EVOLUTION DE GALAXIES
A L'EPOQUE DES PRECURSORS DE SKA

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GALAXY EVOLUTION WITH SKA PRECURSORS

Surveys of ~1 million HI galaxies up to z~1

HI properties and distribution in/ around galaxies, HI content as a function of galaxy type, HI mass function in different environments, role of interactions and mergers in galaxy evolution, velocity field, angular momenta...
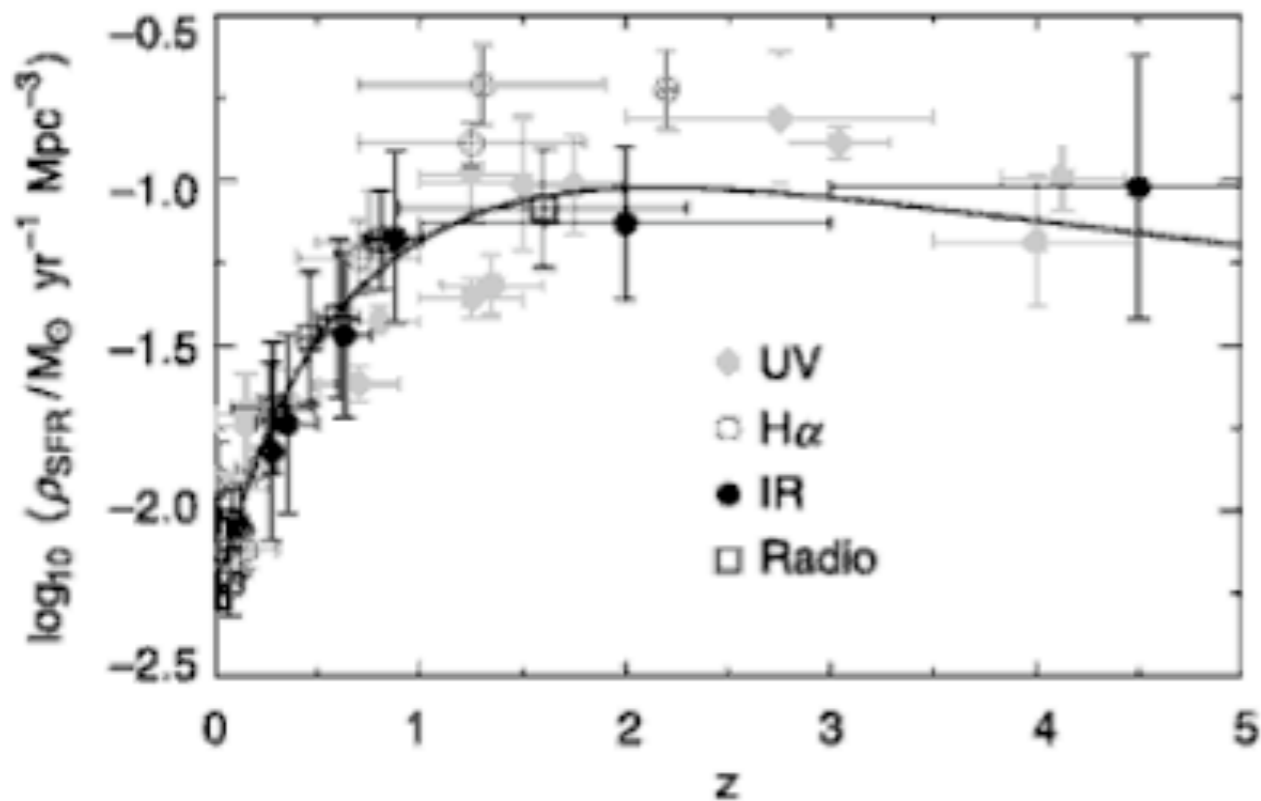
EVOLUTION OF THE GAS CONTENT IN GALAXIES

