



*Starbursts and Galaxy evolution:
Results from COSMOS survey*

Casiana Muñoz-Tuñón

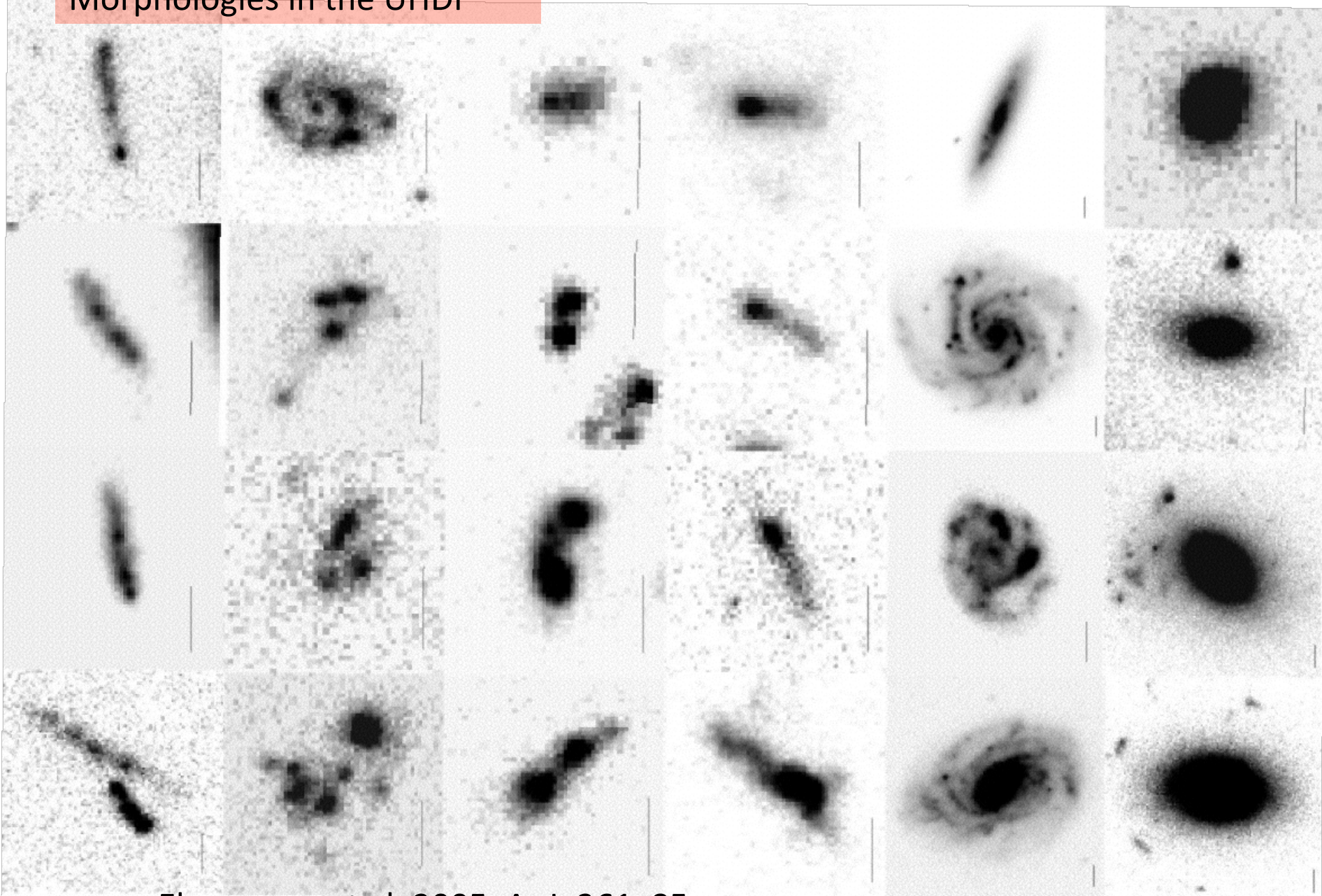
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Jairo Méndez-Abreu (St. Andrews-UK)

Morphologies in the UHDF

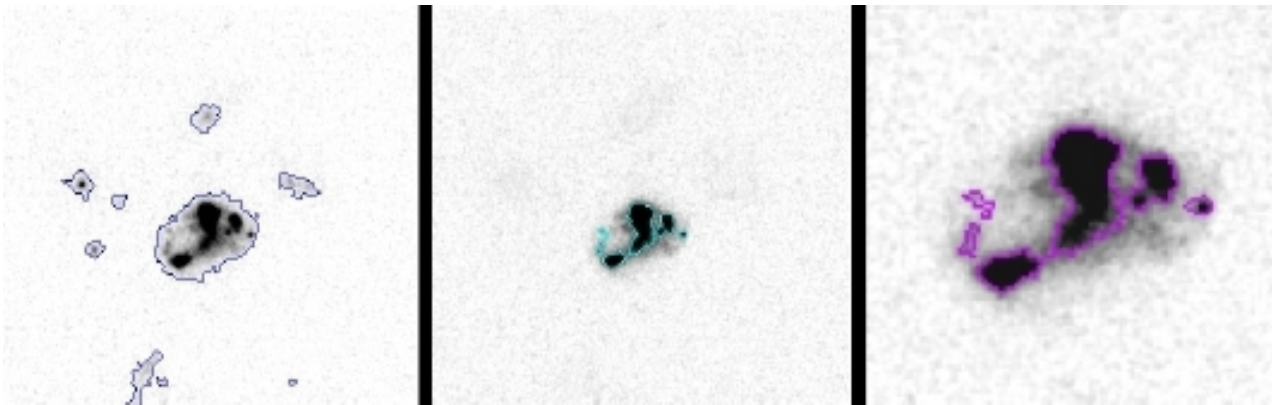
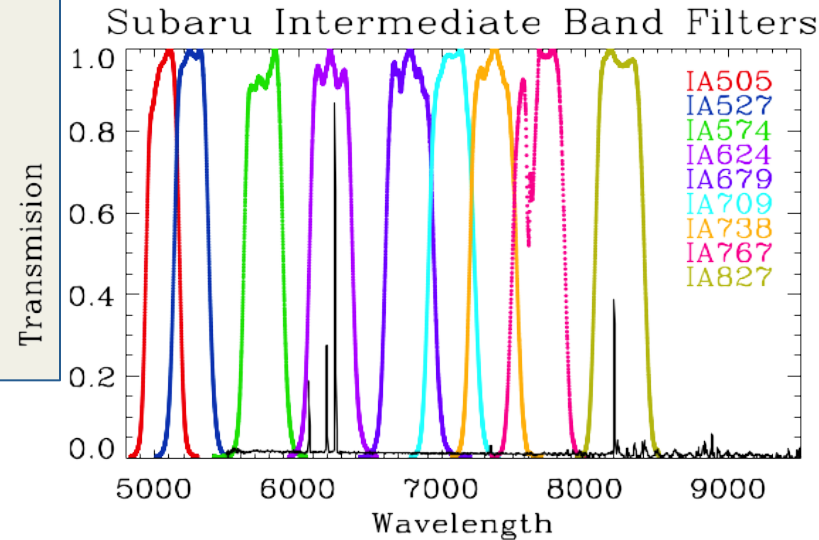


COSMOS

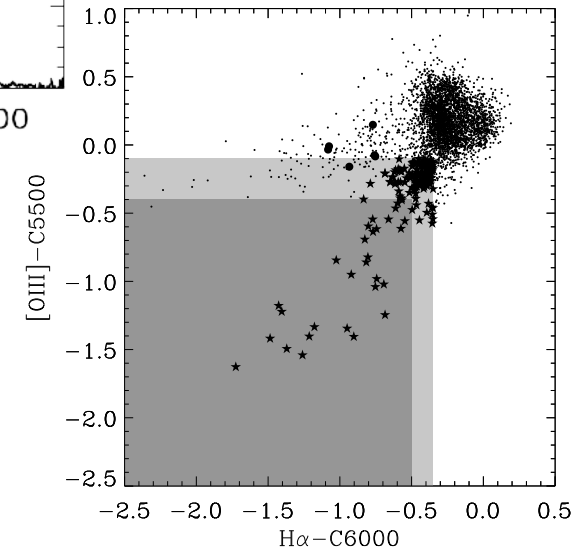
- COSMOS BB catalogue (Capak et al, 2007, ApJS, 172, 99).
- ZCOSMOS (Lilly et al., 2007, ApJS, 172, 70).
- SUBARU.

