

# ALFALFA

## The Arecibo Legacy Fast ALFA Survey of Extragalactic HI

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Cornell University



ALFALFA



ALFALFA is a collaboration of >50 people, from 34 institutions in 19 countries. ALFALFA is an **open** collaboration: anybody with a valid scientific interest and a hardworking disposition can join.

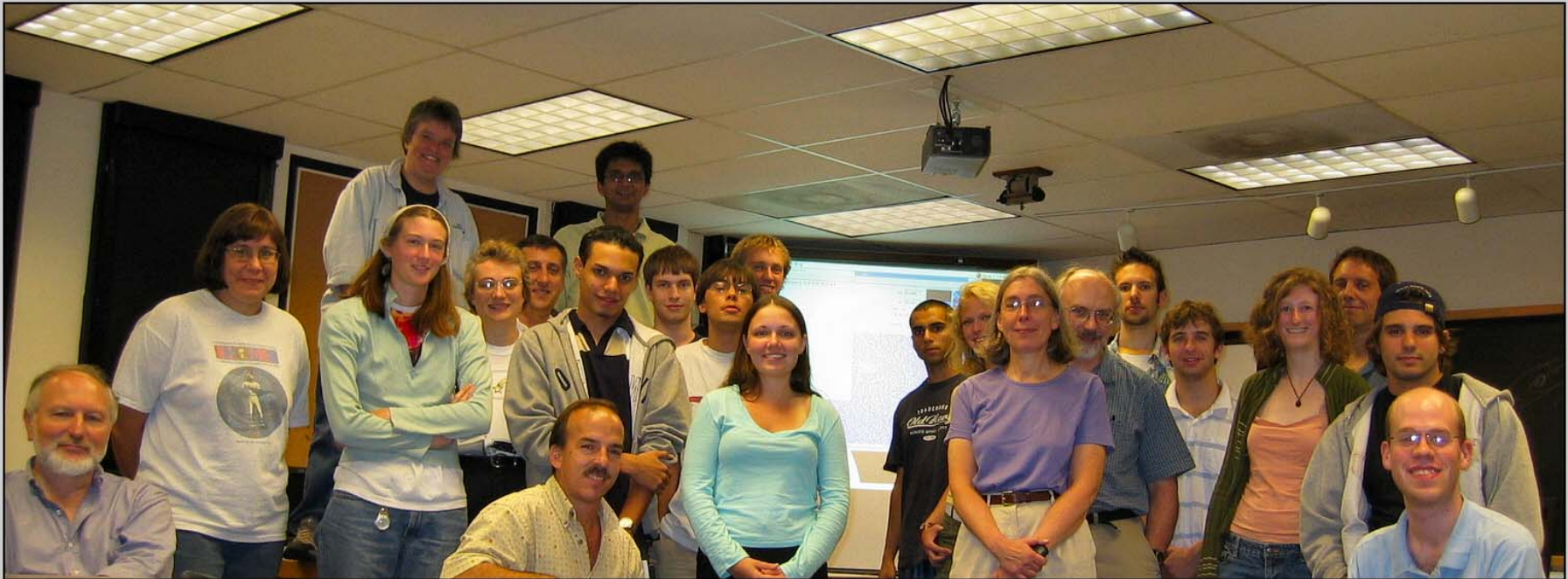
- An extragalactic HI line survey covering 7000 sq deg
- 1345-1435 MHz (-2000 to + 17500 km/s) with 5 km/s res
- 2-pass, drift mode (total integration time per beam ~ 40 sec)
- 1.5-2 mJy rms
- 4000 hrs of telescope time, 5-6 years
- started Feb 2005