- How do galaxies acquire, lose and redistribute their gas content?
- Role of interactions and mergers?
- Cold gas accretion?
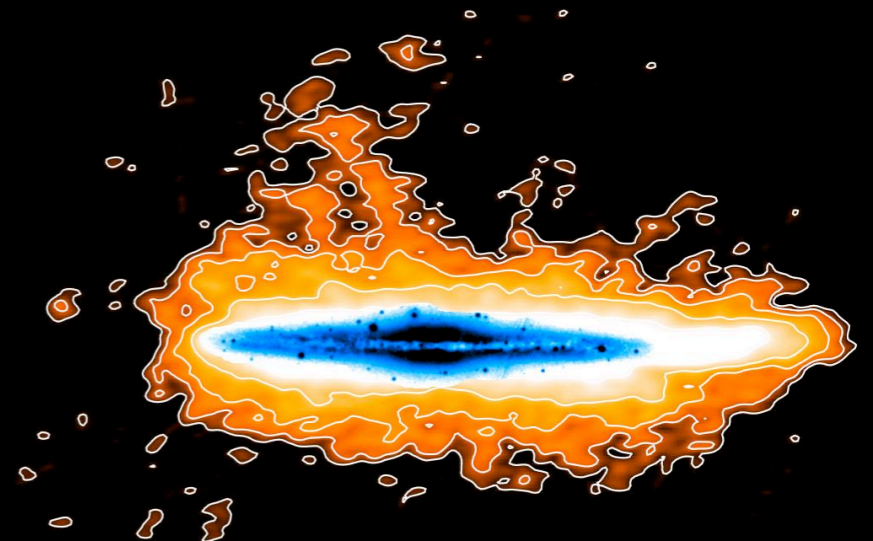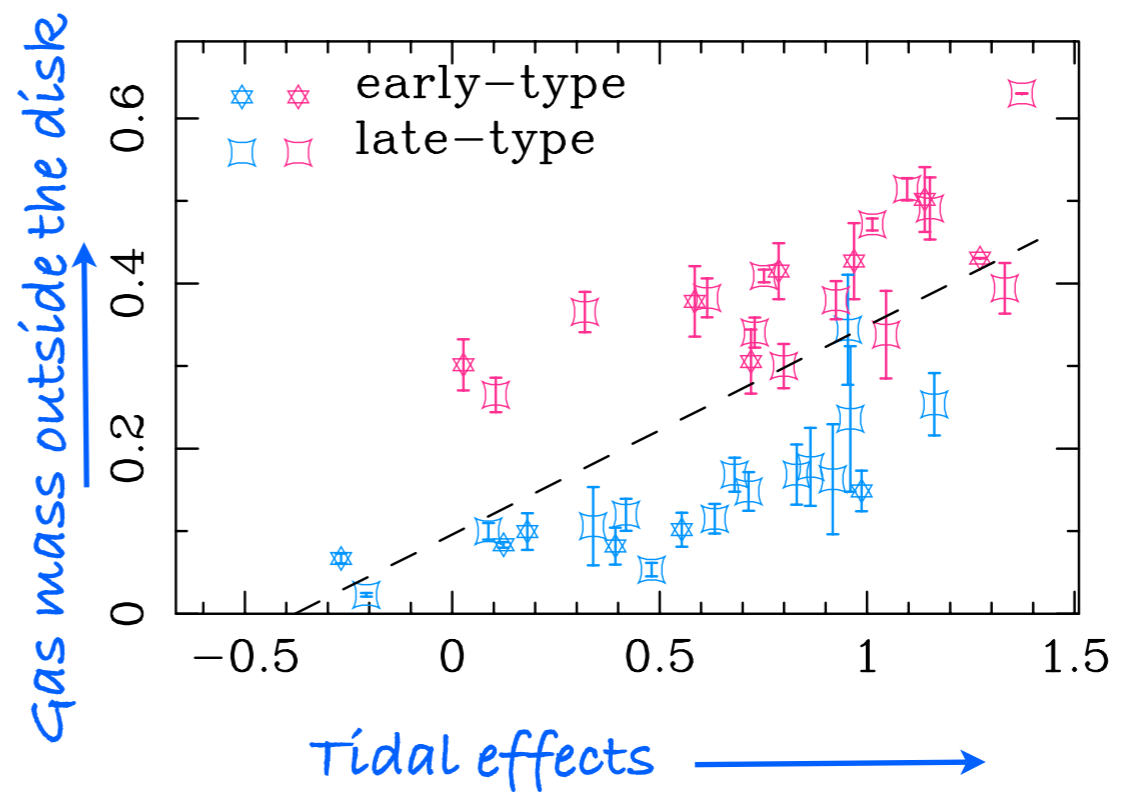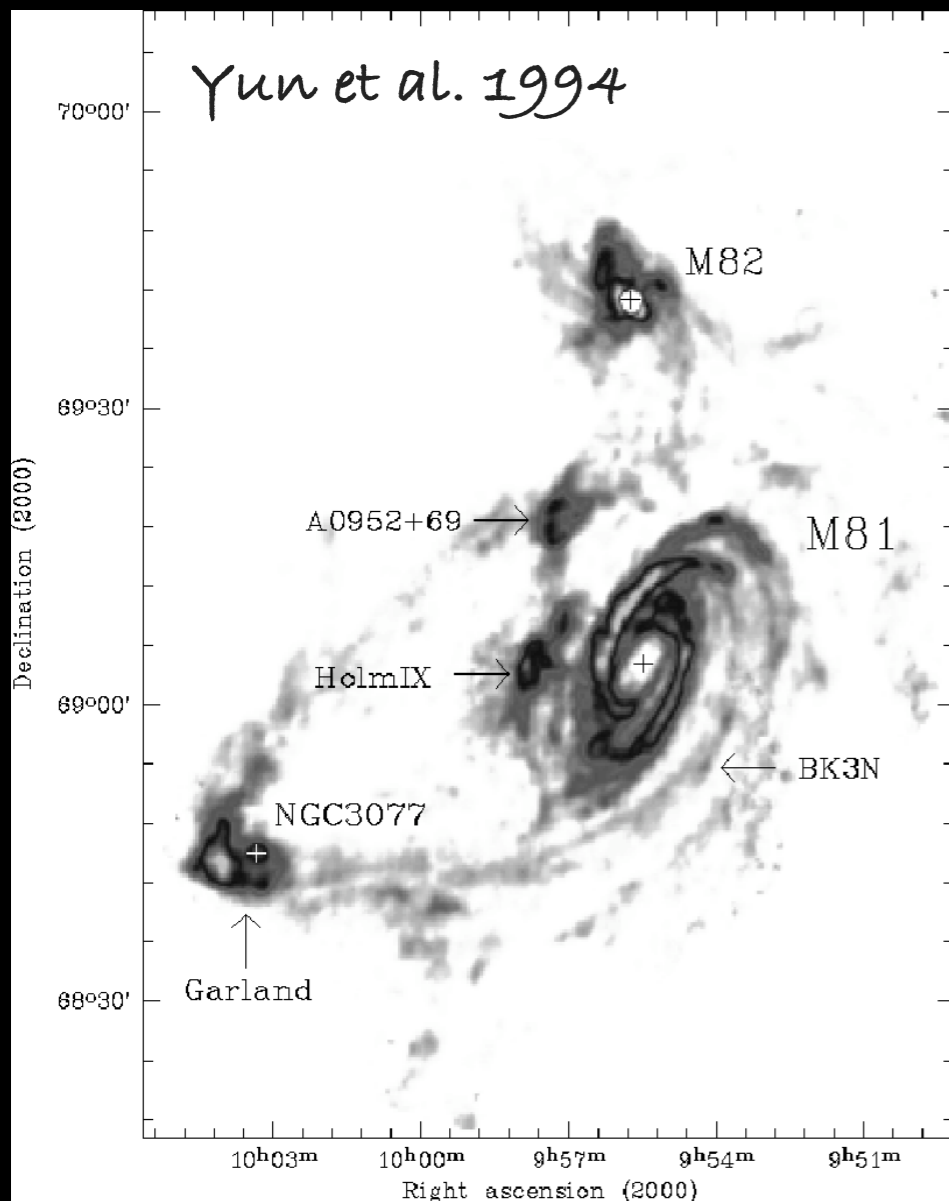
EVOLUTION OF THE GAS CONTENT IN GALAXIES