HST images
Equatorial field

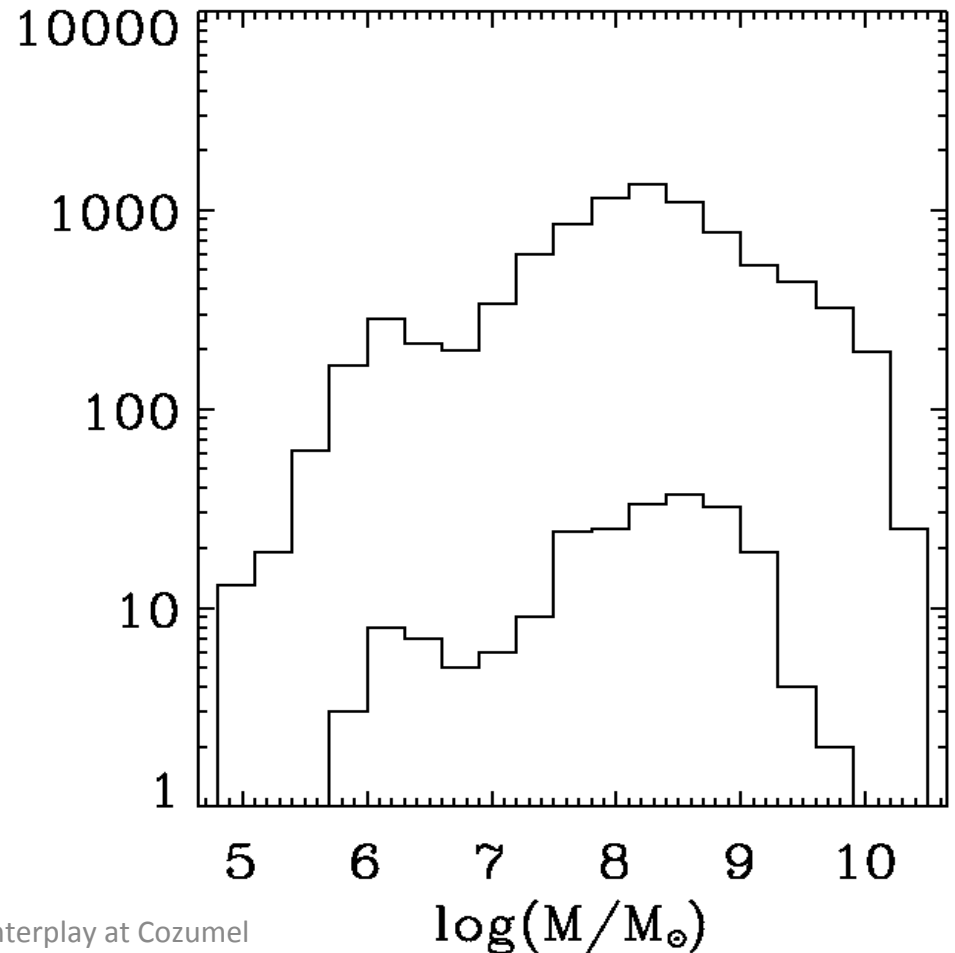
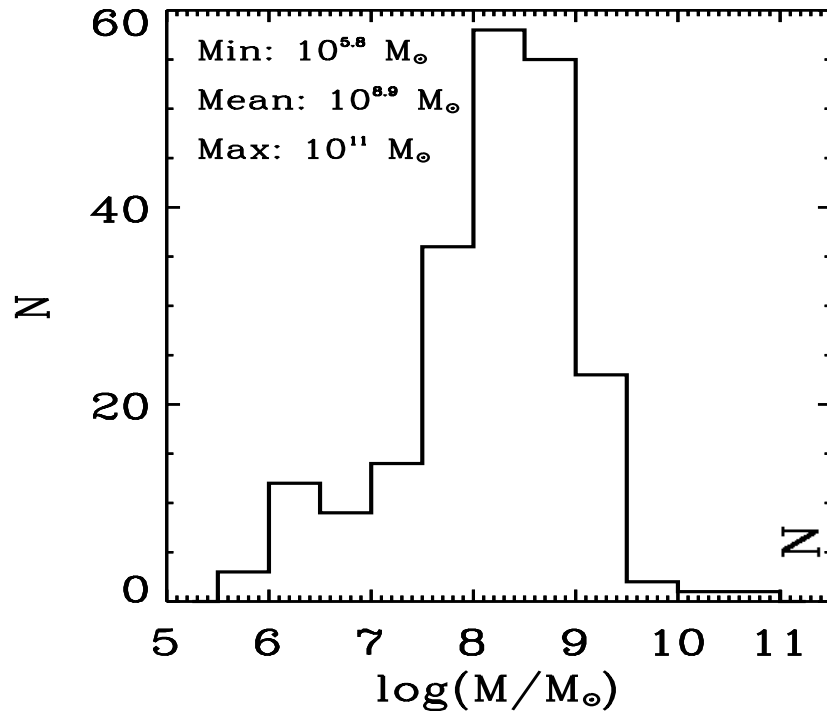
- Search for starburst galaxies
- Systems with EW in $H\alpha / OIII > 80 \text{ \AA}$. (Cairós et al., 2007, 2009).
- $0 > z > 0.5$

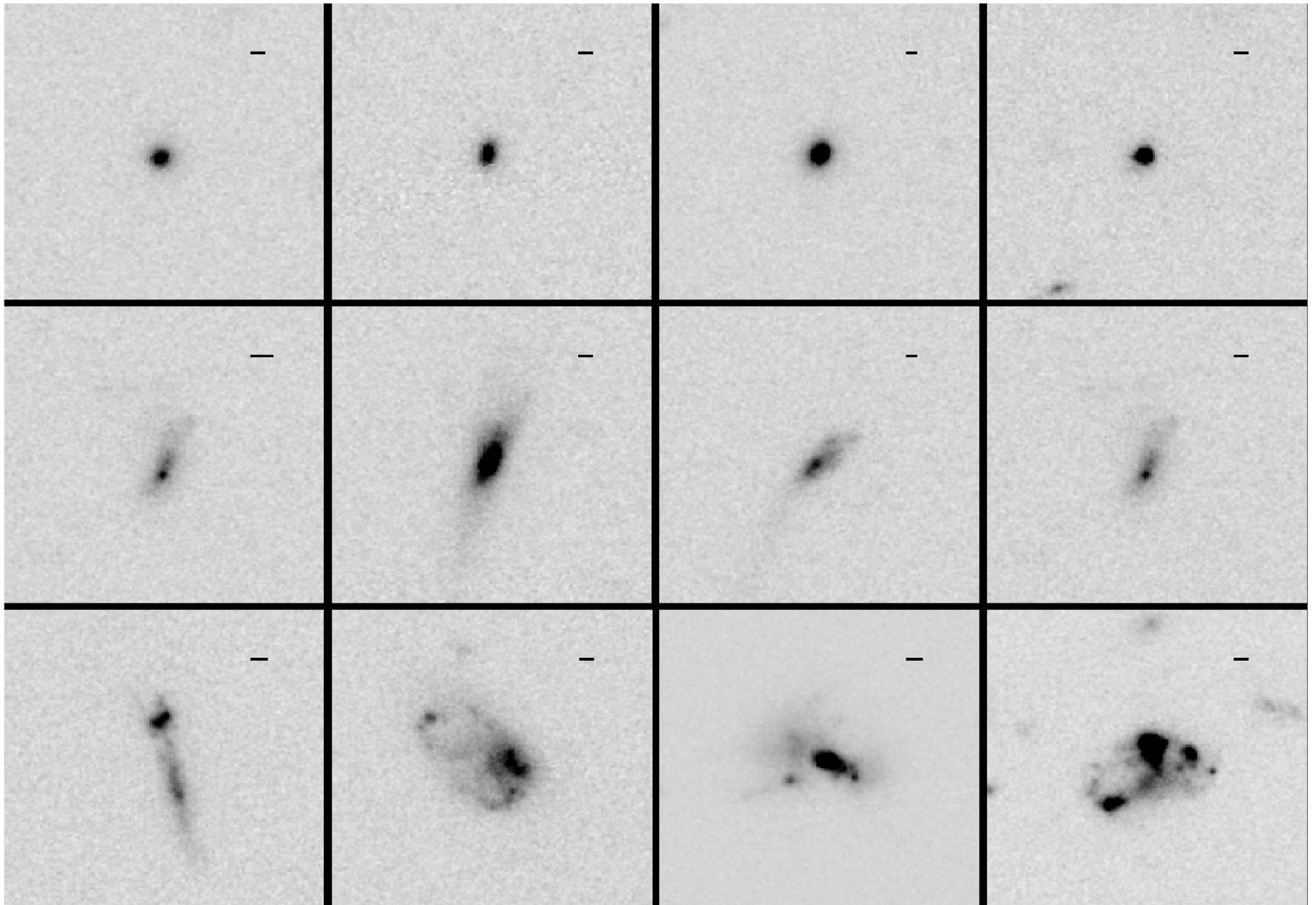


Limiting magnitude: 26 mag/arcsec²



Mass of starbursts (220) and quiescent (300.000) Galaxies

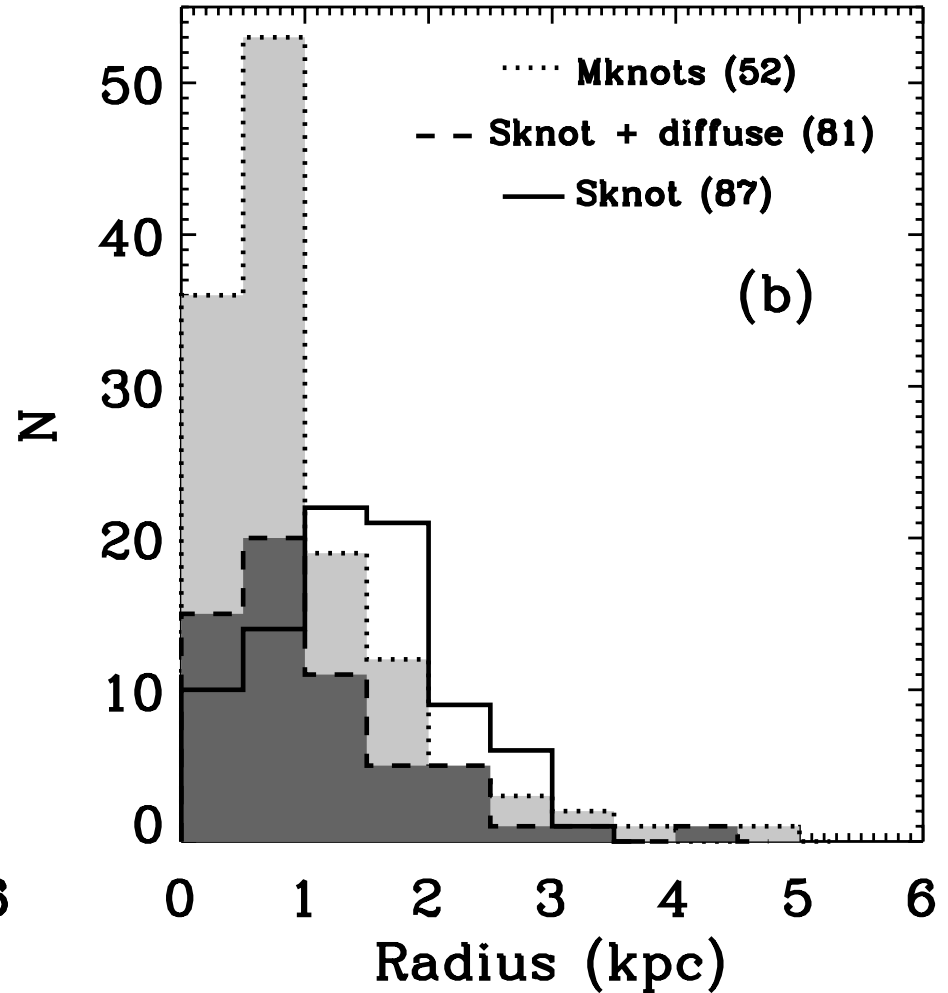
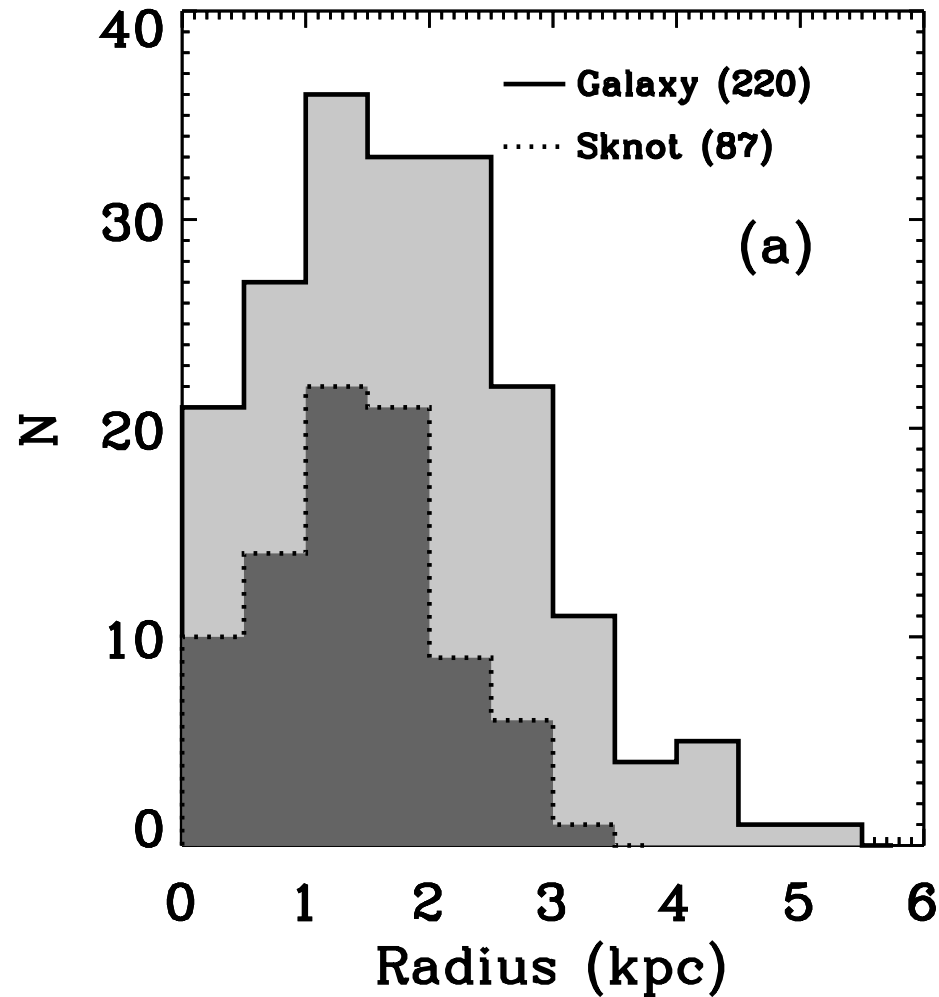




