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# On the nature of starburst galaxies at low- $z$ and their connection with interactions

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We investigate the properties of starbursts and the influence of galaxy-galaxy interactions on star formation (SF) in a sample of 1341 objects (distances  $< 40$  Mpc).

Starbursts present long-lasting SF in circumnuclear regions, which causes an increase of the central stellar density in both interacting and non-interacting systems, and similar gas fractions as normal galaxies. Mergers cause a moderate enhancement of the SF efficiency.

**Díaz-García & Knapen (2020, A&A, 635, A197) [click here](#)**

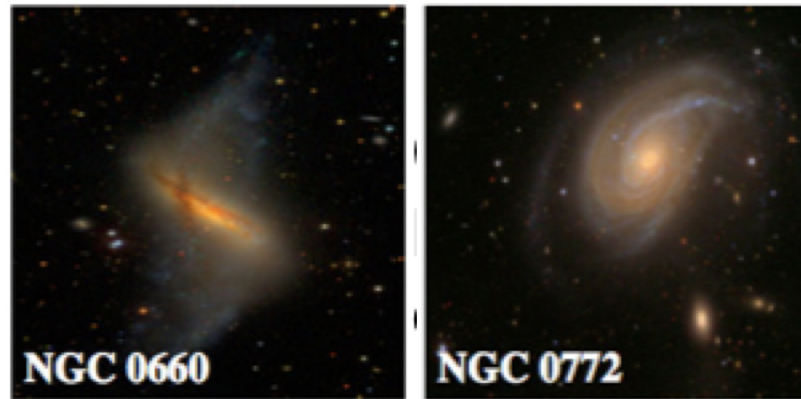
# Moderate enhancement of the star formation in local interacting galaxies

(see e.g. Larson & Tinsley 1978; Bergvall et al. 2003; Smith et al. 2007; Woods & Geller 2007; Li et al. 2008; Robaina et al. 2009; Knapen & James 2009; Saintonge et al. 2012, Ellison et al. 2013; Barrera-Ballesteros et al. 2015; Brassington et al. 2015; Knapen et al. 2015, Ellison et al. 2020)

