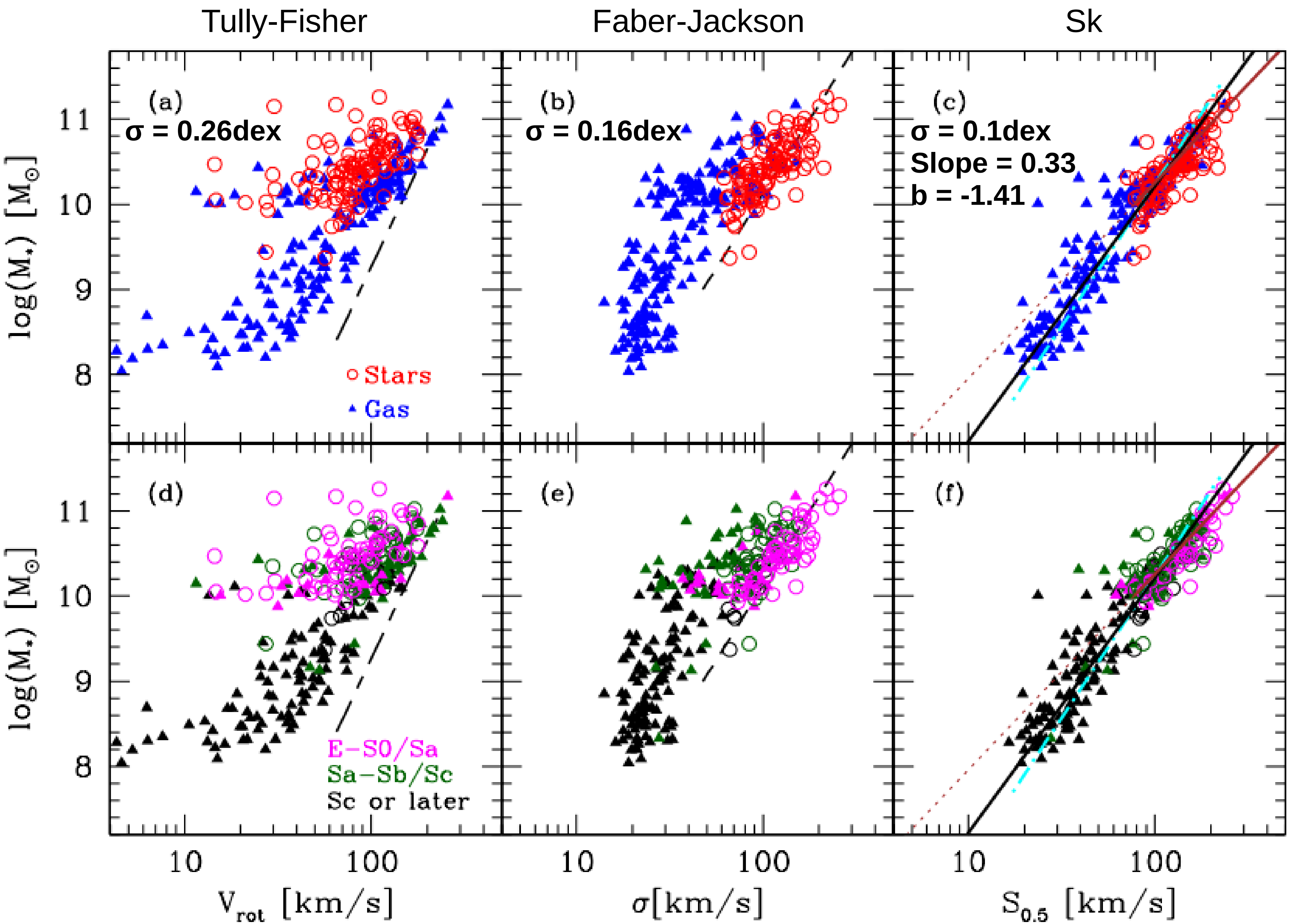
Motivation: Scaling relations

- Galaxy evolution and environmental effects are likely to modify the shape of Tully-Fisher relation. Weiner et al. 2006A, Corteau 1997.