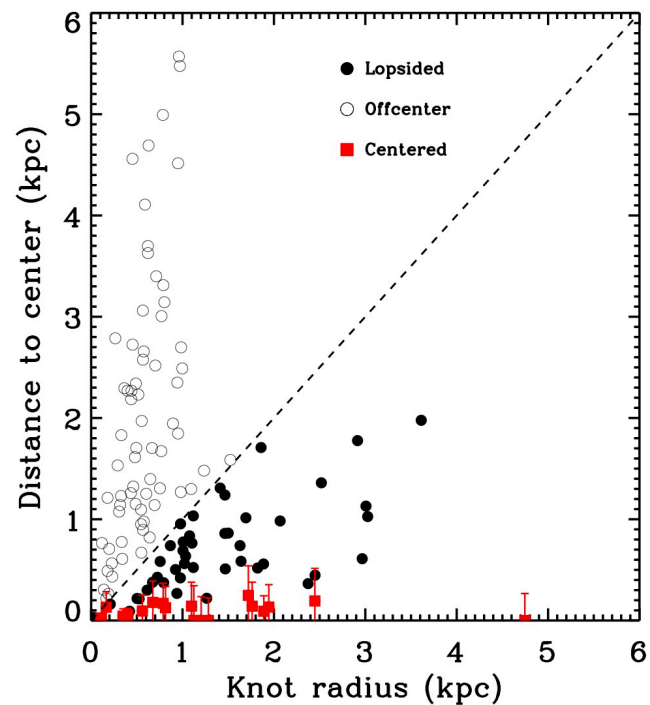
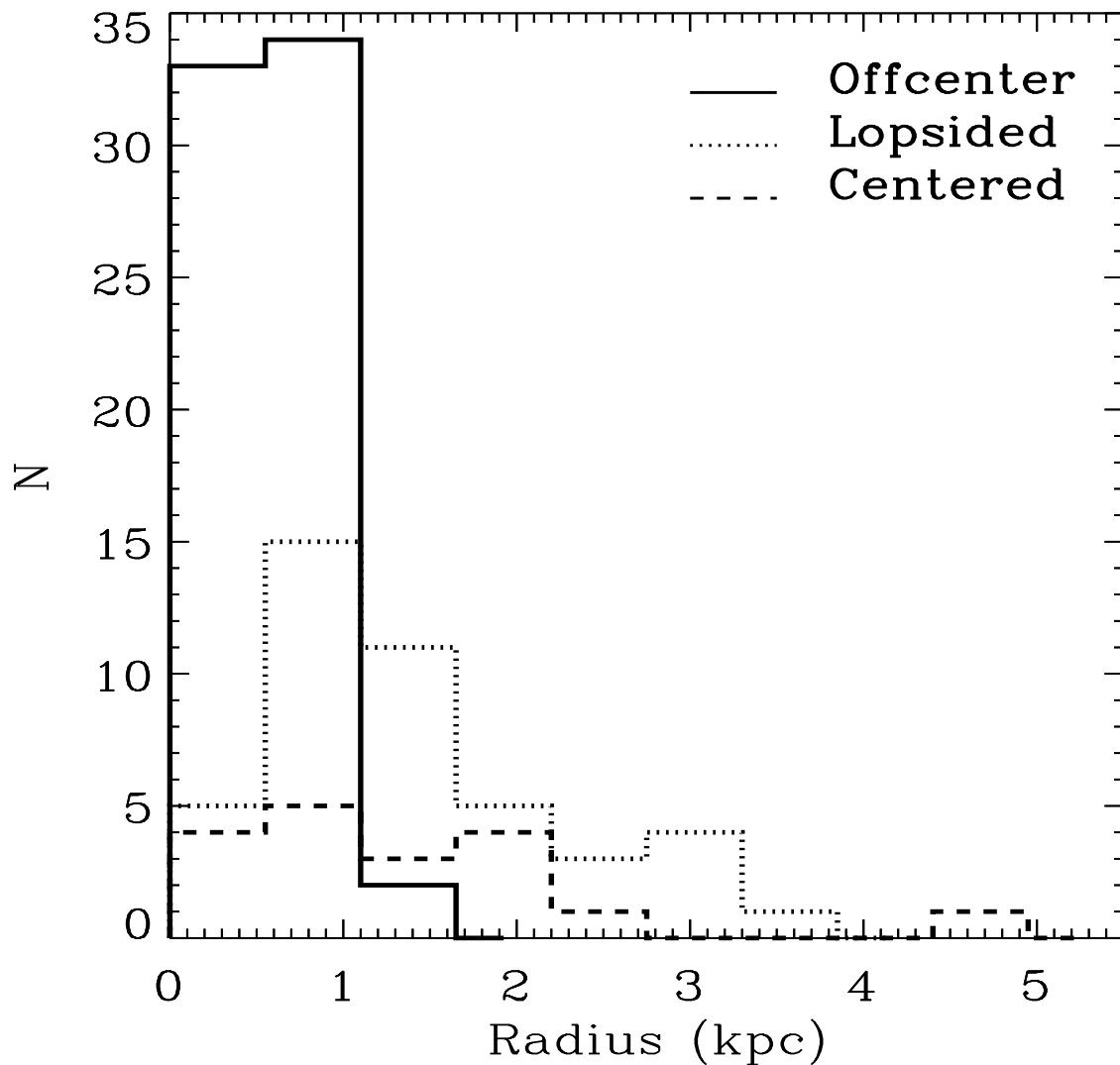
Three classes

