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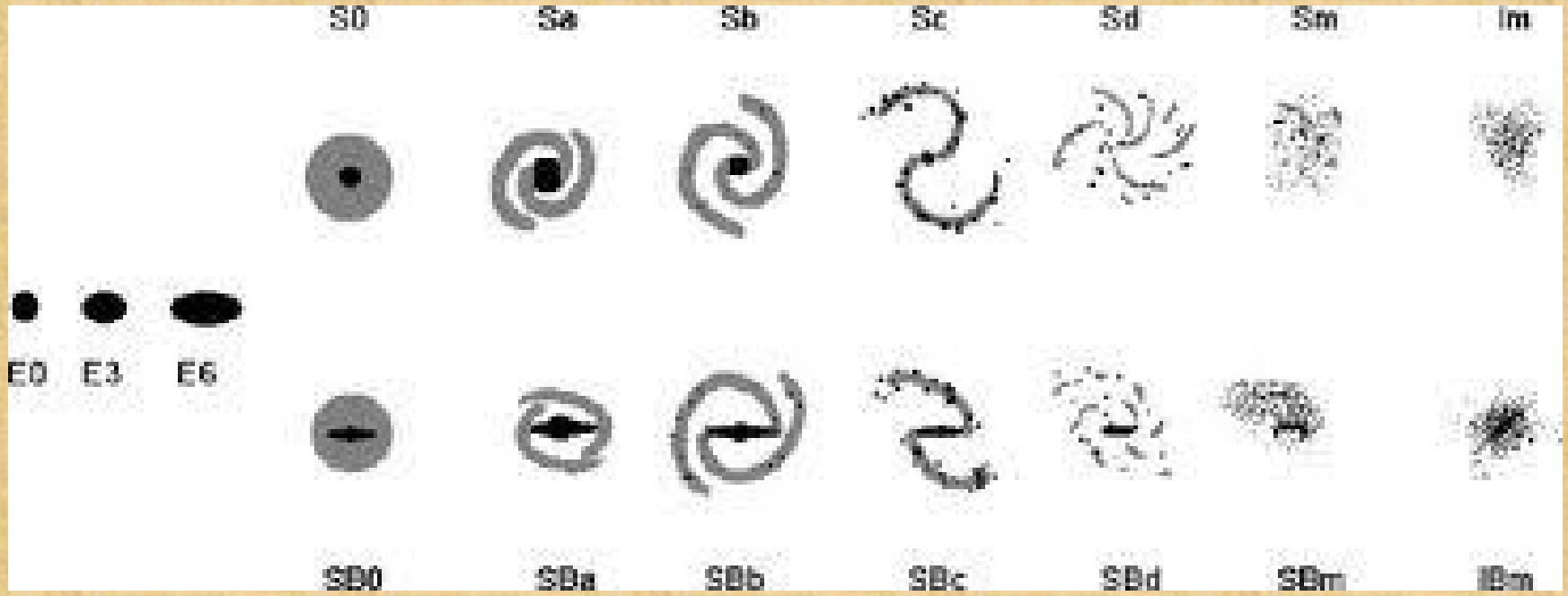
Star formation rates for dS galaxies

dS?!

Do they exist?!

There is not such galaxies at the Virgo cluster!!



De Vaucouleurs 1958

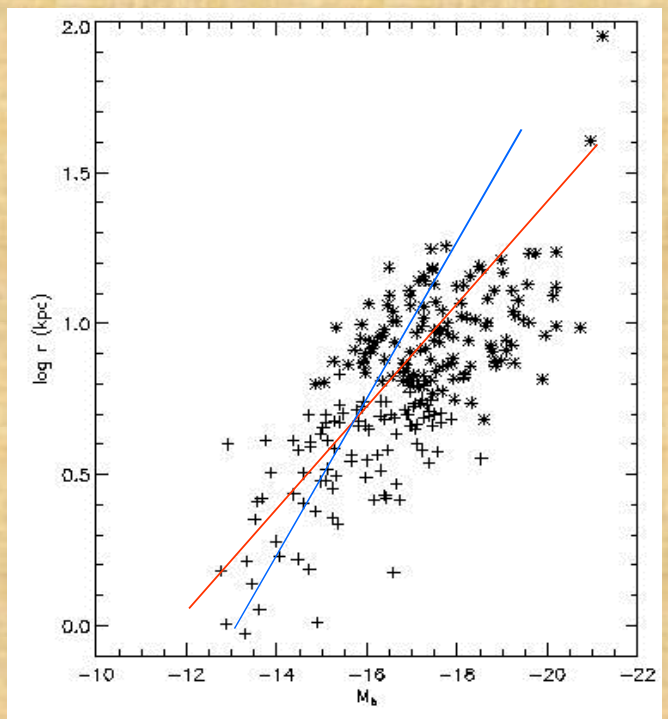
1958 Reaves studied the dwarf spiral galaxies inside the Virgo cluster