The SFR density declines by a factor 10 from z ˜ 1.
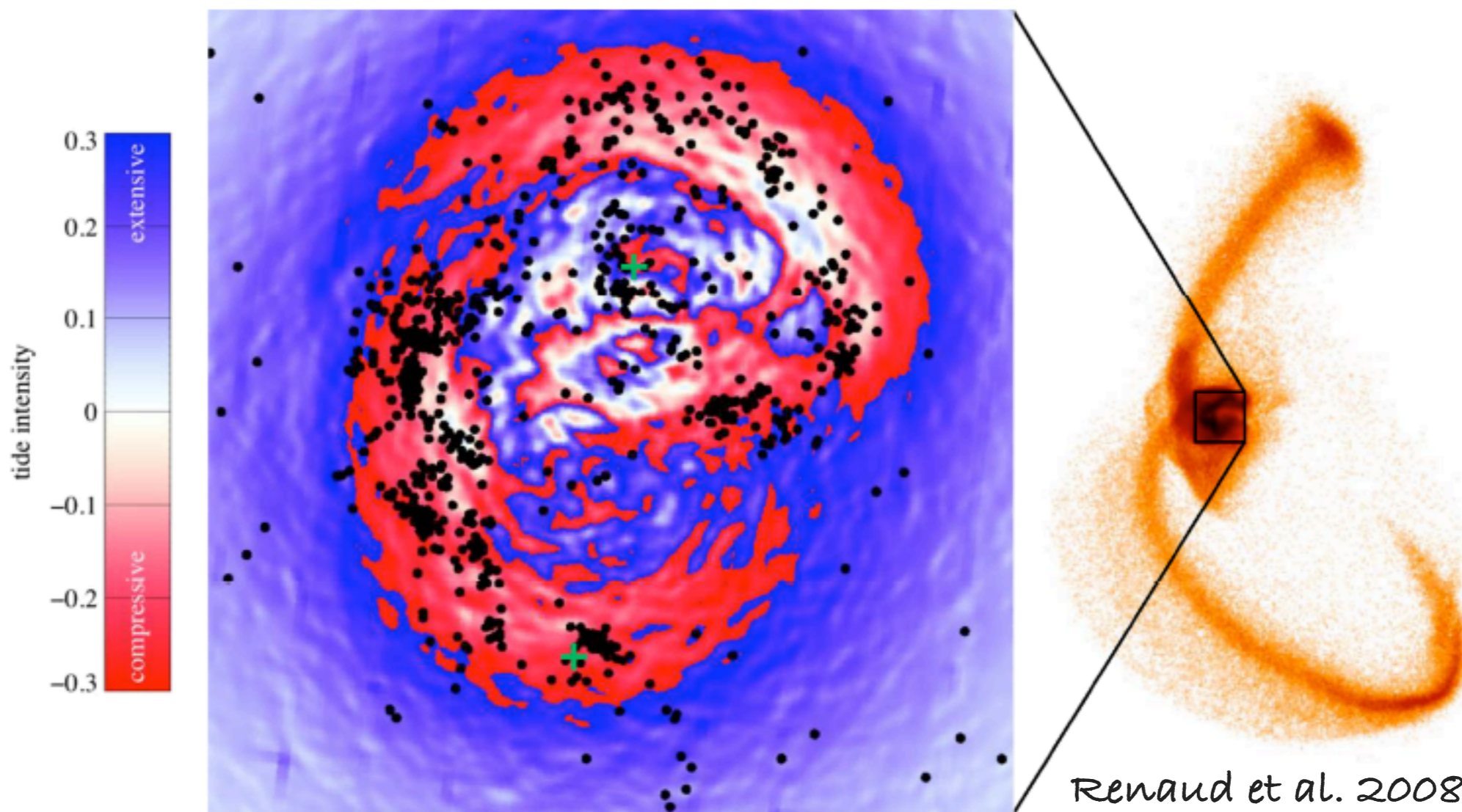
What are the factors driving this evolution? **What is the role of interactions and mergers?**