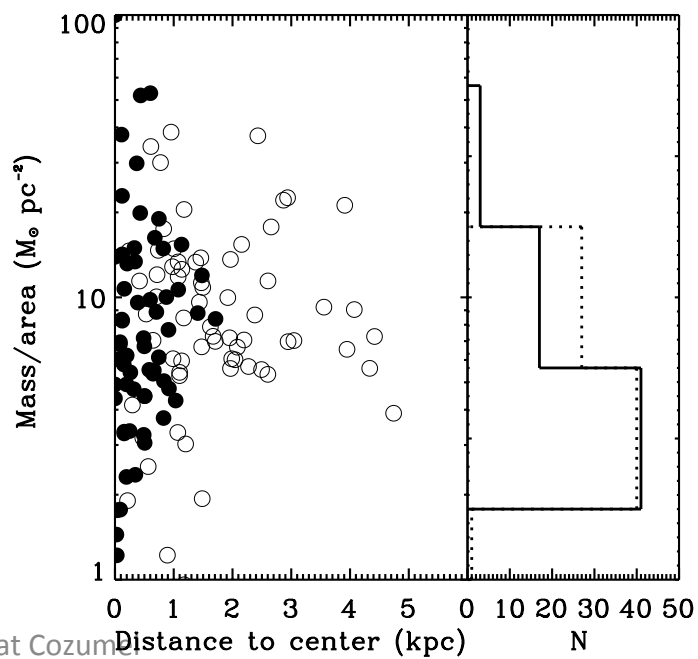
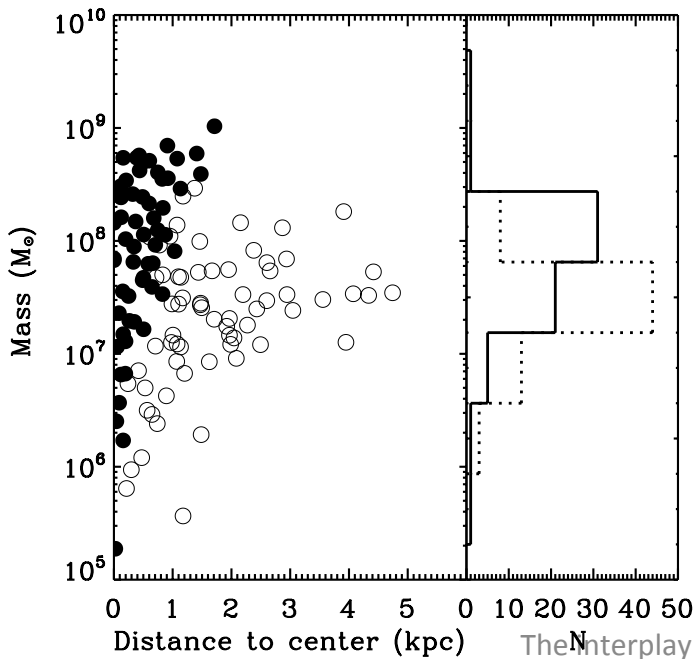
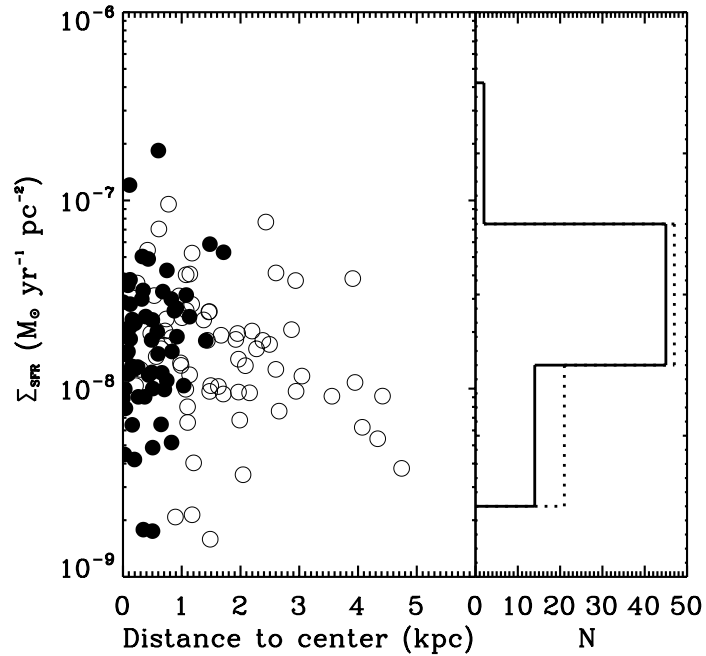
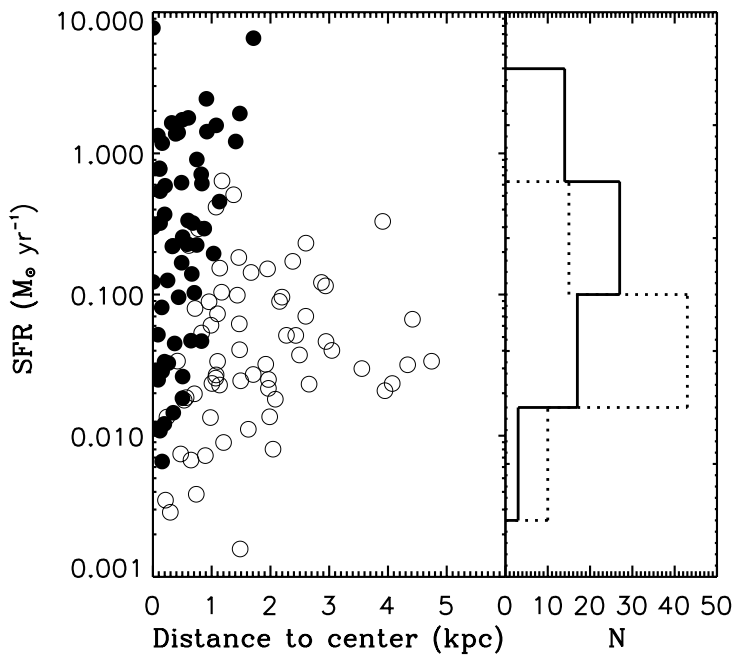
The interplay at Cozumel

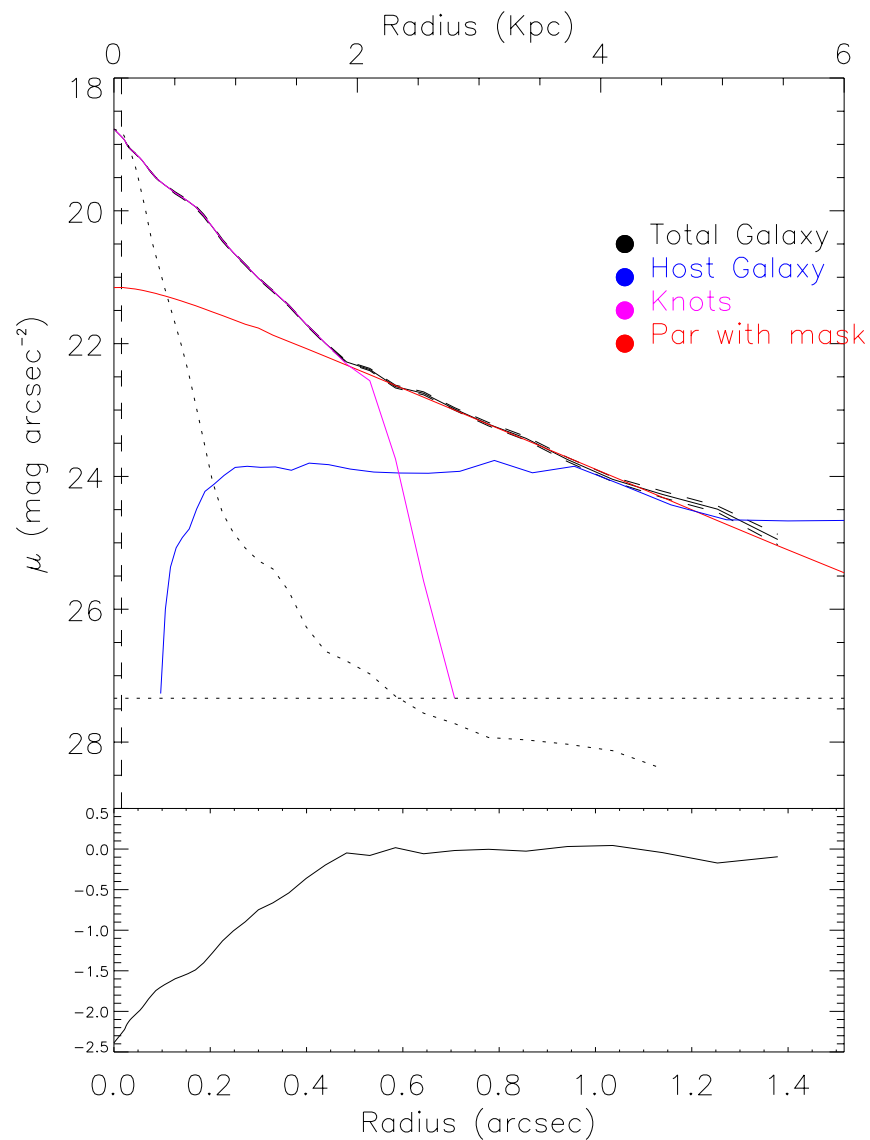
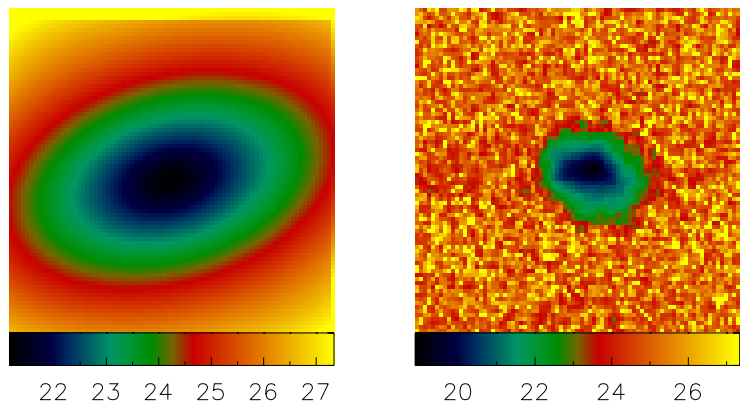
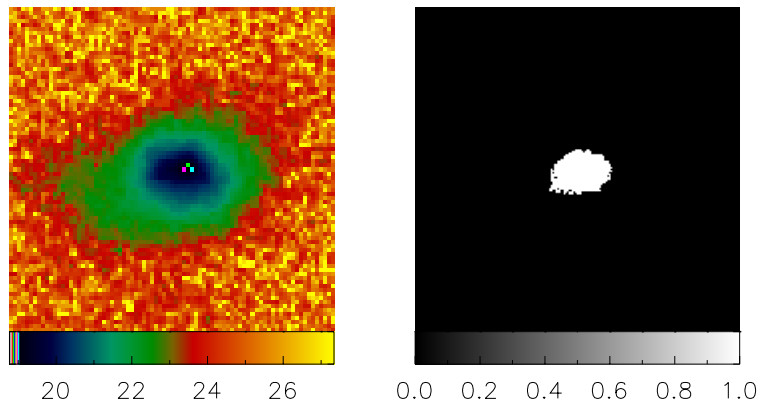
Galaxy classes and their Clumps