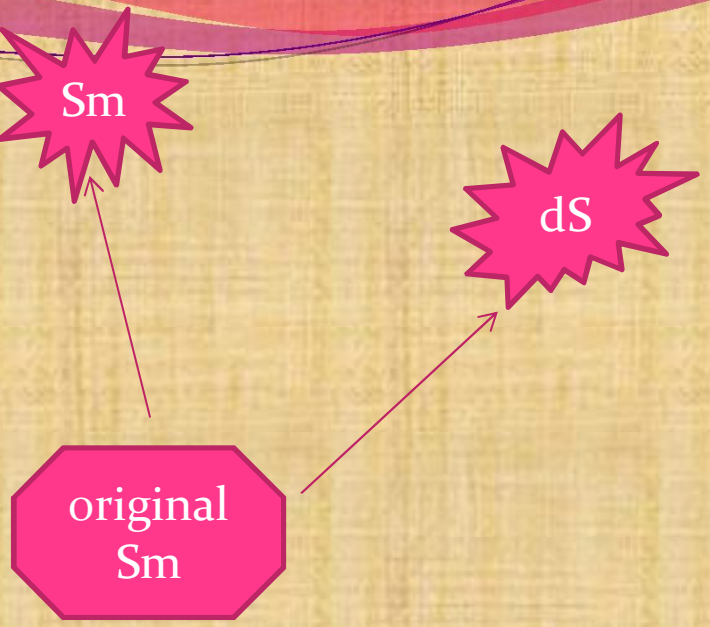
1973 Nilson classified 12 of the galaxies in the UGC as dS

Schombert et al. (1995) claimed that they have discovered a new type of galaxies: early-type dwarf spirals

Hidalgo-Gámez (2004) listed 111 small and low luminous galaxies with spiral structure (or classified as spiral!).

A total of 358 Sm and Sd galaxies were studied





A late-type galaxy is dwarf when
$r_{25} \leq 5$ kpc
$-18 \leq M_b$

We have studied so far:

-the metallicity of dS is slightly lower than for normal Sm (Hidalgo-Gámez et al. 2012)

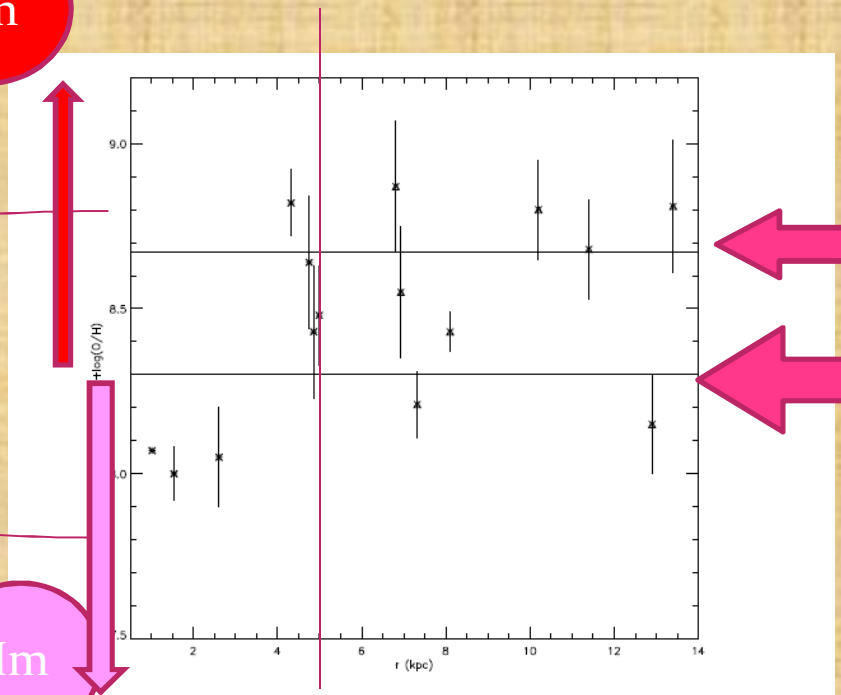
-The slope of the T-F relationship is slightly different for Sm and dS (Cárdenas-Martínez 2011)