TIDAL EFFECTS ON GALAXY DISKS

Yun et al. 1994

Di Matteo et al. 2007

TIDAL EFFECTS ON GALAXY DISKS

Renaud et al. 2008

...AND INDUCED STAR FORMATION

- Compressive and extensive tides, torques from stellar bars determine the amount of gas available in the central regions of a galaxy for fueling a starburst
- At low redshift, models predict SFR in agreement with observations (a factor of 3-4 on average)

(Di Matteo et al. 2007; 2008; Knapen & James, 2009)

...AND INDUCED STAR FORMATION

- At higher redshifts (gas fractions ˜40-50%), the situation is still unclear.
- Stellar bars could be less efficient in driving gas into the central regions. Higher gas fractions could survive the merger and eventually reforming a disk (Hopkins et al. 2009)
- Effects on SF enhancements (dependency on SF prescriptions, feedback, ...)

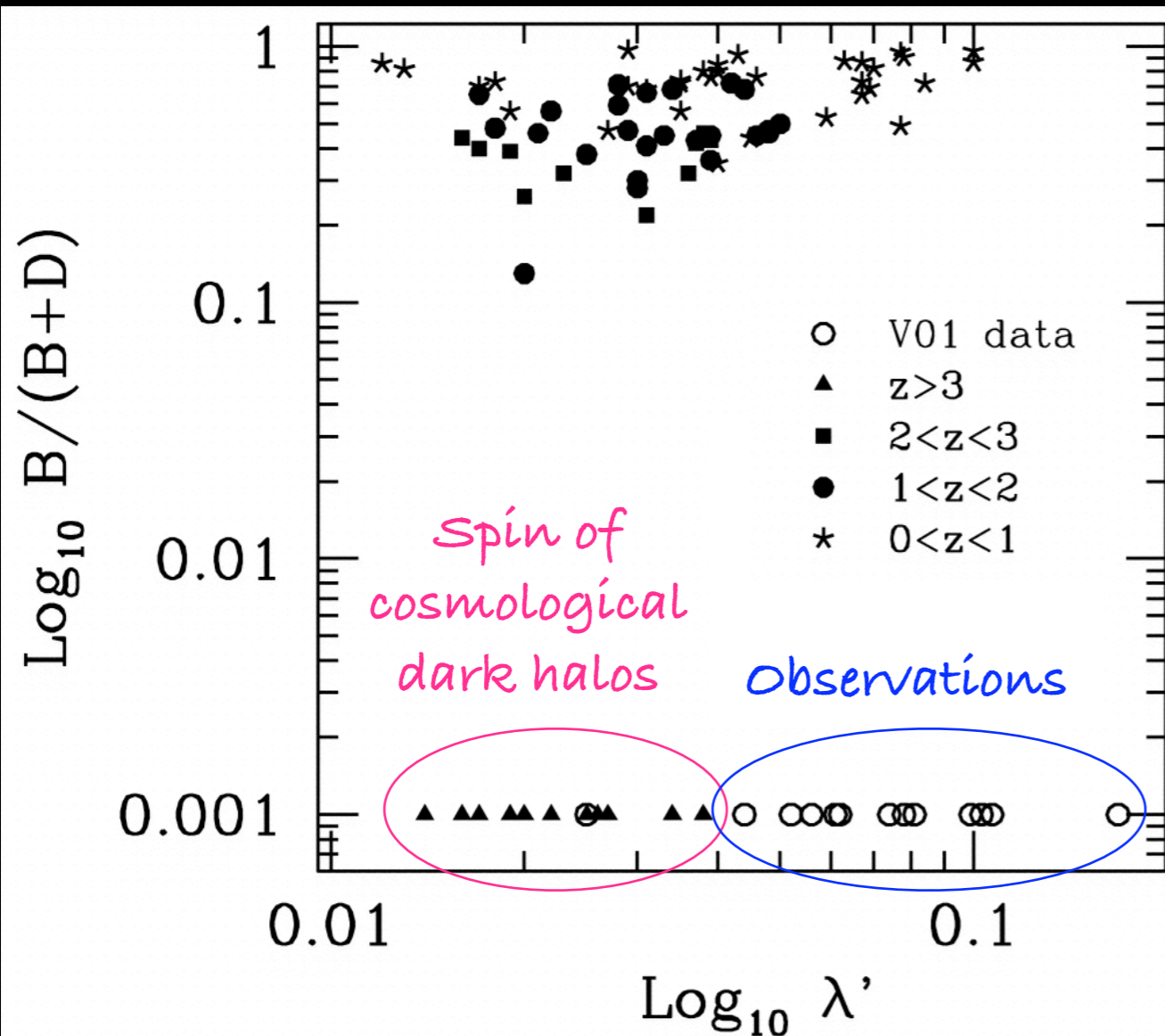**The comparison with the evolution of the HI content will represent a crucial test for the models**

ANGULAR MOMENTUM
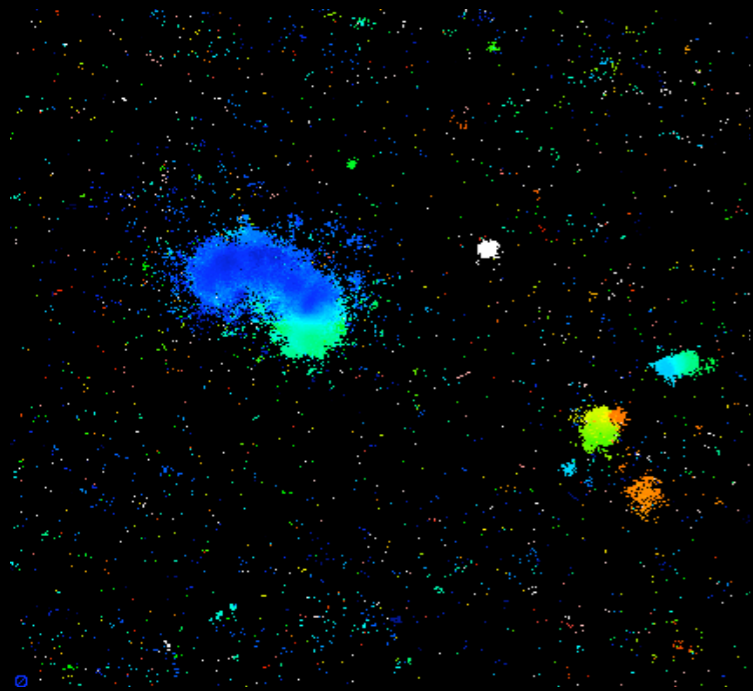
ASKAP and MeerKat:
velocity fields for ~ 2000 galaxies
and
angular momenta for ~ 30000 galaxies

How do galaxies acquire, lose and redistribute their angular momentum during mass assembly?

D'Onghia & Burkert 2004

$$\lambda = JE^{1/2}/GM^{5/3}$$

Spin parameter

Discrepancy between the spin of simulated dark halos and those of observed galaxies

ANGULAR MOMENTUM

- How do interactions and mergers affect the internal AM of galaxies?