The Knots at their location Centered and off-centered



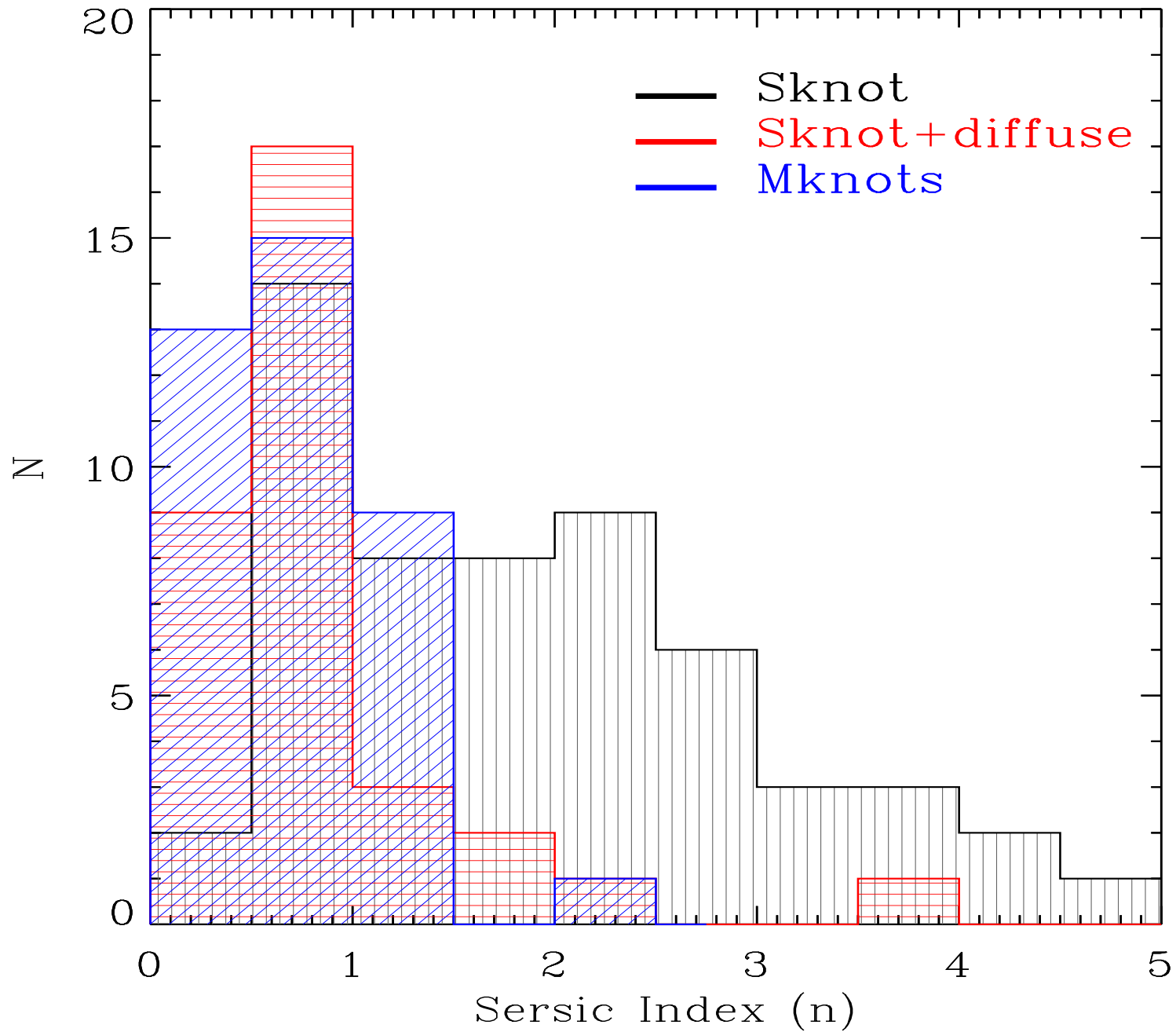




See Amorin, R., Muñoz-Tuñón, C. et al., A&A 467, 541–558 (2007)

“Two-dimensional fits of the stellar hosts in BCD galaxies”

Hinojosa-Goñi et al. 2016 in preparation.



The clumpies (Sknot+diff. and Mknots) ($133/220 \approx 60\%$) are disks

- 220 Starbursts Galaxies in COSMOS @ $z < 0.5$.
- $\langle \text{Mass} \rangle = 10^{8.2} M_{\text{sun}}$.
- Similar mass distribution as the quiescent galaxies
- Catalogue of the SF knots (HST)//
- Three classes: Sknot, (Sknot+diff and Mknot) “clumpy”
- 60% Starbursts Galaxies in COSMOS are clumpy
- Galaxies about 10 times more massive than the knots.
- The more massive knots bigger and in the centre of their host galaxy.
- The knots are “similar” (Surface SFR, Surface Mass)
- The host galaxy Sersic index of the clumpies is $\langle 1 \rangle$.
- Clumpy Starburst are turbulent disk-like Dwarf galaxies evenly starbursting.



What triggers SF in these
turbulent low-mass galaxy
discs??

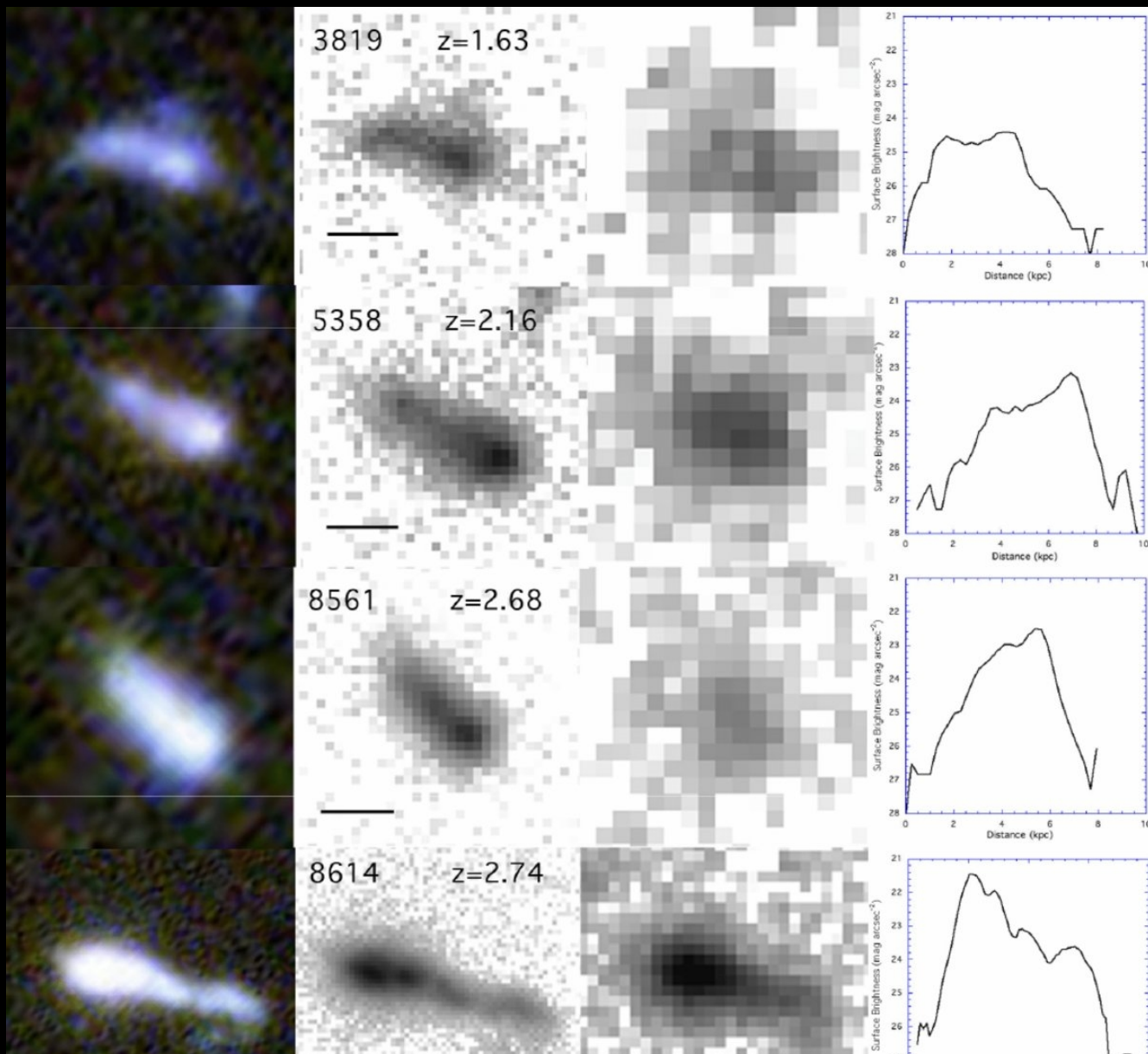
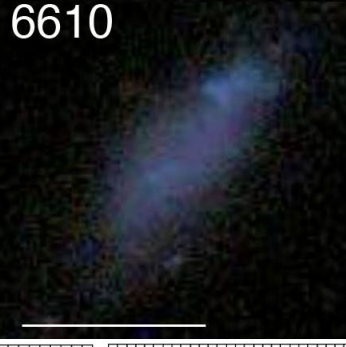
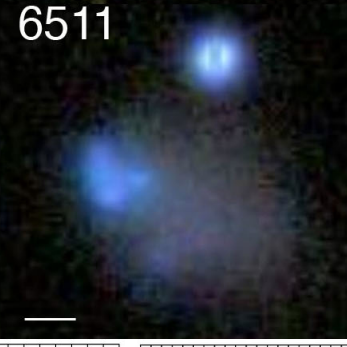
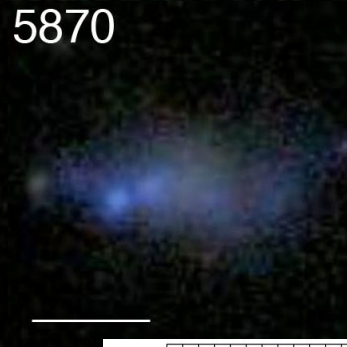
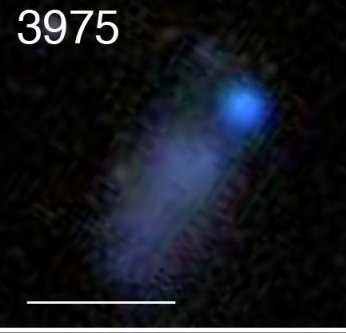
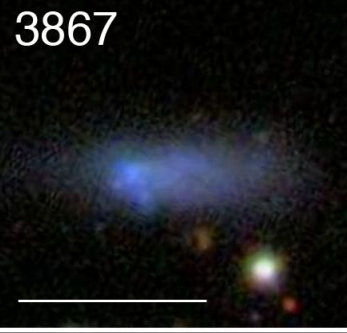
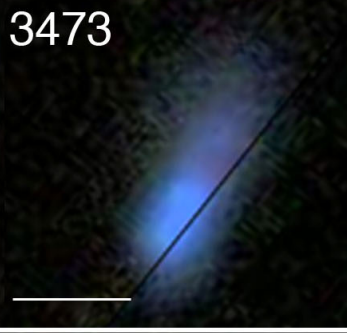
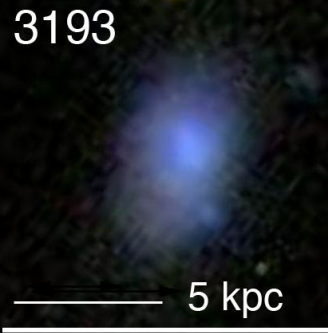
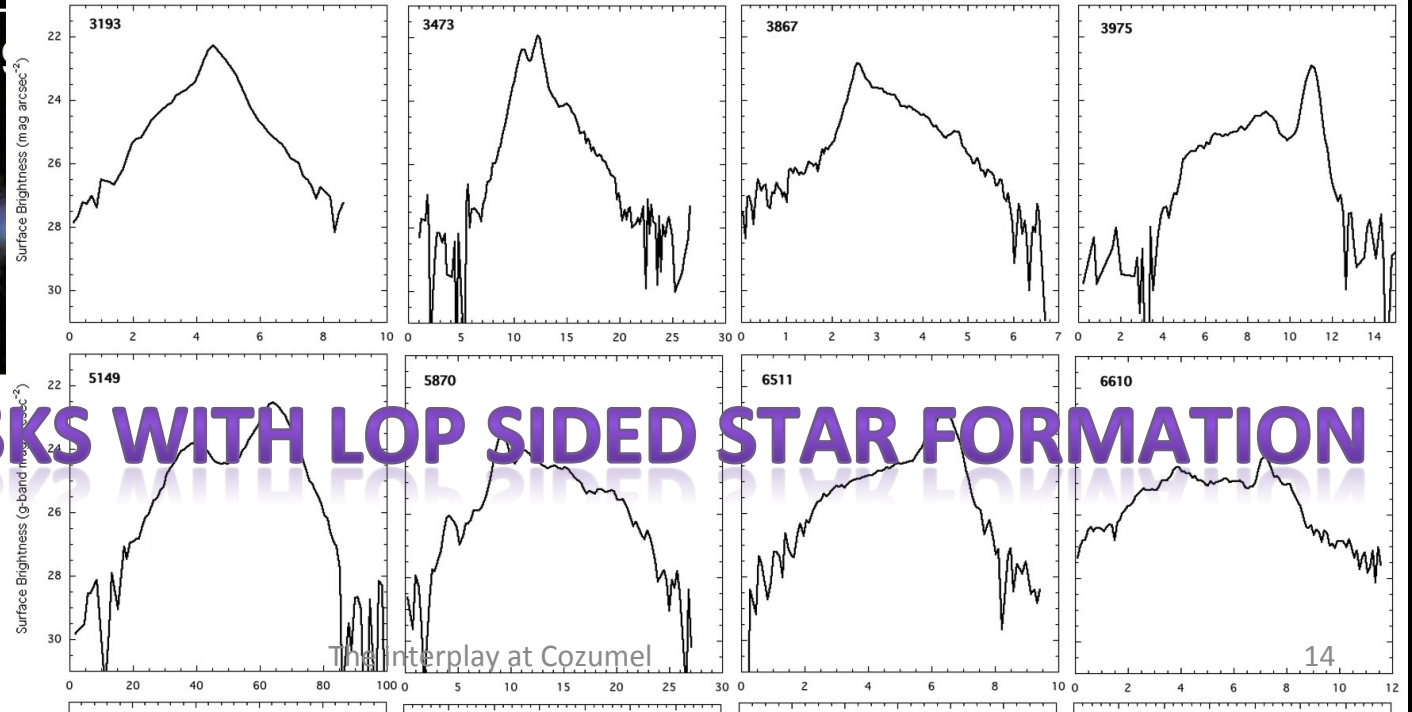
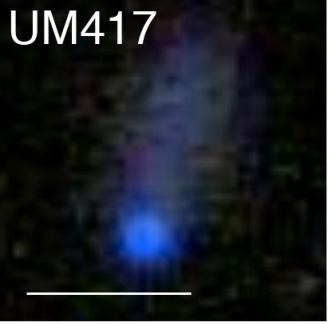