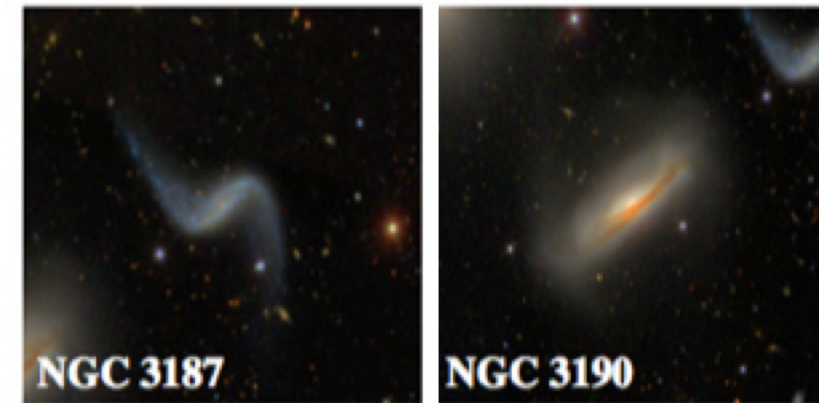
**Class A**  
**Currently merging**



**Class B**  
**Highly distorted  
due to interaction**



**Class C**  
**Minor ongoing interaction**



*We use the catalogue by Knapen et al. (2014, A&A, 569, A91) in the S4G survey*

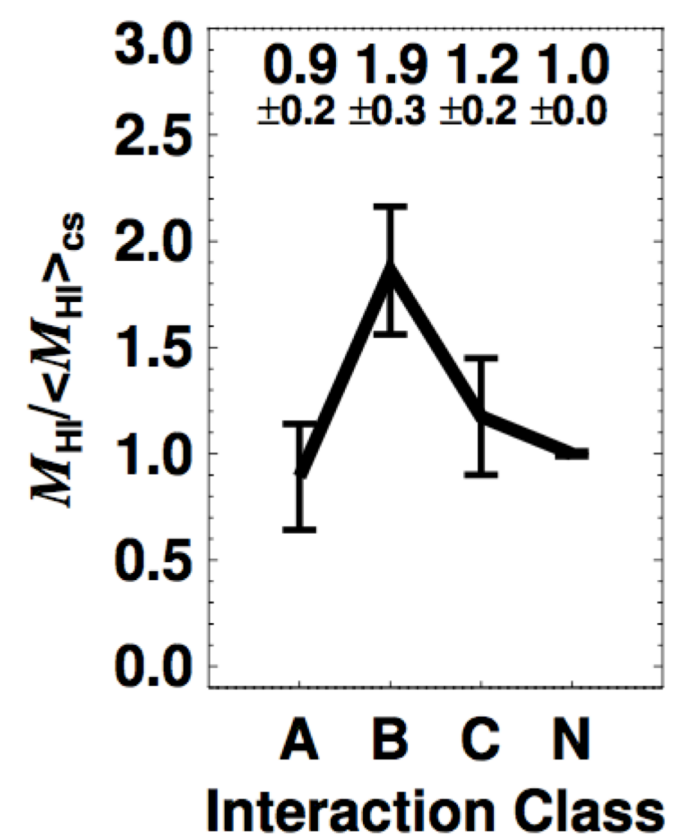
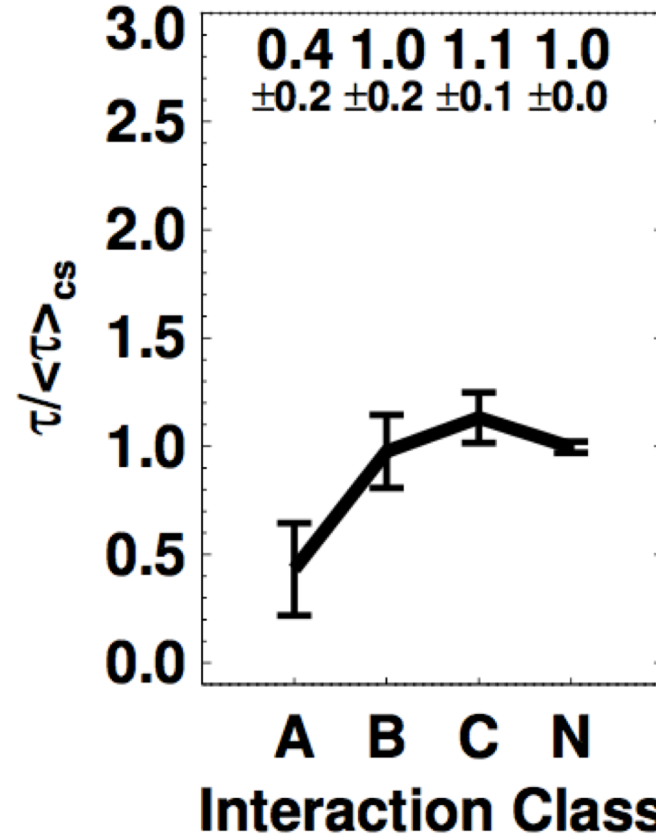
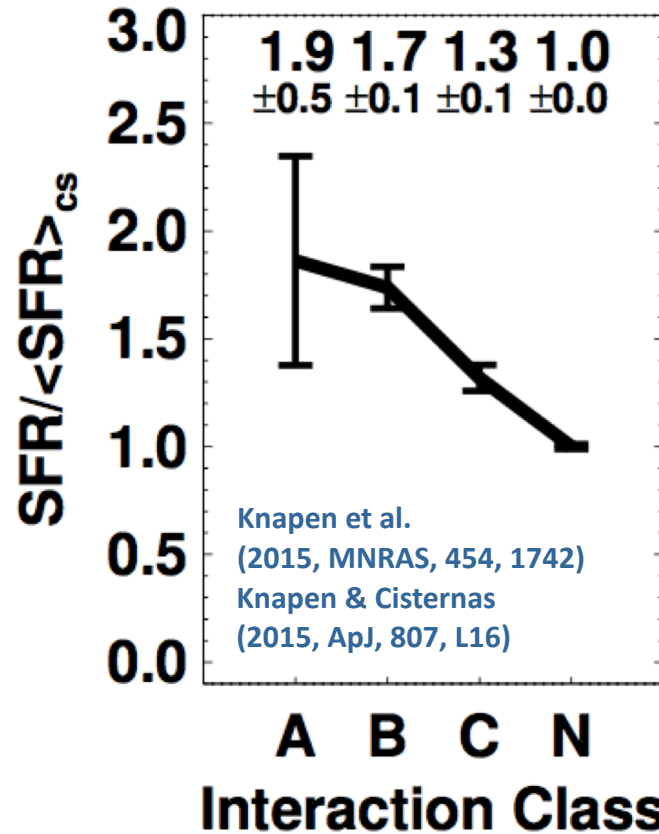
On average, mergers enhance:

**Star formation rates**  
(IRAS far-IR flux)

&

**Gas depletion times**  
(LEDA's 21 cm HI data)

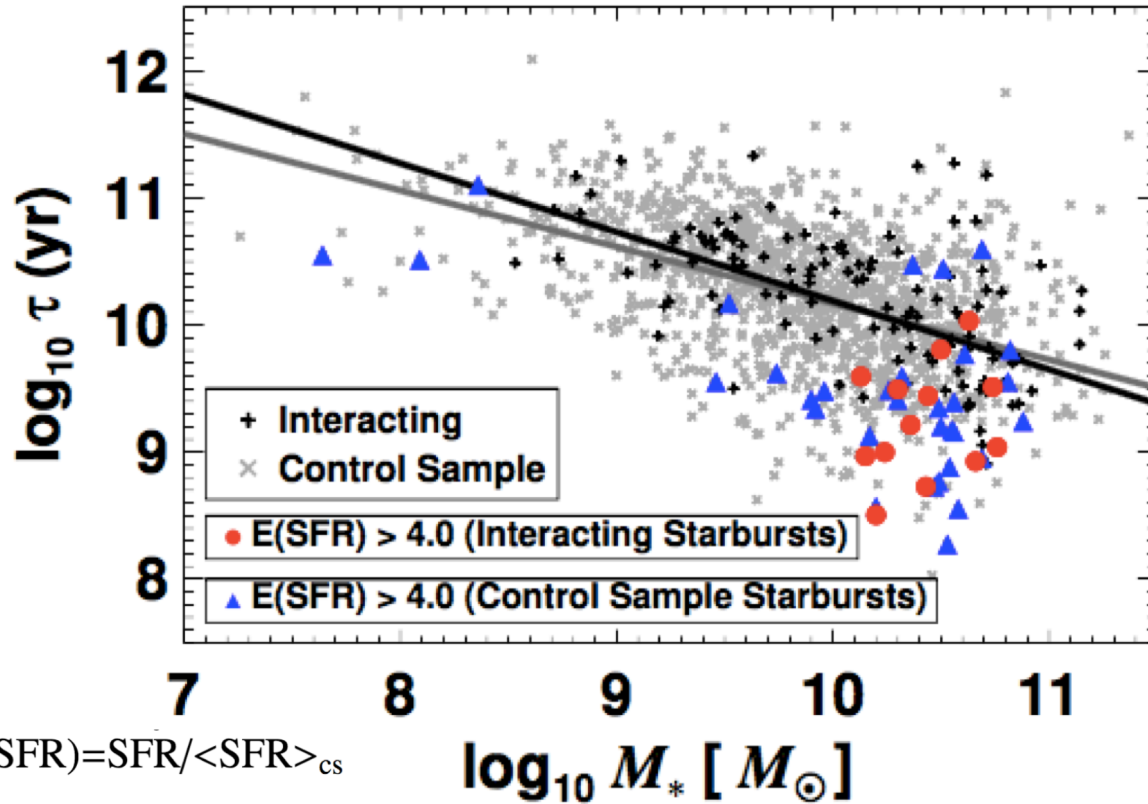
Enhanced gas fraction in highly distorted systems, but not in mergers (quenching?)