- Different works have investigating the possibility of bringing galaxies of all types onto the same scaling relation. Zaritsky et al. (2008), Kassin et al. (2007), Cortese et al. (2014)

$$S_K^2 = KV_{rot}^2 + \sigma^2$$

Cortese et al., 2014 - SAMI

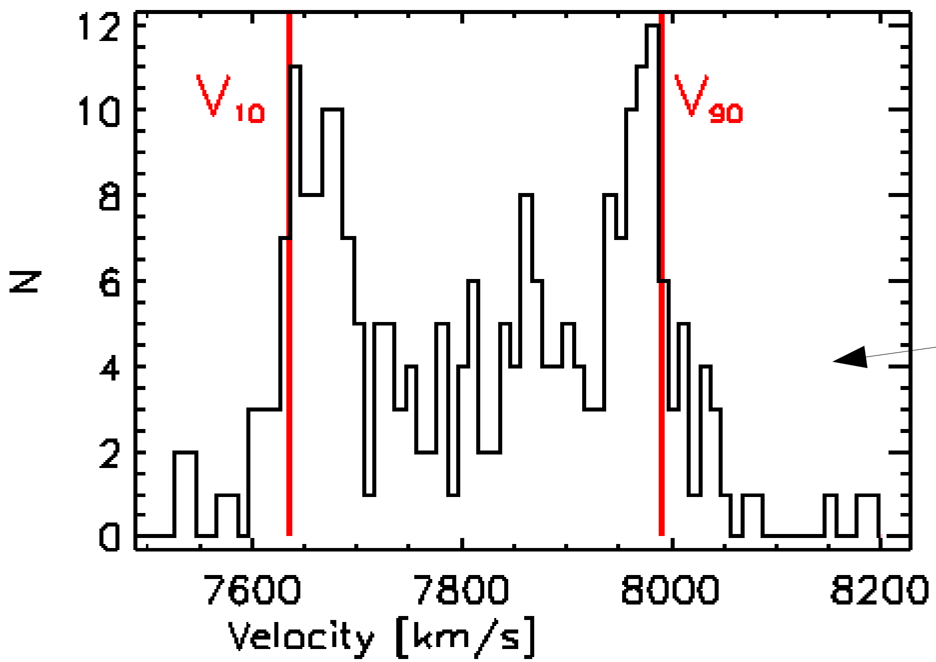


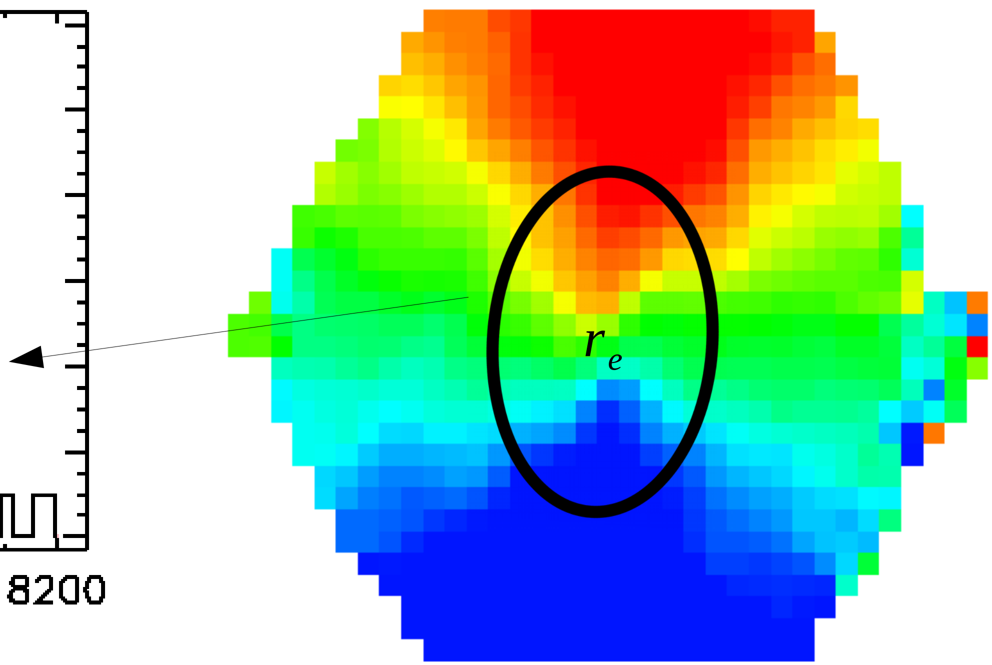
Methodology: We follow the same procedure as Cortese et al. (2014)

Line-of-sight velocity and dispersion maps were obtained using the PIPE3D (S. F. Sánchez et al. 2007).