- Do they lead to a slow systematic increase with time (D'Onghia & Burkert 2004)
or is rather a random walk process (Vitvitska et al. 2002)?
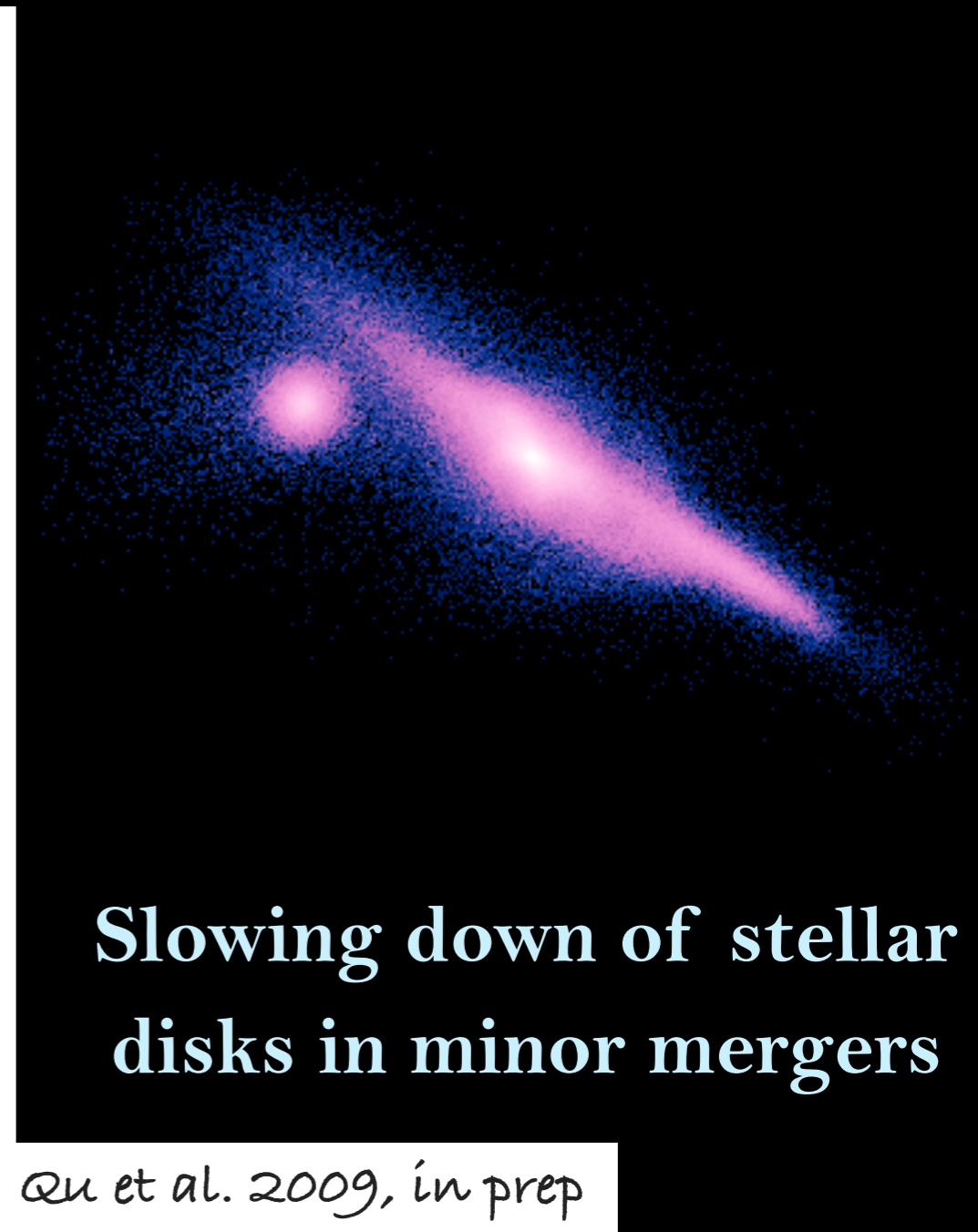