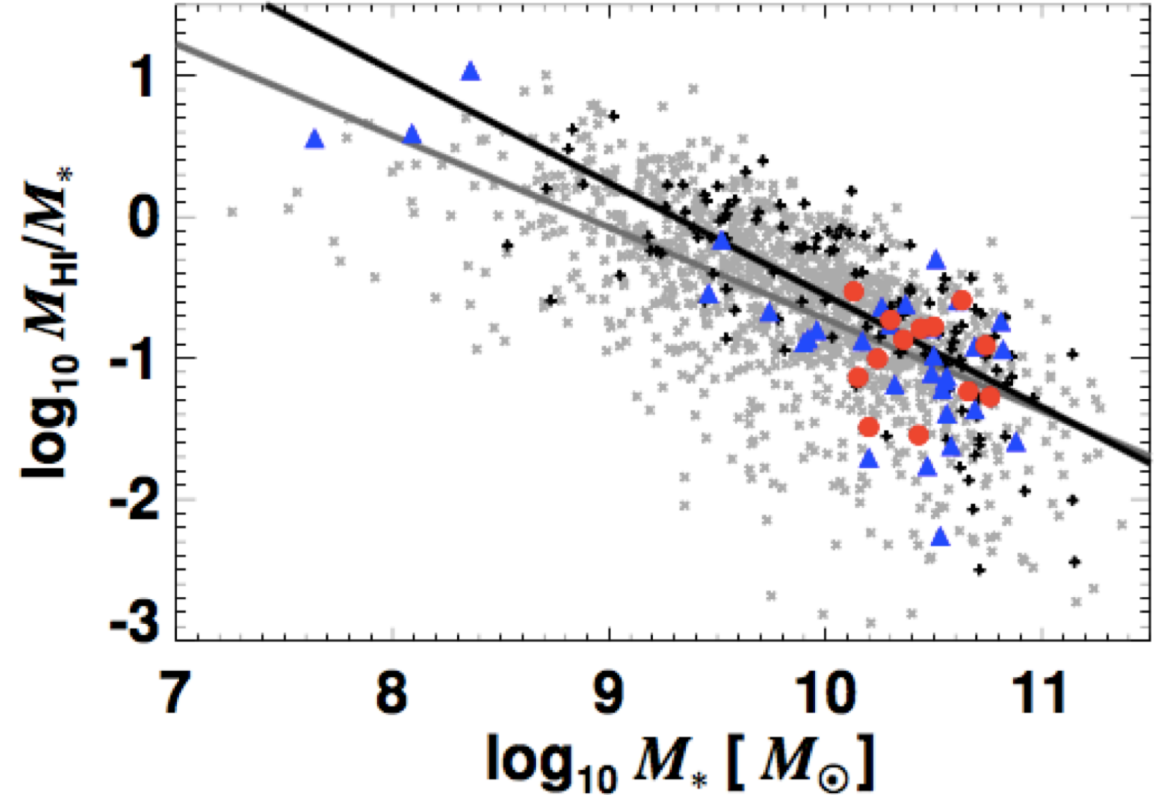
For each galaxy, all quantities normalized to Control Sample (cs), comprising non-interacting galaxies (**N**) with  $\pm 0.2$  dex in  $M_*$  and  $\pm 1$  in T-type

# Starbursts (red and blue symbols) : > 4 times enhanced SFR relative to control sample

Gas depletion time VS. total stellar mass



Gas fraction VS. total stellar mass



- Starbursts: lower gas depletion times ( $\tau$ , left) + similar gas fractions (right) as normal galaxies

- Similar distribution of gas fraction and  $\tau$  in interacting and control sample galaxies
- Starbursts are mainly high- $M^*$  galaxies, not necessarily interacting