<http://egg.astro.cornell.edu/alfalfa>

and Giovanelli et al. 2005a AJ 130,2598 and astro-ph



ALFALFA

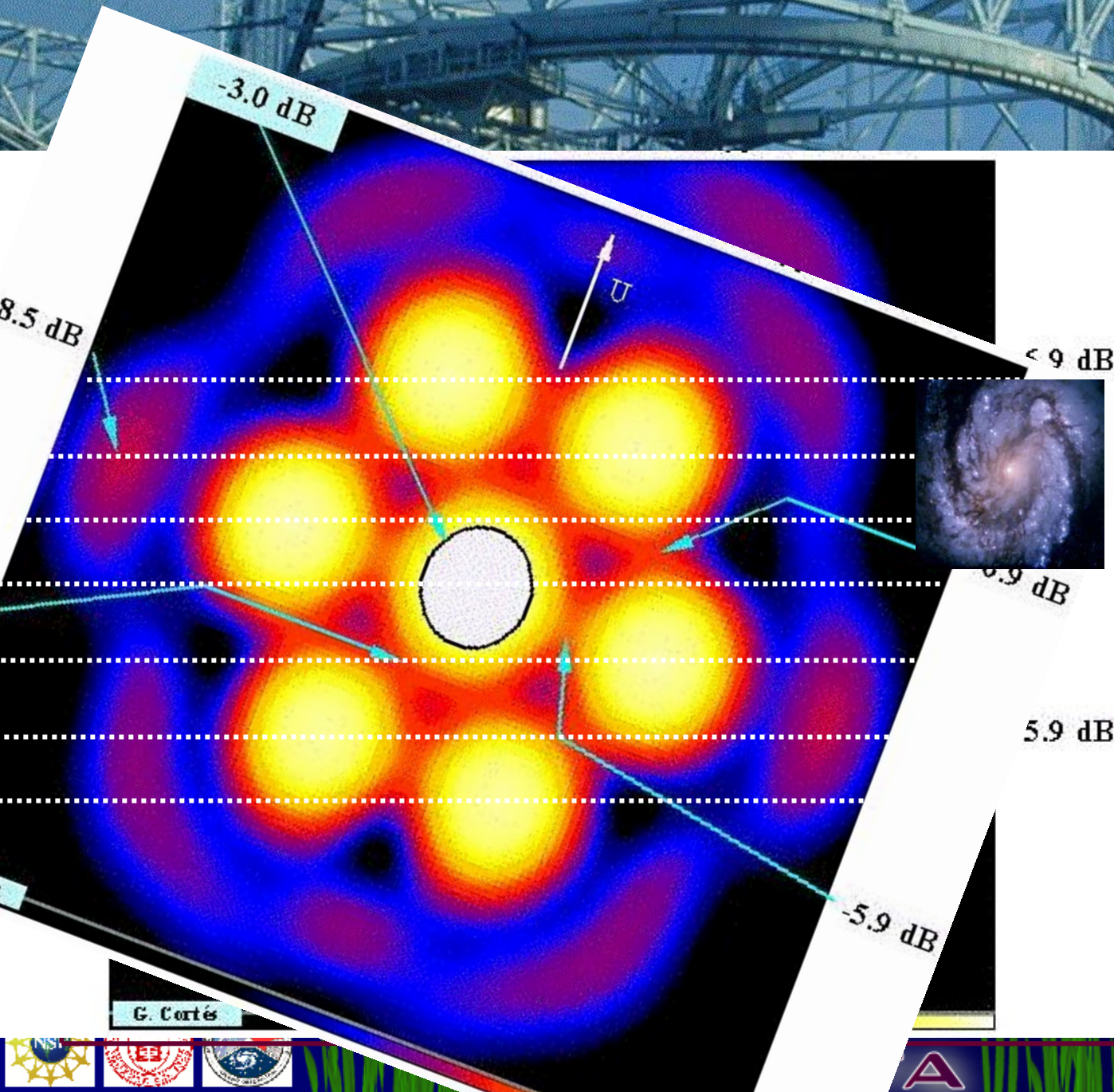
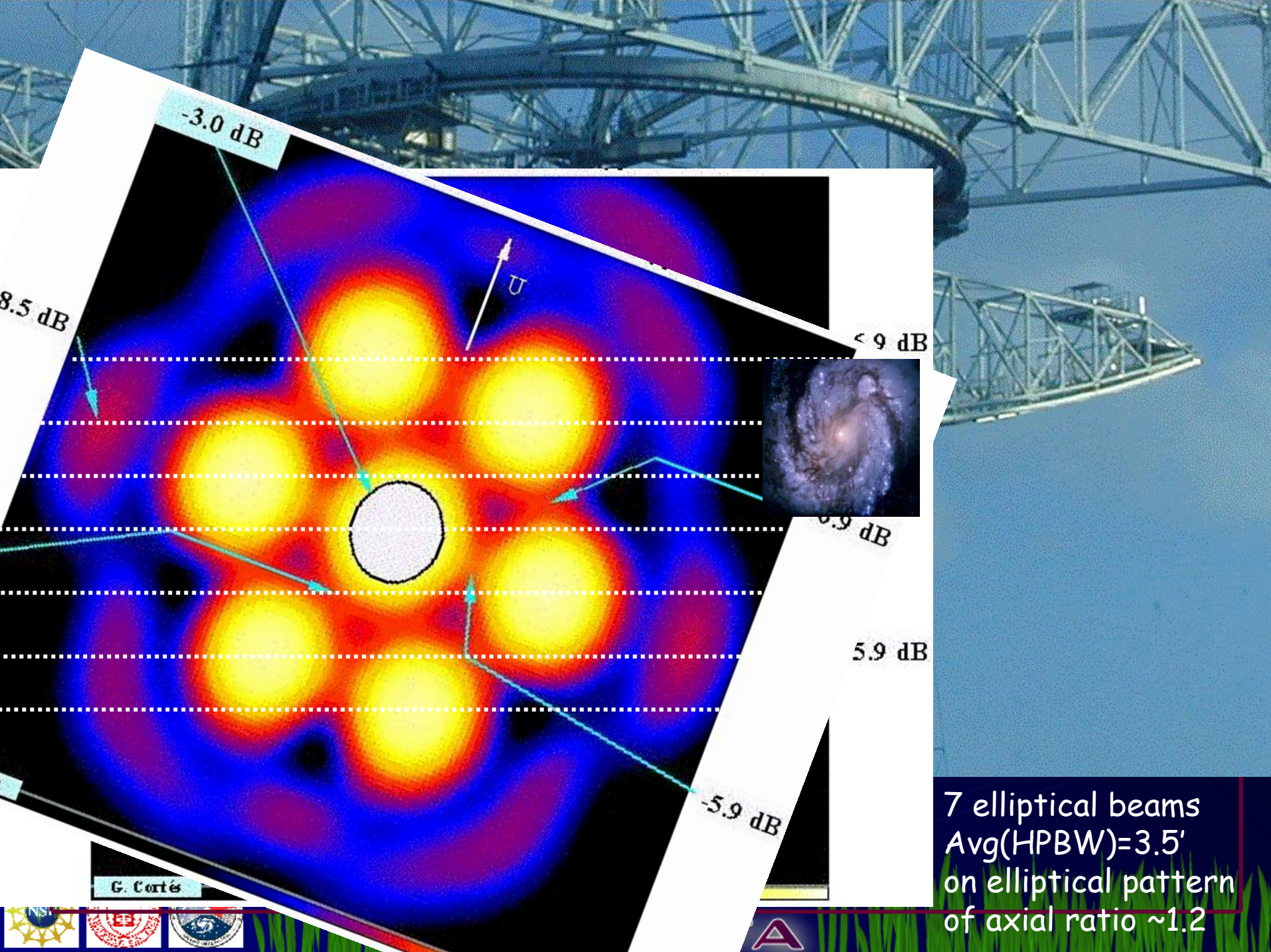