Figure 1 from Tadpole Galaxies in the Hubble Ultra Deep Field B G. Elmegreen and D.M. Elmegreen 2010 ApJ 722 1895.

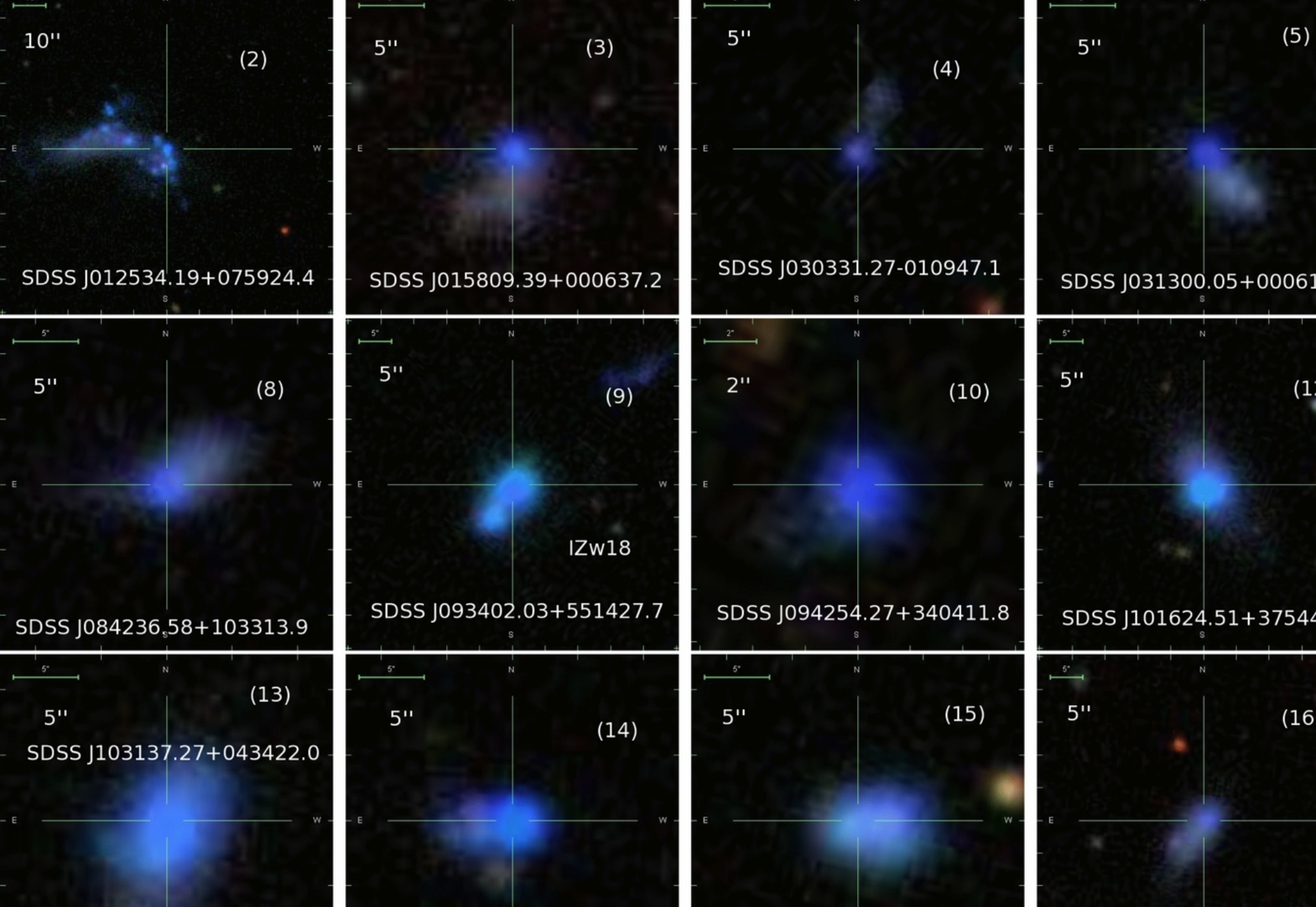


Elmegreen, D. et al.,
2012, Ap.J., 750,

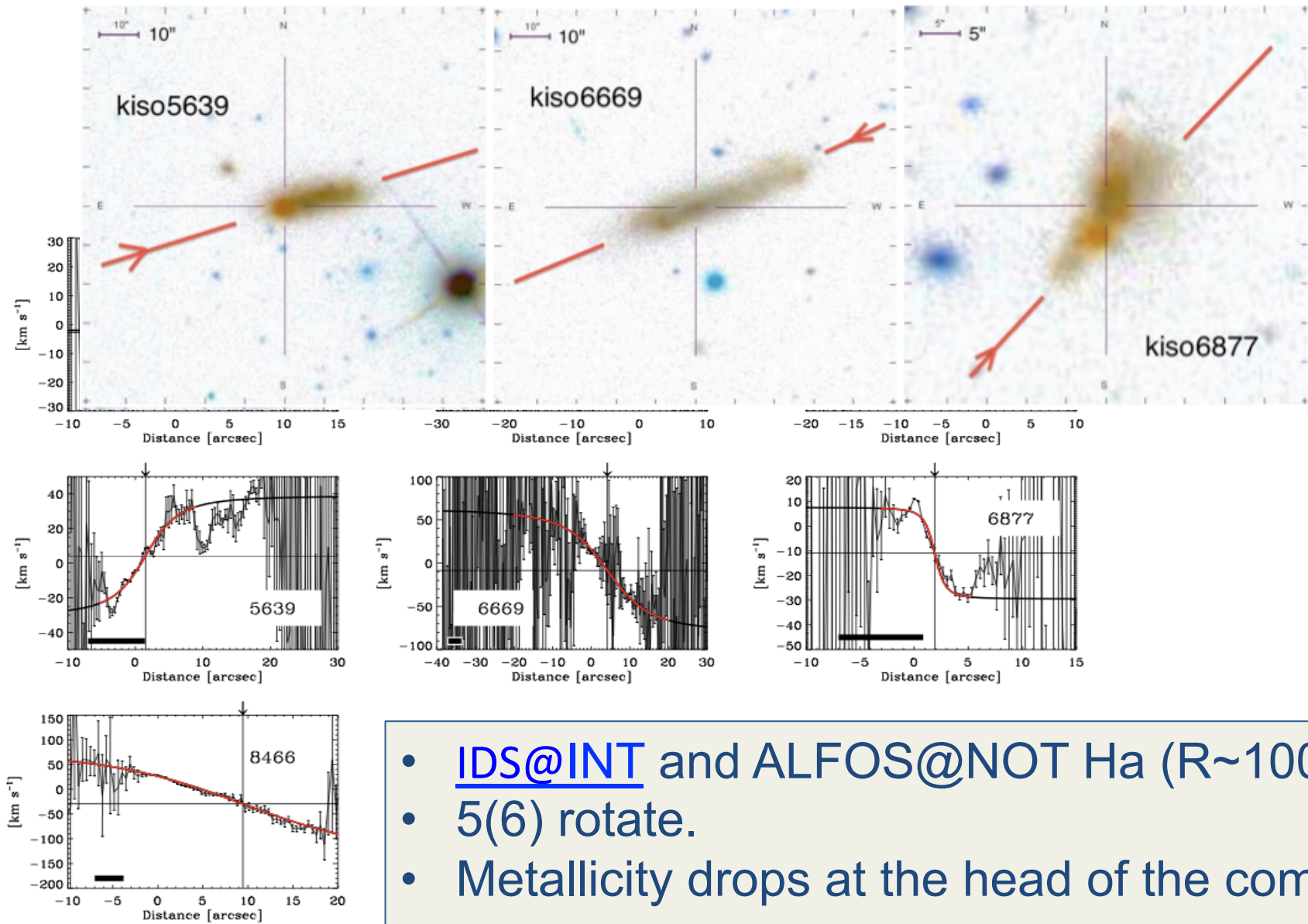


DISKS WITH LOP SIDED STAR FORMATION

The interplay at Cozumel

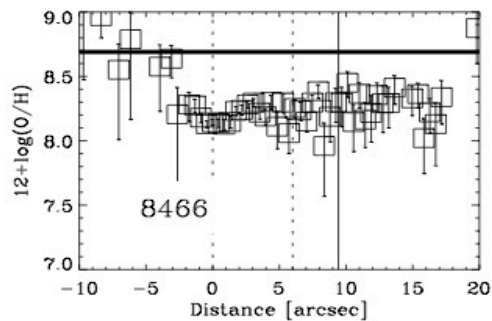
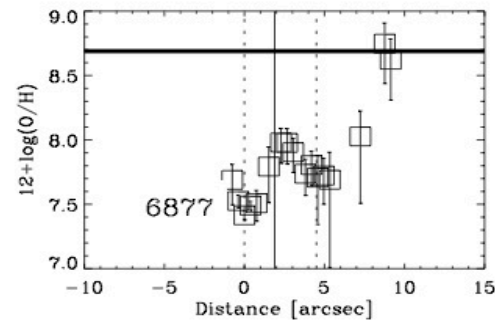
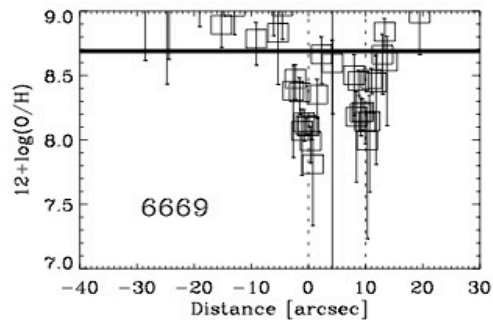