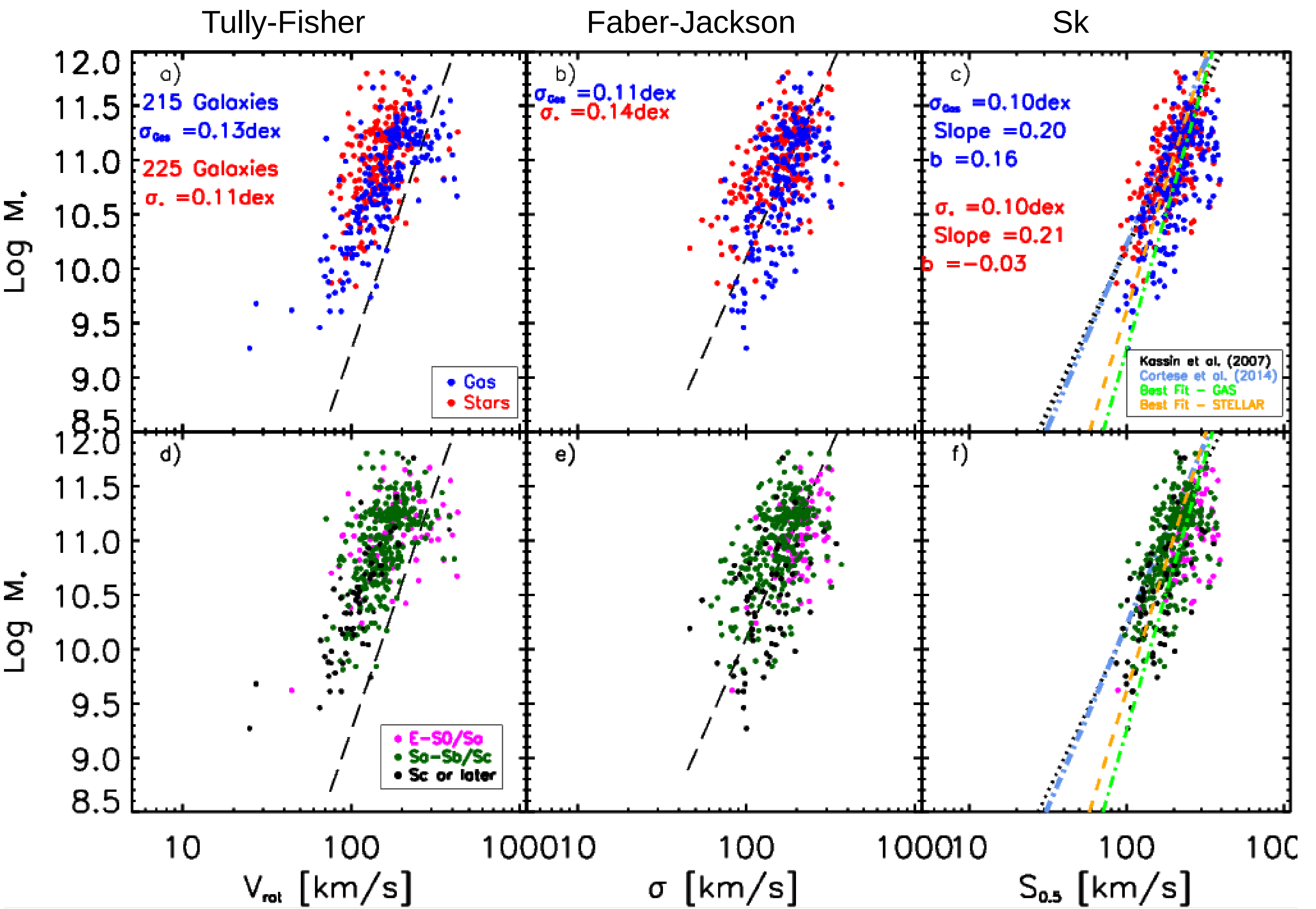
Gas and Stellar rotational velocity: ***Similar to integrated HI profile***