The chemical abundances (Hidalgo-Gámez et al. 2012)

Sm

dS

Im



solar

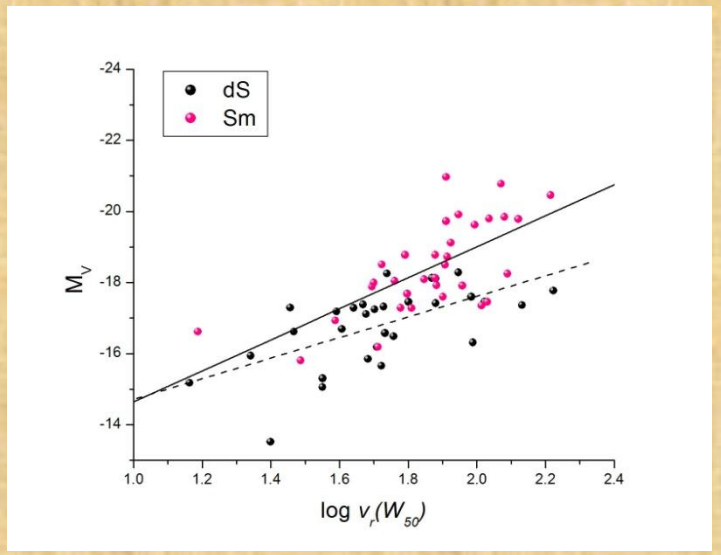
LMC

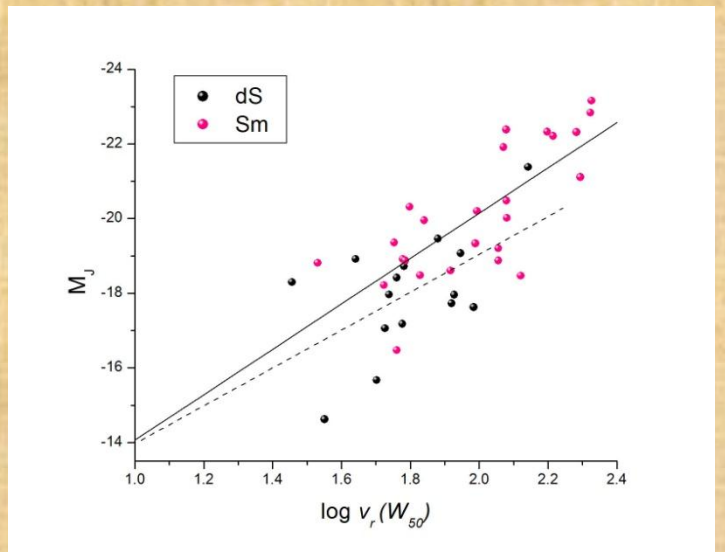
ig. 3. Oxygen abundance vs. the optical size of the galaxies studied in the present investigation. The triangles are the Sm galaxies and the stars the dS ones. The solar and LMC metallicities are shown as horizontal solid lines. It is clear that the majority of the dS galaxies have subsolar abundance, while most of the Sm galaxies have solar and oversolar abundances.