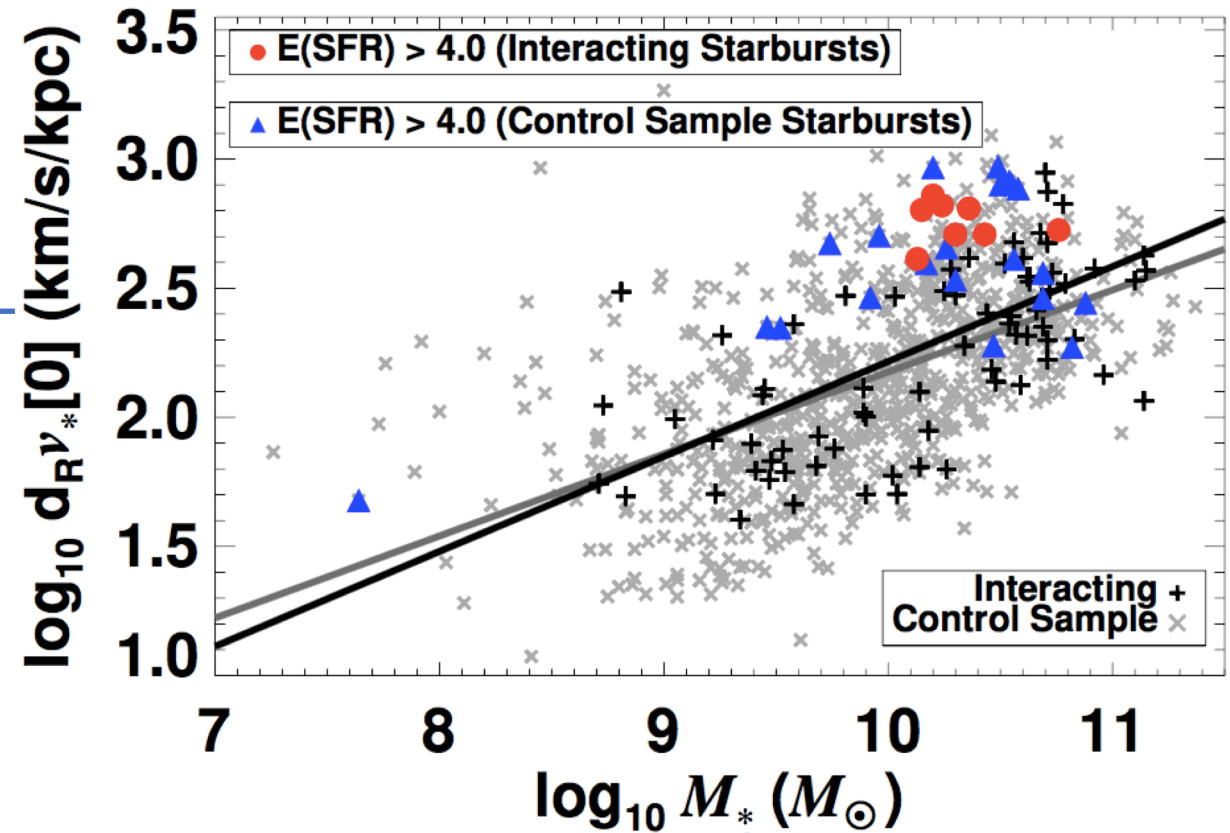
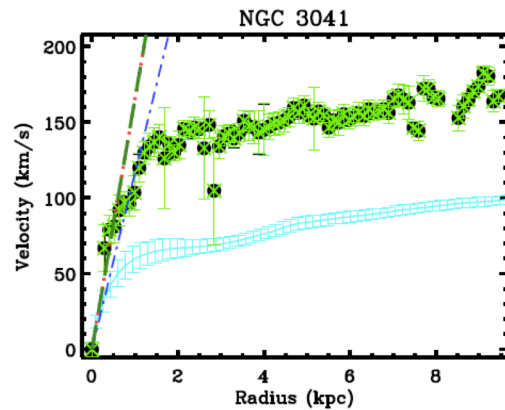
Starbursts (red and blue) → higher central stellar concentrations, for a given  $M_*$ -bin

## Central concentration

Traced from the inner slope of the stellar component of the rotation curves

Díaz-García et al. (2016, A&A, 587, A160) [click here](#)

Erroz-Ferrer et al. (2016, MNRAS, 458,1199) [click here](#)



Total stellar mass

IRAC 3.6 micron imaging

Muñoz-Mateos et al. (2015, ApJS, 219,3)



# Some concluding remarks

**Starbursts are characterised by higher central stellar concentrations**

This points to these systems having undergone continuous circumnuclear SF over a period of  $10^8$  to  $10^9$  yr, nourished by gas inflow that is driven by both interactions and non-axisymmetries

*Starbursts have low gas depletion timescales, yet similar gas fractions as normal main-sequence galaxies*

**Mergers produce an enhancement (by a factor of  $\sim 2$ ) of the SF efficiency,** in line with theoretical predictions that are based on numerical models

**Díaz-García & Knapen (2020, A&A, 635, A197) [click here](#)**

*This project has received funding from the European Union's Horizon 2020 research and innovation programme under the Marie Skłodowska-Curie grant agreements No 893673 and 721463*