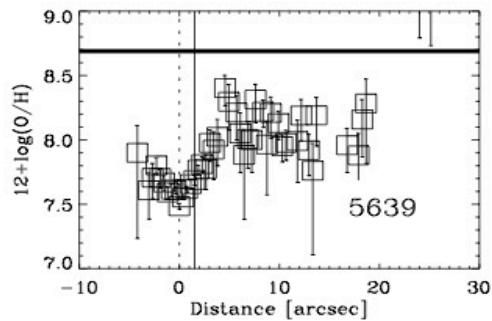
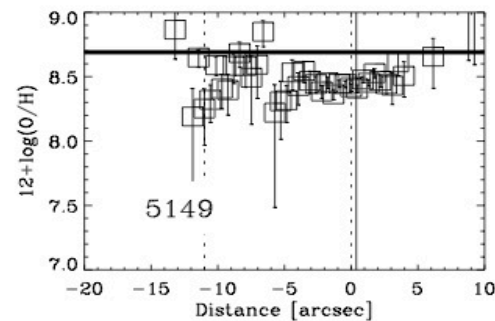
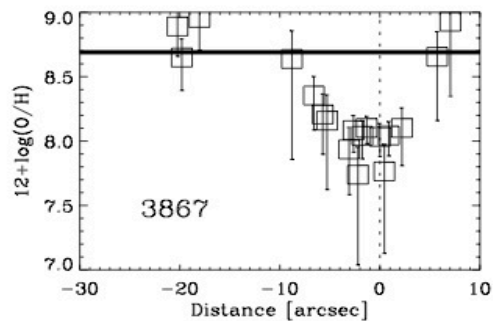
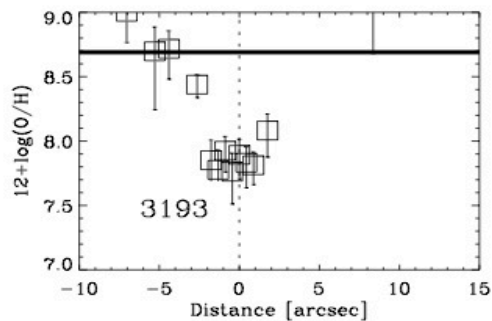


Morales-Luis et al. 2011 ApJ 743 77.; see also Papaderos et al, 2008.



- [IDS@INT](#) and ALFOS@NOT Ha (R~10000)
- 5(6) rotate.
- Metallicity drops at the head of the comet.

Metallicity (Oxygen abundance)



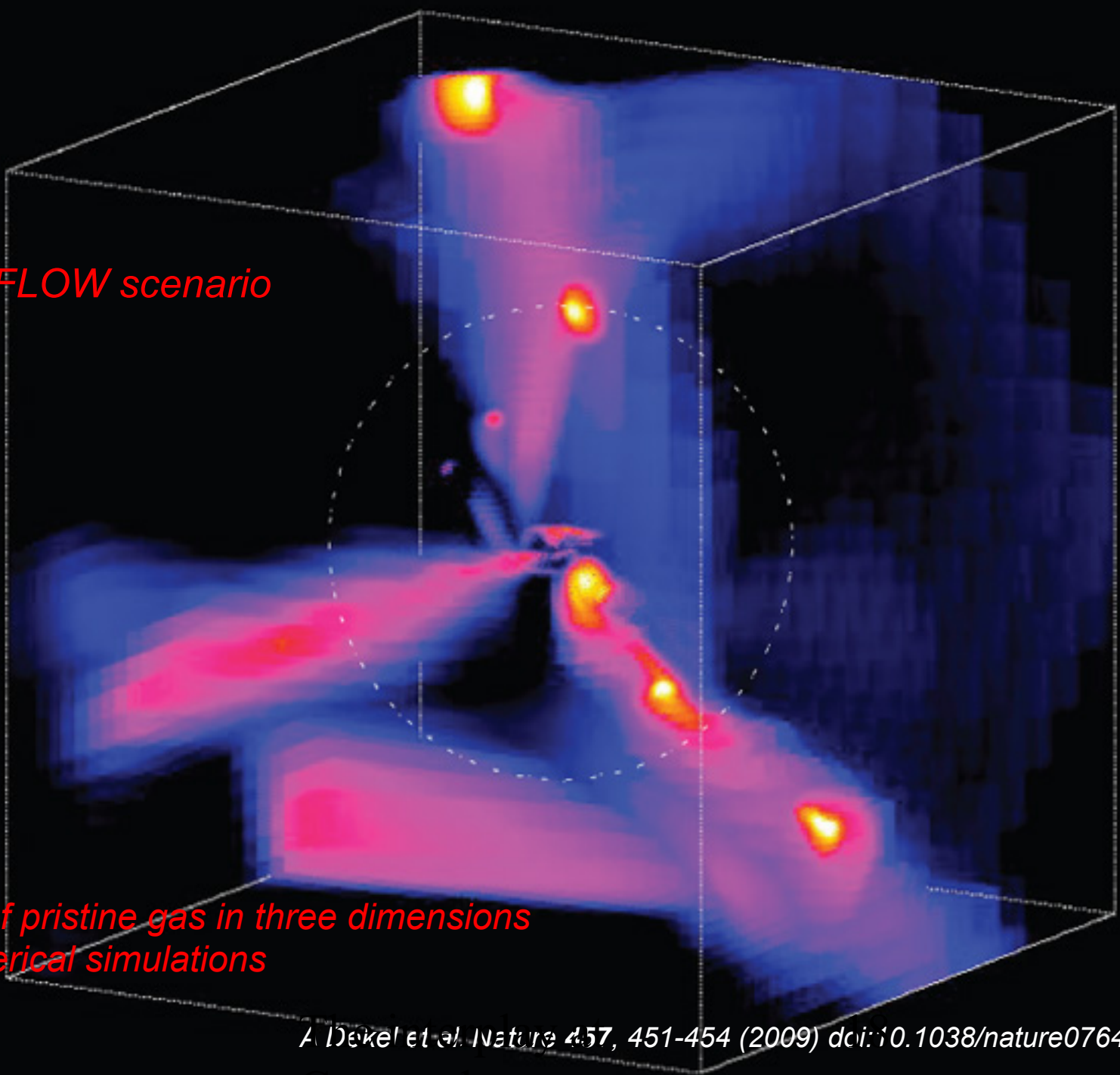
- O/H based on $[\text{NII}]6583/\text{H}\alpha$