The Tully-Fisher relationship (Cárdenas-Martínez 2011)

(1)	Tipo de Galaxias (2)	Pendiente ± Δb (3)	Coeficiente r (4)	Núm. De Galaxias (5)
En la banda V	dS	-2.89±0.70	-0.61	30
	Sm	-4.35±0.85	-0.67	33
En la banda R	dS	-2.1±0.86	-0.42	30
	Sm	-3.33±0.80	-0.58	35
En la banda I	dS	-2.26±0.74	-0.73	10
	Sm	-3.55±0.77	-0.72	21
En la banda J	dS	-5.07±2.04	-0.59	15
	Sm	-6.07±1.10	-0.75	25

Tabla 3.5.- Los datos obtenidos de la relación TF, recopila las gráficas que se muestran en la Fig. 3.27 a 3.30





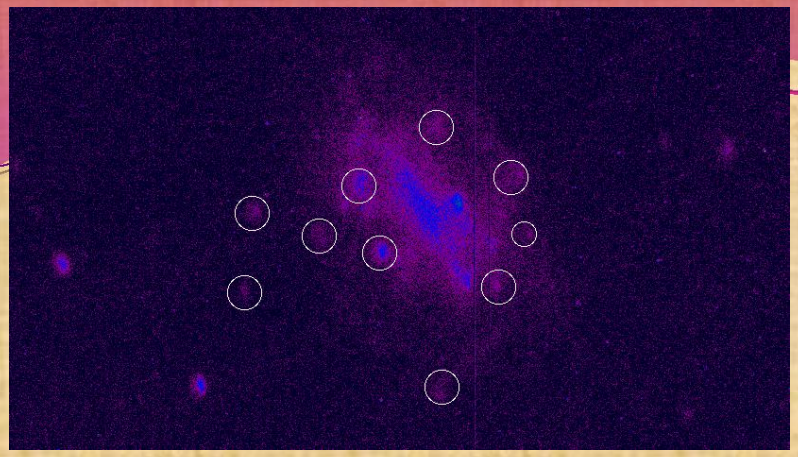
Star Formation rates

We studied nine dS of the sample observed with the 1.5 m telescope at SPM observatory (Mexico) in two different campaing: March and November 2002.

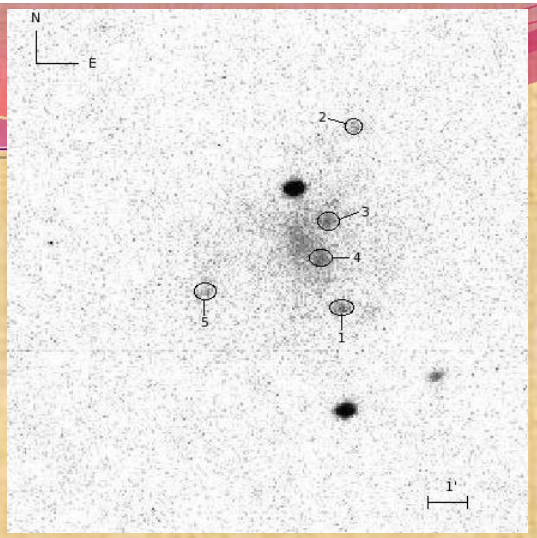
The integration times were between 30 min to 1 hour at the Hα filter

The seeing is about 1.5”

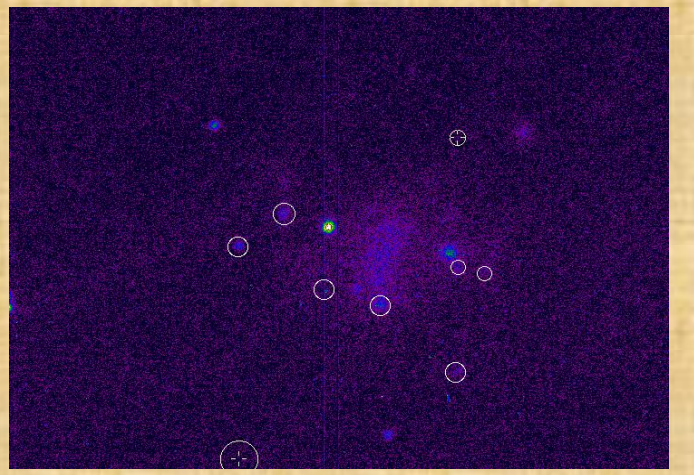
No previous selection of any kind was considered for the observed galaxies