$$V_{rot} = \frac{W}{2(1+z)sin(i)}$$

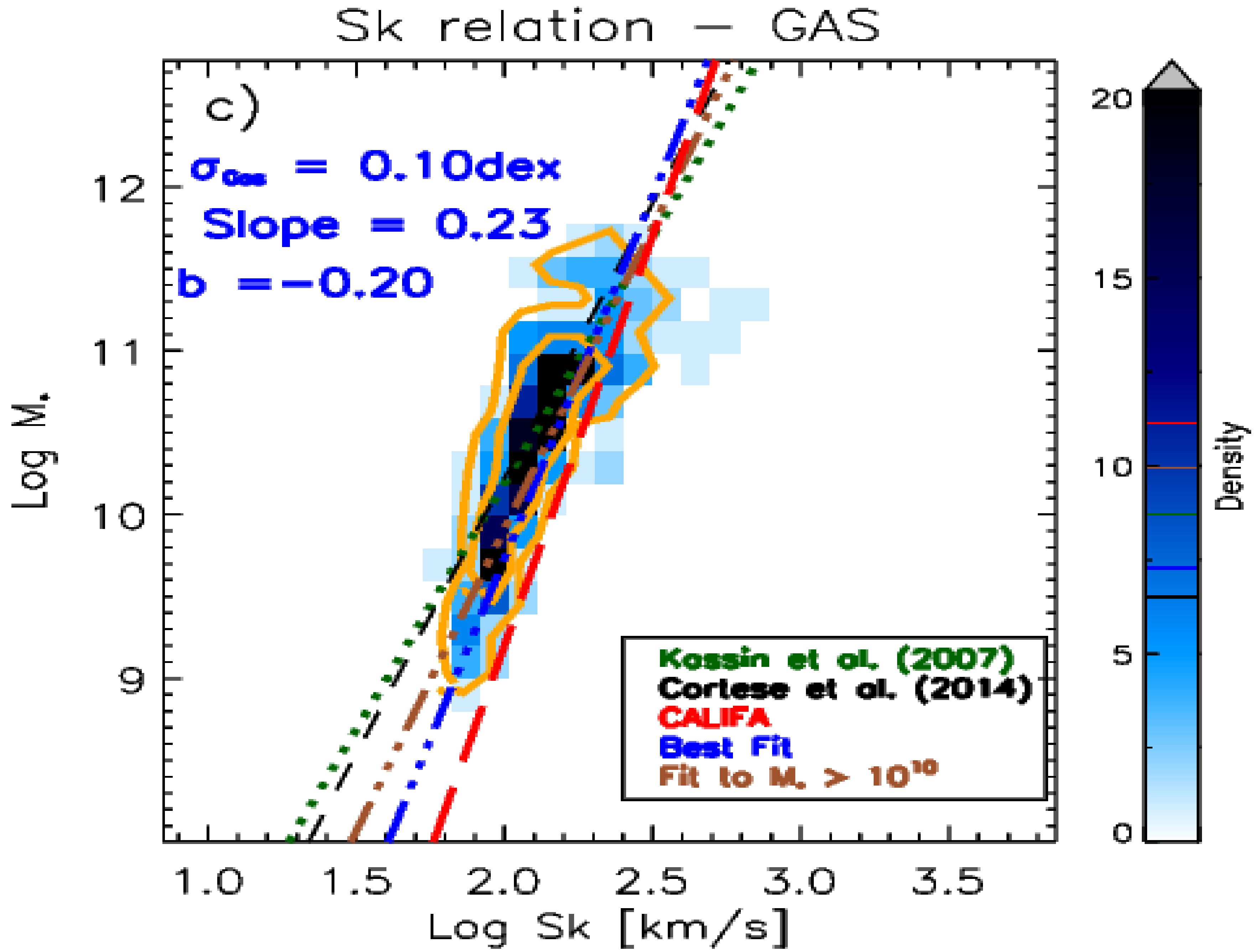




Results: Scaling relations: CALIFA Sample