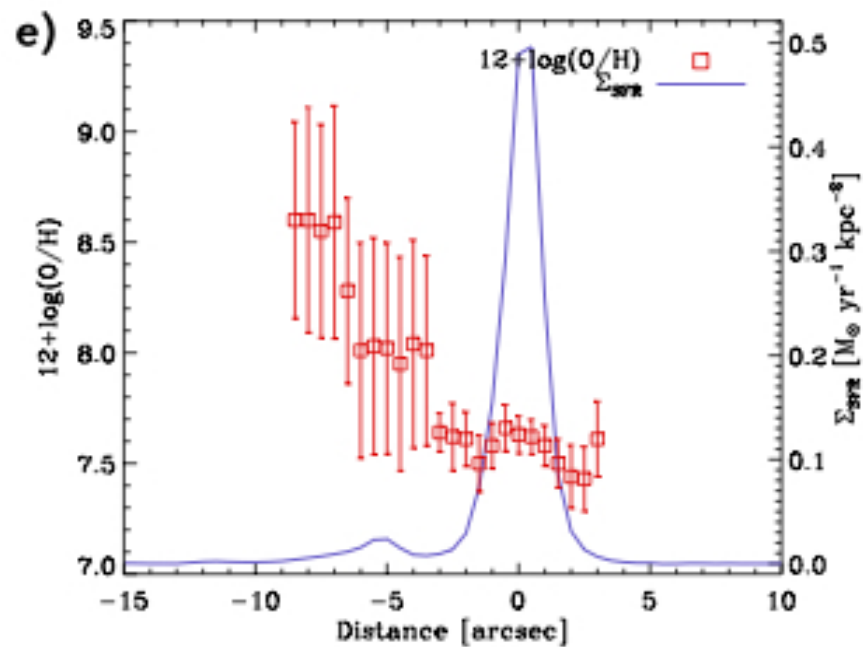
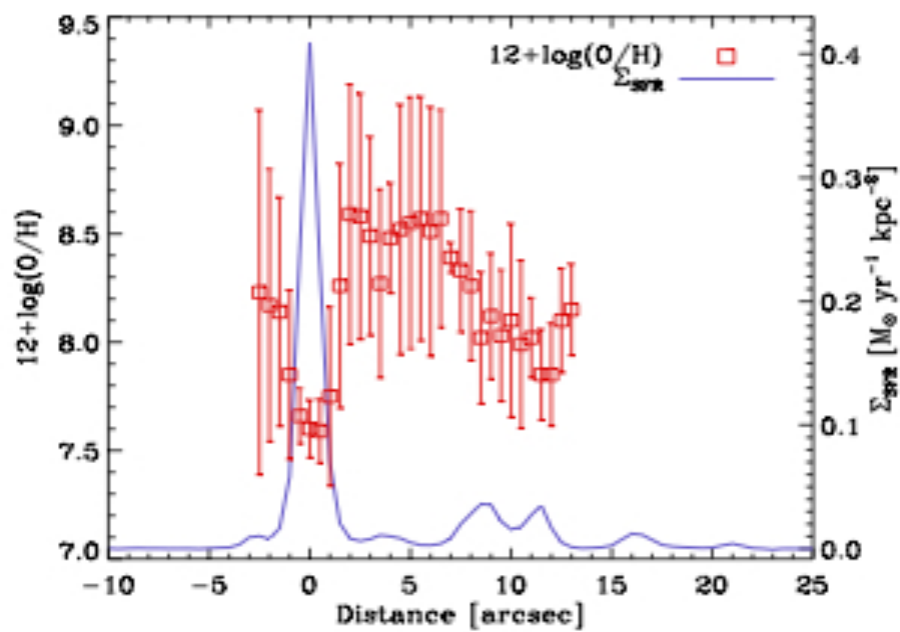
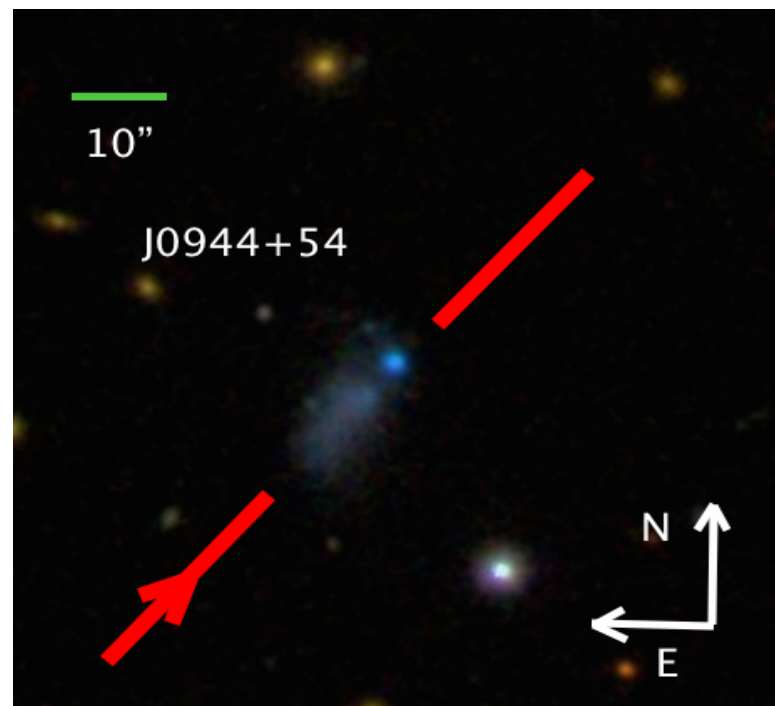
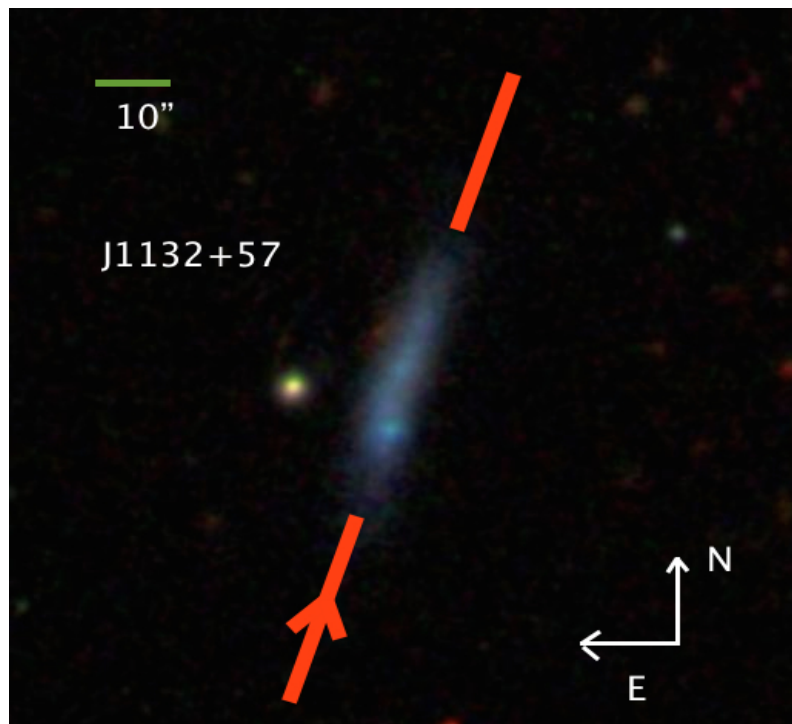
- $\text{H}\alpha$ Flux Peaks
- Rotation Center
- Solar Abundance

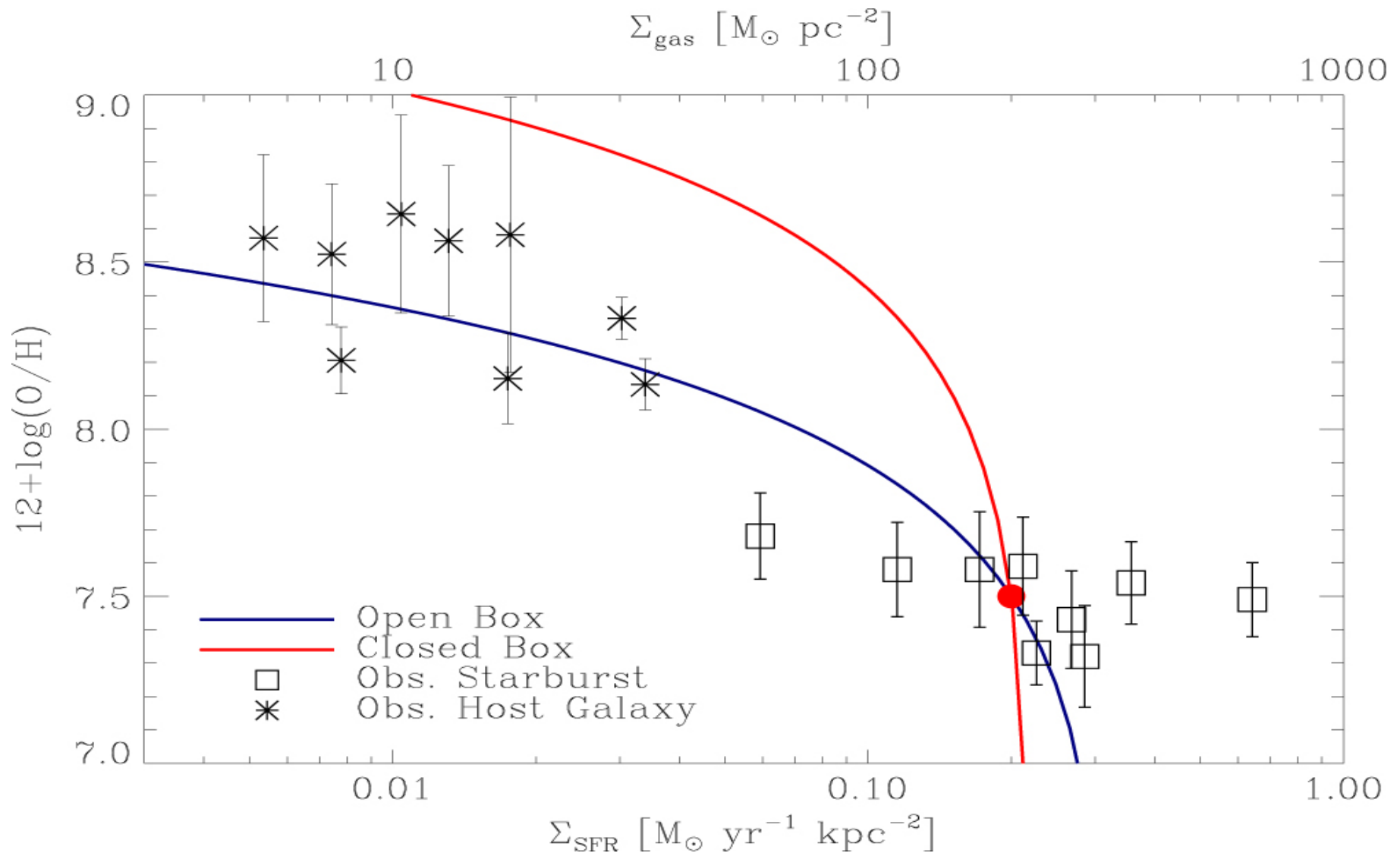
COLD FLOW scenario

*Streams of pristine gas in three dimensions
from numerical simulations*

A. Dekel et al. Nature 457, 451-454 (2009) doi:10.1038/nature07648







Sanchez Almeida, Elmegreen, Muñoz-Tuñón & Elmegreen. 2014, *A&AR*. 22,71.
 Sanchez Almeida, Morales Luís, Muñoz-Tuñón et al. 2014, *Ap.J.* 783,45.
 Sanchez Almeida, Elmegreen, Muñoz-Tuñón et al. 2015, *Ap.J.* 810L, 110.
 Ceverino, D., Sanchez Almeida, Muñoz-Tuñón, Dekel et al.. 2016, *MNRAS*, 457, 2605.

Summary (from XMPs) and some speculation...

- Extremely metal poor have **clumpy** morphology
- Local ones rotate with the head displaced from the rotation center.
- Metallicity drops at the head (largest SFR)

★ All the results suggest that **XMP** are **disks in early stages of assembling** with its **star-formation sustained by accretion of external metal poor gas**.

- 60% starburst in COSMOS are clumpy// some of the cometary and all of them disks-like with SF most likely resulting from violent disks instabilities.
- They are candidates to be discs “rejuvenated” by SF driven by new gas from the IGM.


Small is Beautiful

And

*Dwarf starburst can be the traps to catch
the cold flow accretion still in action in
the nearby Universe*



*Thanks to all of you
and also to...*

- 
- *Jorge Sánchez Almeida (IAC)*
 - *Mercedes Filho (IAC-Porto)*
 - *Debra Elmegreen & Bruce Elmegreen. (NY)*
 - *Estallidos's team.*