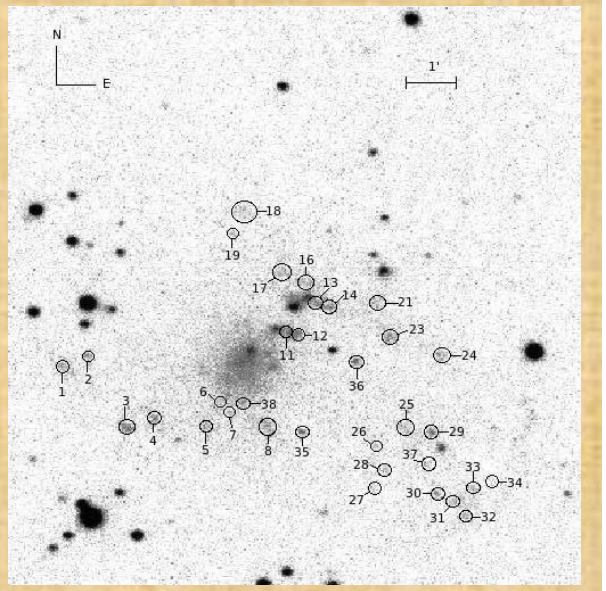
UGC 6205



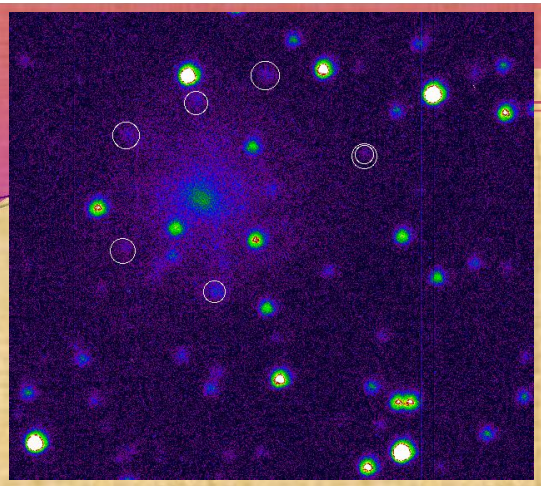
UGC 5296



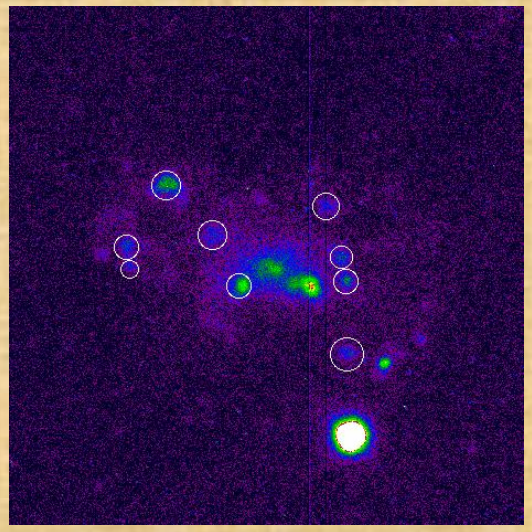
UGC 6304



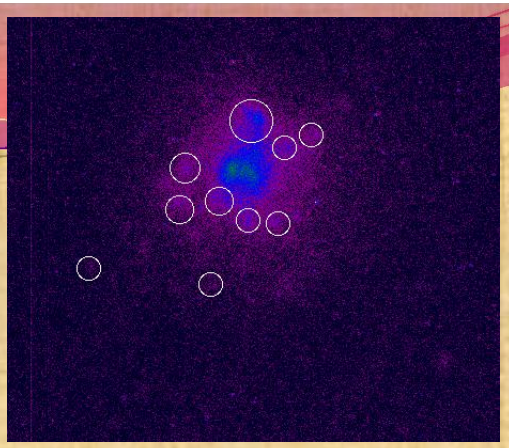
UGC 11820



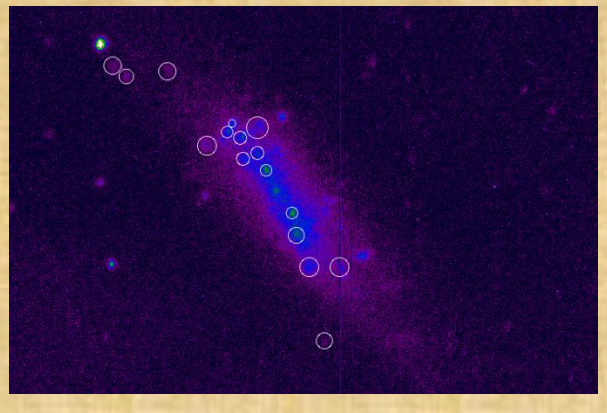
UGC 3775



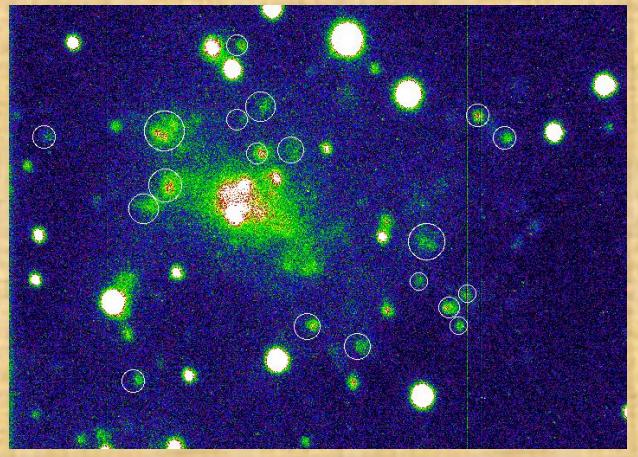
UGC 5242



UGC 9570



UGC 891



UGC 12212