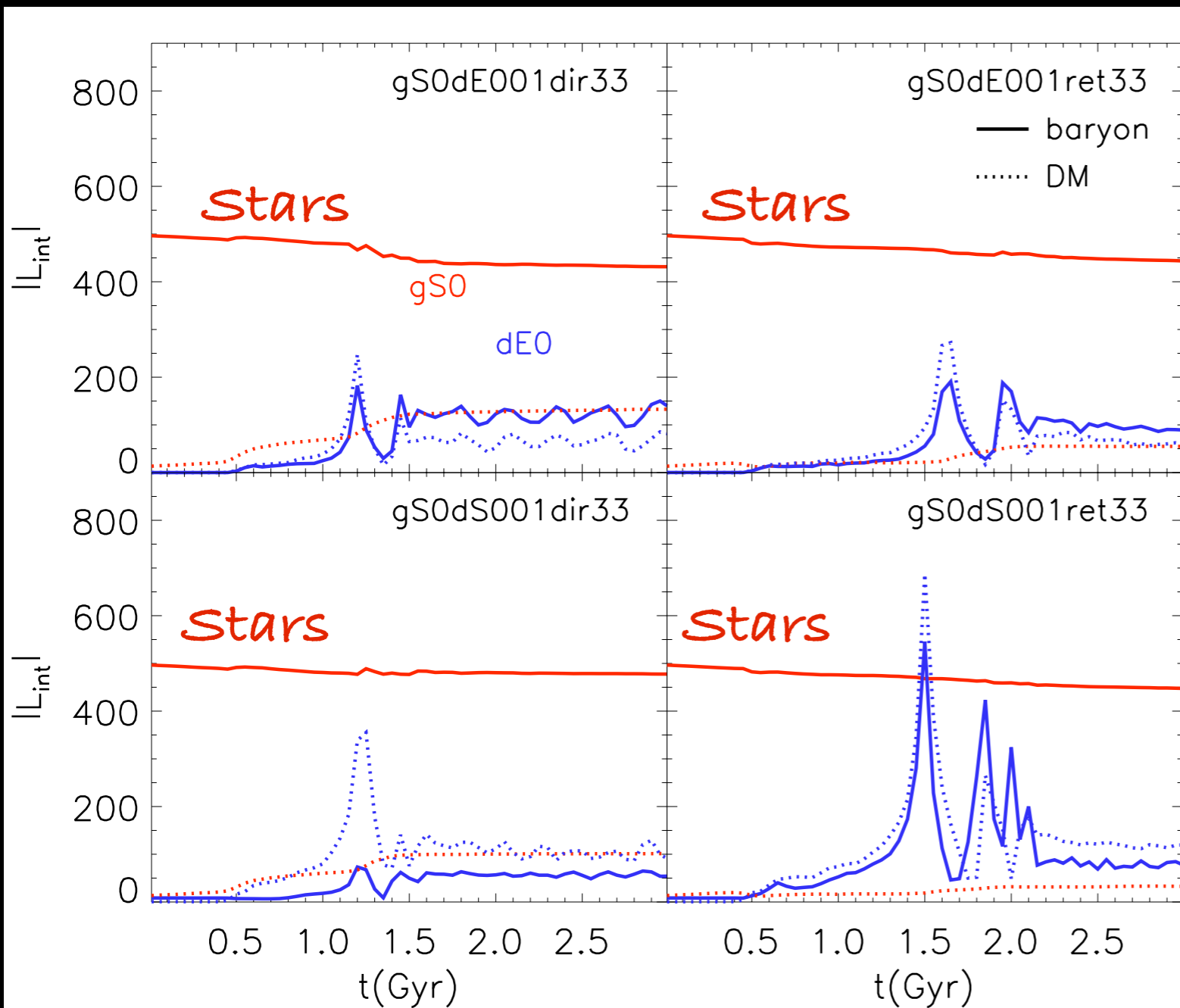
- How do the AM is redistributed among baryons and dark matter?
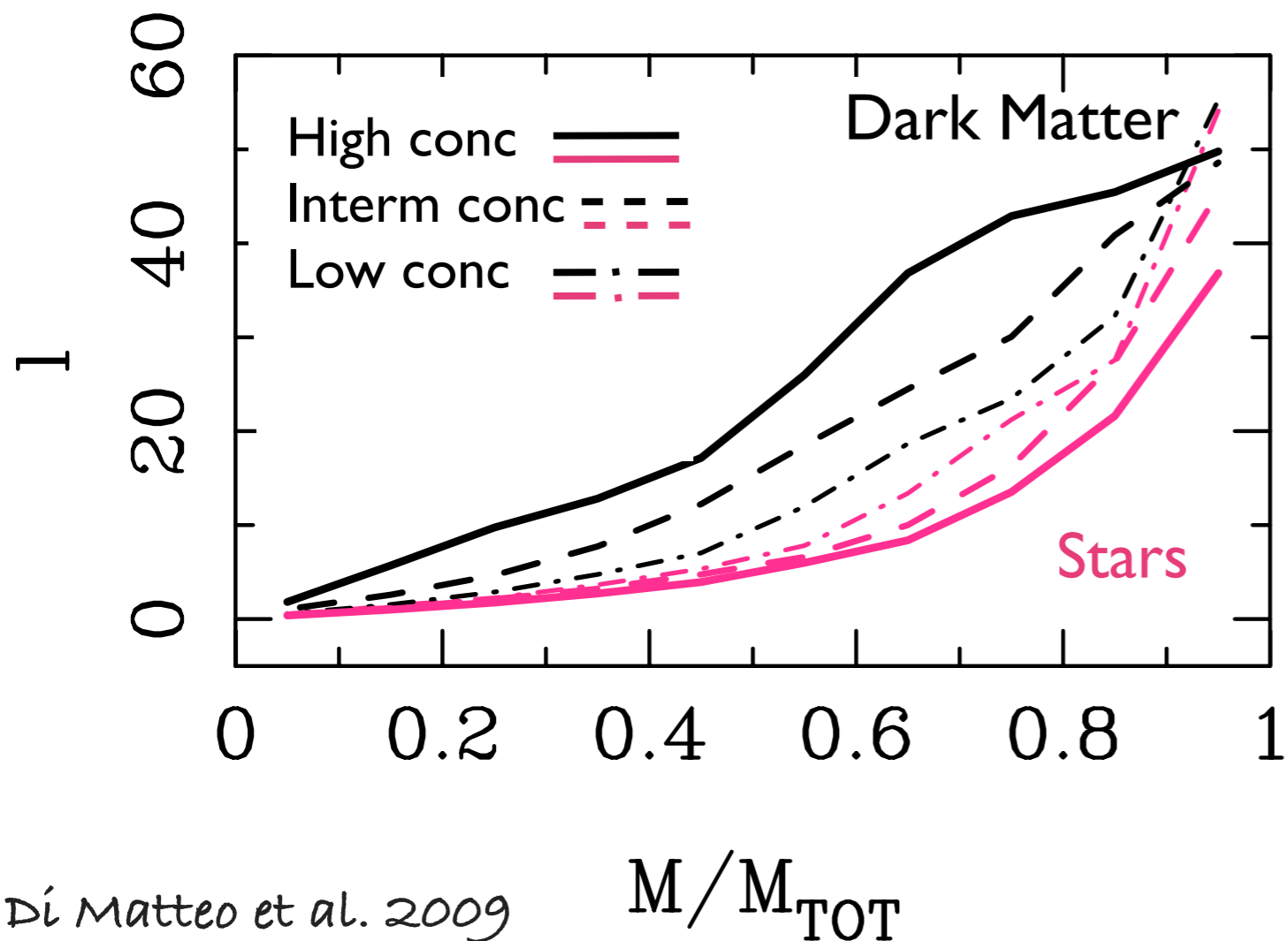
Di Matteo et al. 2009