Sk Scaling relation: MaNGA Sample Preliminary results

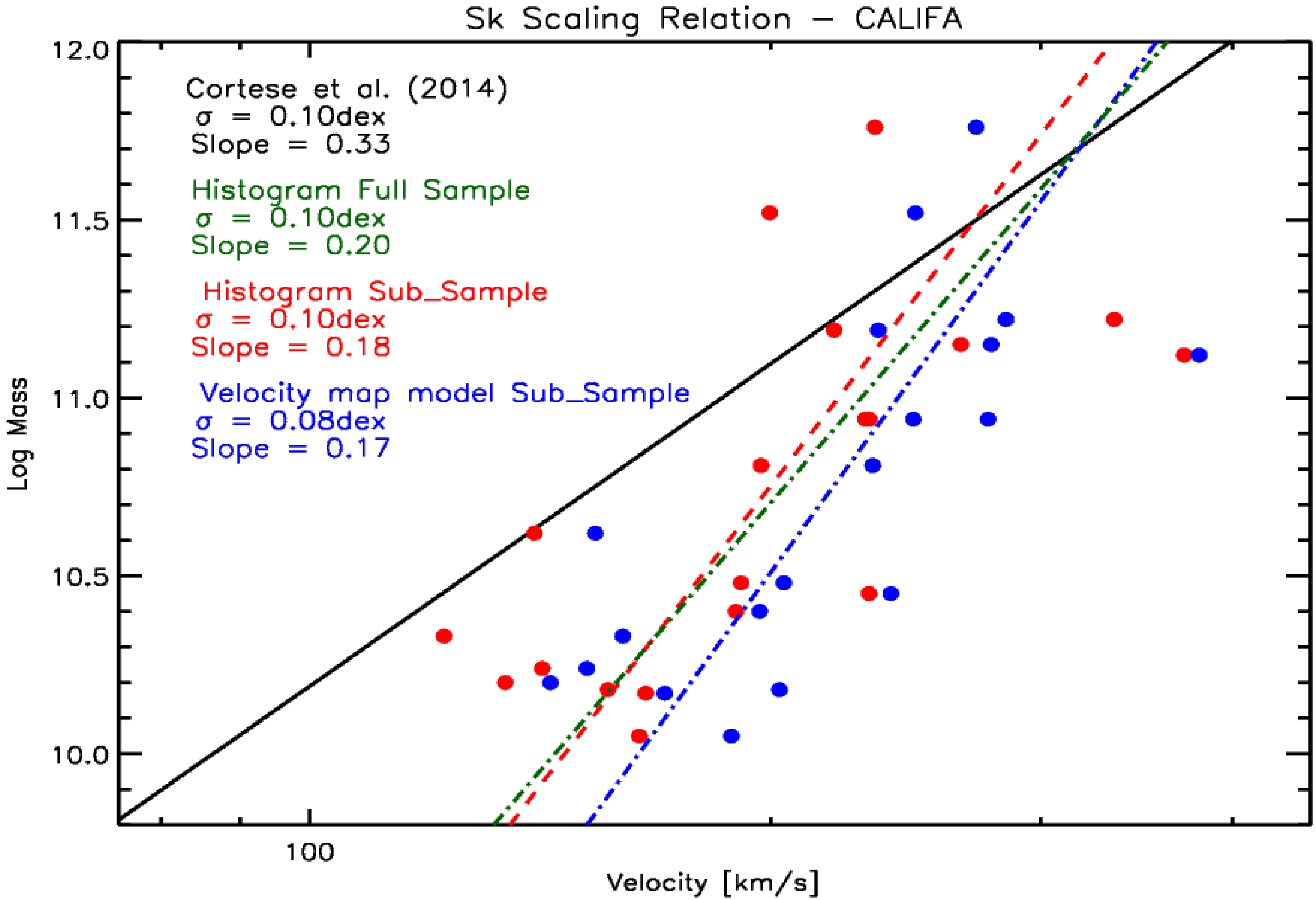


Summary:

Sk Scaling relation:

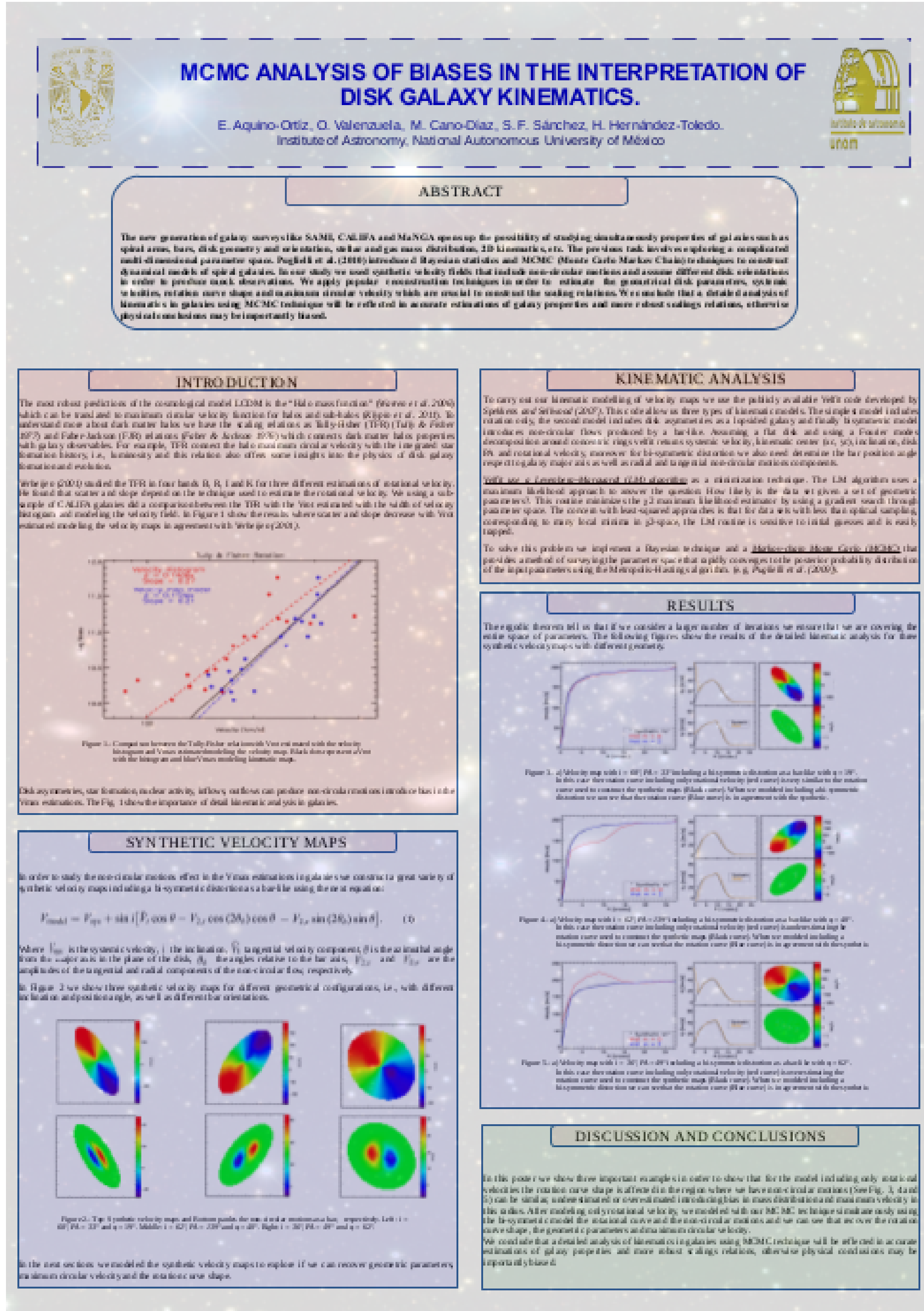
Survey	Galaxies	Slope	Intercept	Scatter
SAMI	***193***	0.33	-1.41	0.1dex
CALIFA	***215***	0.20	0.16	0.1dex
MaNGA	***357***	0.23	-0.20	0.1dex

work in Progress:
A well resolved sub-sample of CALIFA galaxies



This result shows the importance of detailed kinematic analysis in Spiral galaxies.

More Details: Poster #61



CONCLUSIONS:

- Scaling relation using the S parameter is more tight than Tully-Fisher and Faber-Jackson relation.

- There is a possible indication of systematic differences between scaling relations using different samples (SAMI, CALIFA and MaNGA).

- We emphasize the importance of detail study of kinematics in galaxies.

- After understanding all possible uncertainties we will be ready to test theoretical models.

Methodology: We follow the same procedure as Cortese et al. (2014)

Line-of-sight velocity and dispersion maps were obtained using the PIPE3D (S. F. Sánchez et al. 2007).

The final sample was selected as follows:

I. In each kinematic maps the spaxels with errors greater than 20 km/s and 50 km/s for gas and stars, respectively are discarded.

II. The fraction (f) of good spaxels within an ellipse of semi-major axis equal to effective radius, inclination and
- position angle must be greater than 80%.

Gas and Stellar rotational velocity: *Similar to integrated HI profile*

$$V_{rot} = \frac{W}{2(1+z)sin(i)}$$