The spatial resolution of the observations is between 70 pc for UGC 891 to 200 pc for UGC 9570

The Hα fluxes were galactic extinction corrected and the contamination due to nitrogen was considered

The distance used in the luminosity determination was obtained from NED

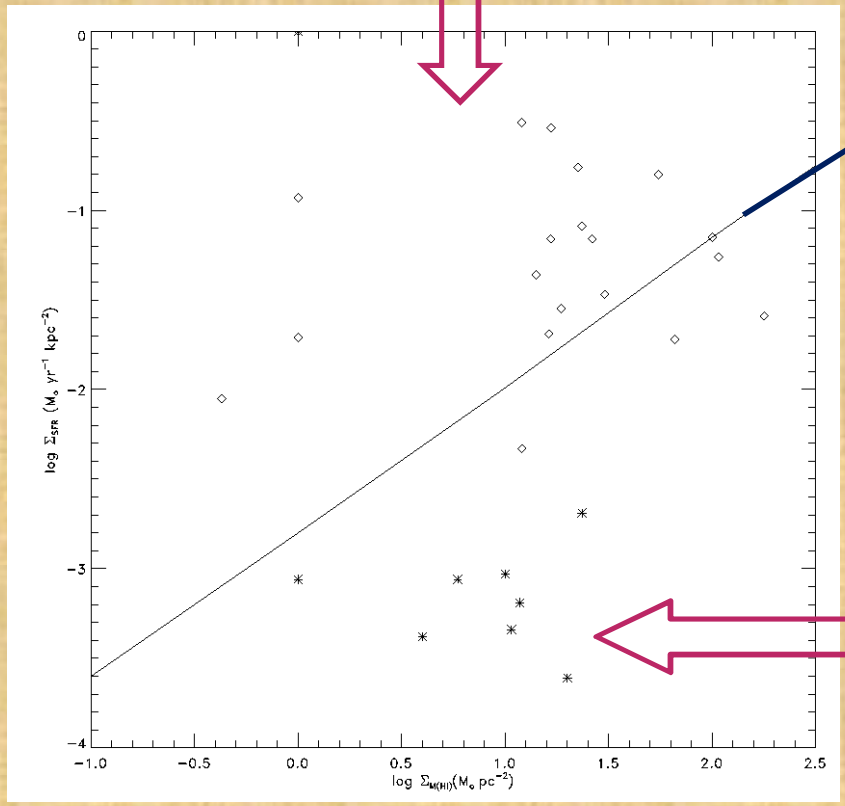
The SFRs were determined following Kennicutt (1998):