The amount of AM acquired by the different components of a galaxy depends on the **mass ratio**, on the **morphology** of the interacting galaxies, on the orbital parameters...
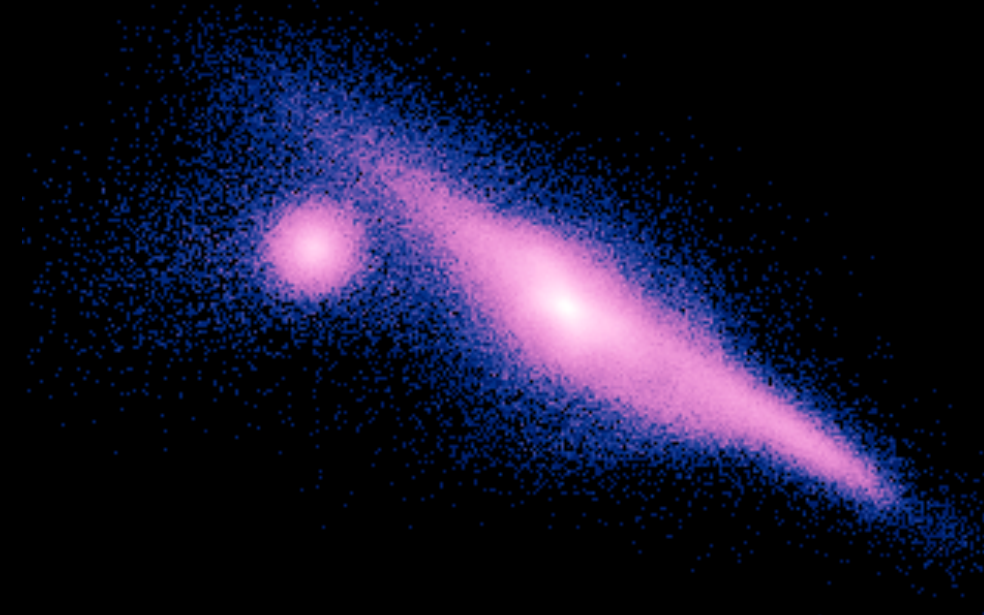
Slowing down of stellar disks in minor mergers

Qu et al. 2009, in prep

ANGULAR MOMENTUM

We need a coherent picture of the way AM is redistributed during mass assembly:

✳ the role of gas?

✳ dependency on the stage of the interaction?

✳ dependency on the environment?

The comparison with HI velocity fields and angular momenta will represent a crucial test for the models