$$SFR\ (M_\odot\ yr^{-1}) = 7.910^{-42} L_{H_\alpha}\ (erg\ s^{-1})$$

Name	SFR (10^{-2} M$\odot$ yr^{-1})	M(HI) (10^{8} M$\odot$)	R (kpc)	N° HII regions	Lmax
UGC 891 (X)	1.99	2.9	3.13	16	38.47
UGC 5296	2.64	3.1	3.02	5	39.14
UGC 6205	3.28	5.2	4.99	10	39.09
UGC 6304	6.1	3.6	4.72	9	39.37
UGC 11820	1.9	15.4	4.96	38	38.57
UGC 12212	6.96	8.5	3.3	22	38.85
UGC 3775	6.02	0.7	4.68	8	39.42
UGC 5242 (B)	3.42	2.9	4.86	11	39.06
UGC 9570 (dS)	2.16	-	-	10	38.63

Relationship between the SFR and global parameters

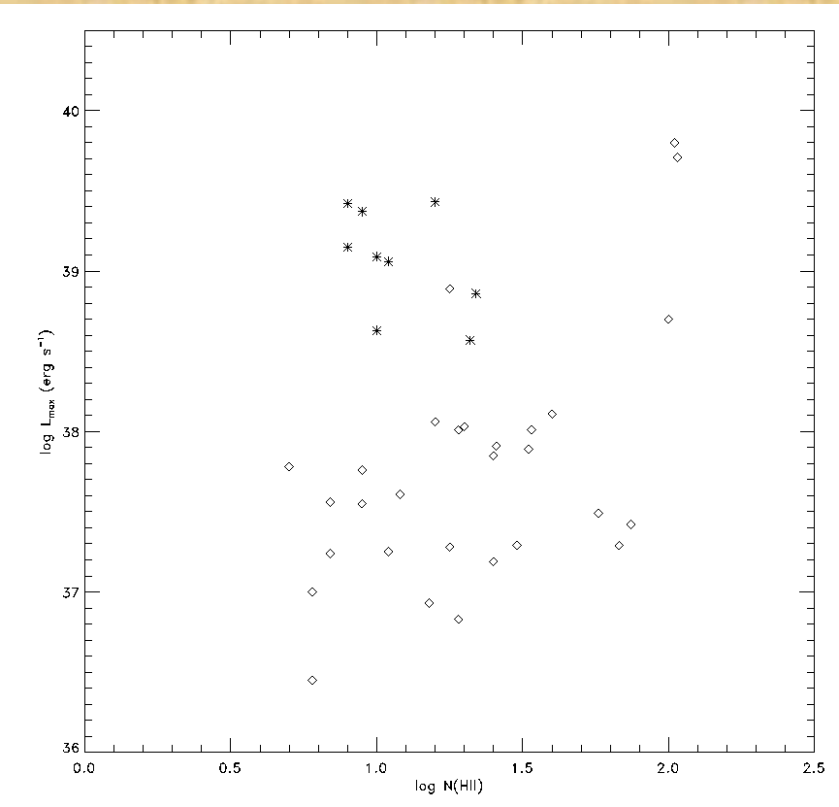
S
m



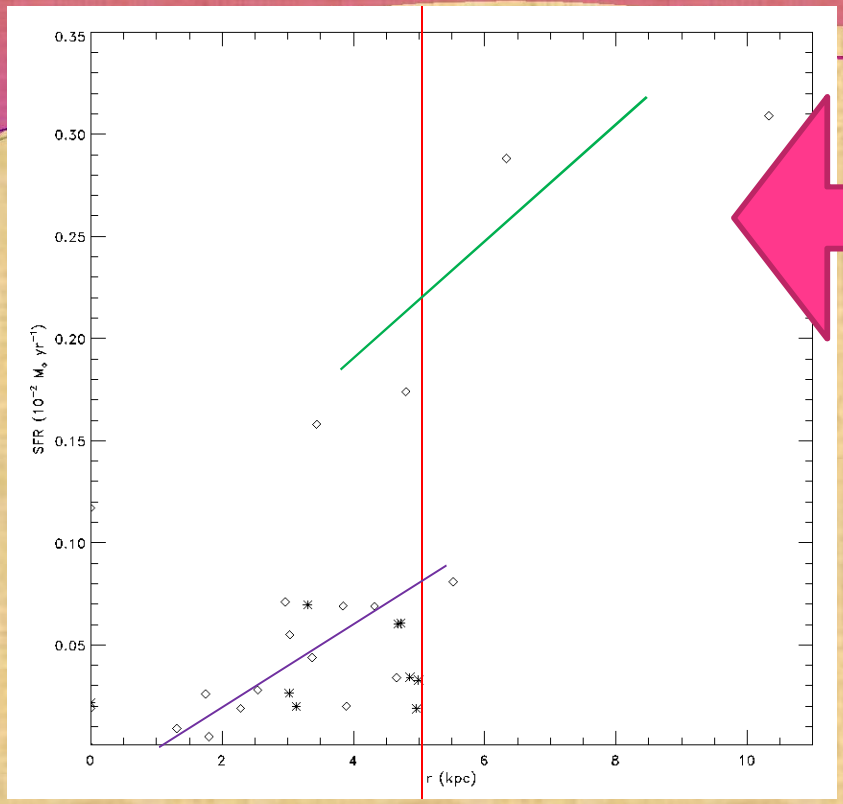
Spiral galaxies by Kennicutt (1998)

dS

Youngblood & Hunter (1999): If you are an Im galaxy, as more HII regions you have the large the maximum luminosity (more or less)



But if you are a dS you will clustered around a luminosity of about [illegible] and 10 HII regions



Slope 0.03, r=0.58

Slope 0.03 r=0.7

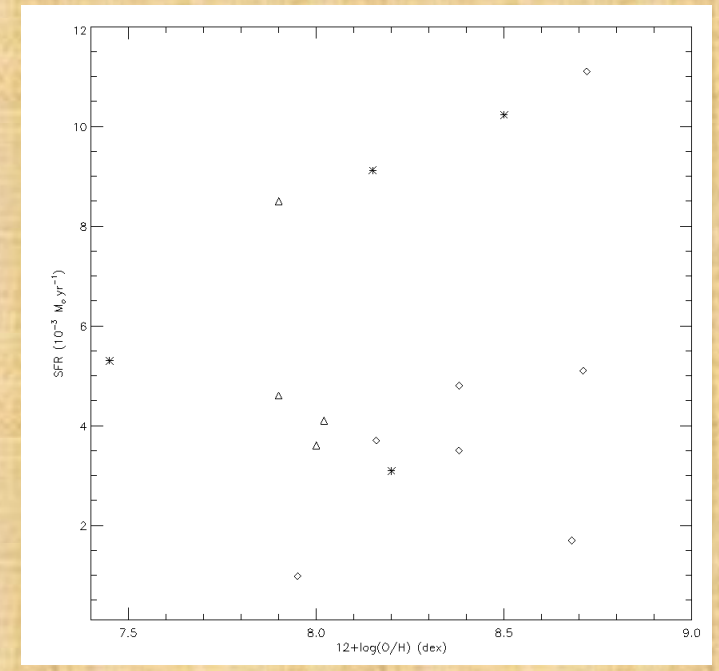
There might be a break in the SFR for galactic radius of (about) 5 kpc!!

Hunter & Elmegreen (2004) did not found any correlation between the SFR and the Z, as global parameters

Rosenberg et al. (2008) obtained a negative correlation between the SFR(MIR) and the Z for a sample of galaxies.

We got a positive trend for 3 dS galaxies.

The relation improve very much considering a single galaxy (r=0.5 U5296, r=0.6 U6205, r=0.7 U5242)



Conclusions

-There are dwarf spiral galaxies

-Some of the properties, Z and the T-F, seems to be different

-The SFRs are lower than any other sample of Sm galaxies

-There seems to be a “relationship” between SFRs and size, but is it different for “dwarf” and for “normal” Sm galaxies?

-Do dS galaxies need more hidrogen to form stars?

-Is there an (anti)relation between SFRs and Z for HII regions?