First ALFALFA Undergraduate Workshop  
Schenectady, New York  
July 2005

See poster by Koopmann et al.



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7 elliptical beams  
Avg(HPBW)=3.5'  
on elliptical pattern  
of axial ratio ~1.2

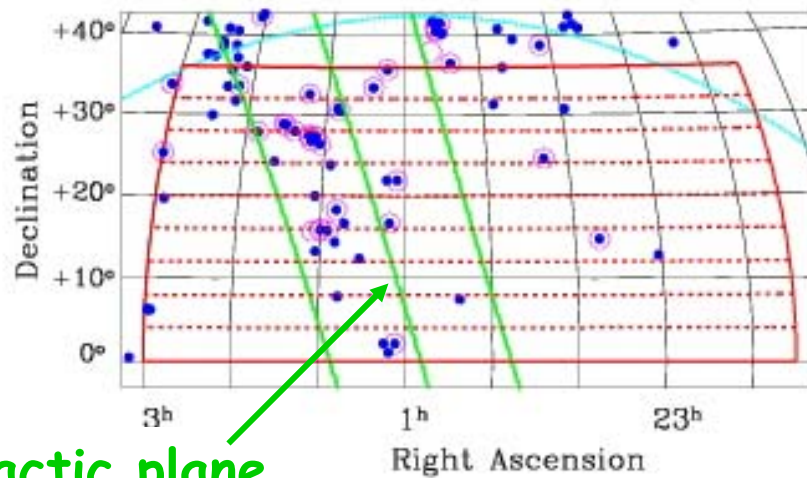
G. Cortés



# ALFALFA Survey

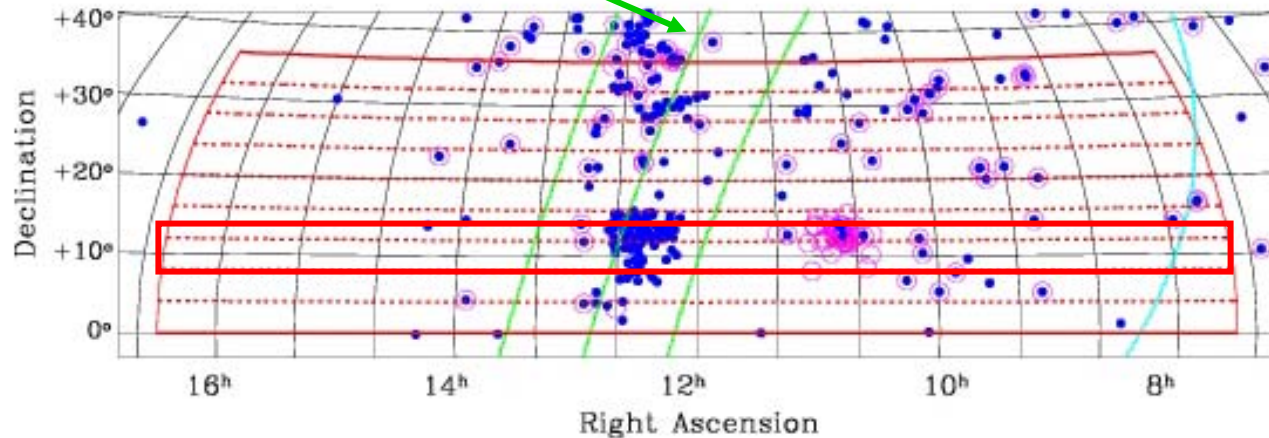


High galactic latitude sky visible from AO



- Commensal with TOGS HI
- Does not compete with galactic plane surveys

Supergalactic plane



# Comparison of blind HI surveys

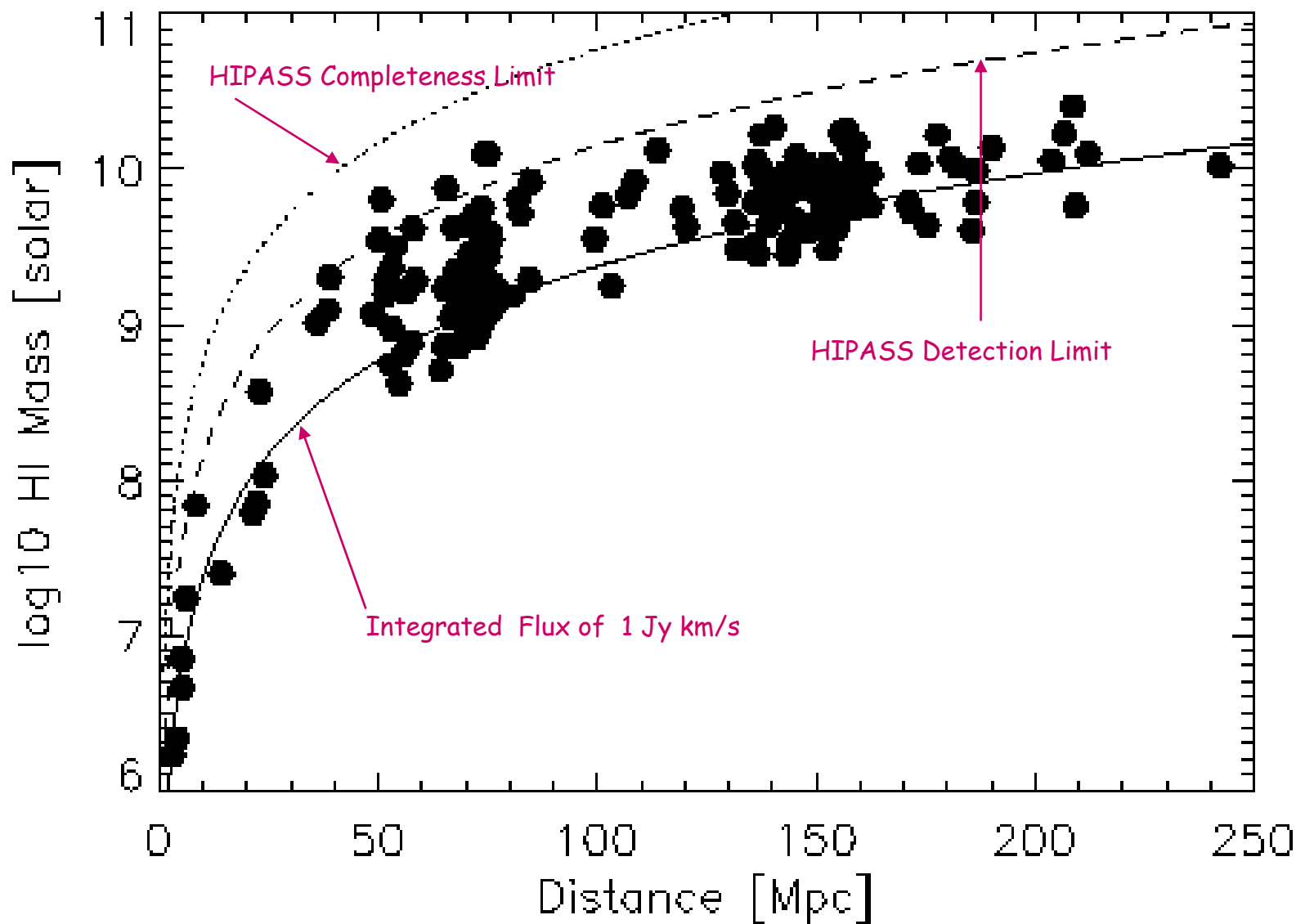


Survey	Beam arcmin	Area sq. deg.	rms (mJy @ 18 km/s)	min $M_{\text{HI}}$ @ 10 Mpc	$N_{\text{det}}$	$t_s$ sec	$N_{\text{los}}$
AHISS	3.3	13	0.7	$2.0 \times 10^6$	65	var	17,000
ADBS	3.3	430	3.3	$9.6 \times 10^6$	265	12	500,000
HIPASS	15.	30,000	13	$3.6 \times 10^7$	4315	460	$1.9 \times 10^6$
HIJASS	12.	(TBD)	13	$3.6 \times 10^7$	(?)	3500	(TBD)
J-Virgo	12	32	4	$1.1 \times 10^7$	31	3500	3200
HIDEEP	15	32	3.2	$8.8 \times 10^6$	129	9000	2000
ALFALFA	3.5	7,000	1.7	$4.4 \times 10^6$	20,000?	40	$7 \times 10^6$

ALFALFA is ~ 1 order of magnitude better than HIPASS in both sensitivity and areal resolution.



# ALFALFA Precursor Run





a1946 Detections: Query Results - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

[←](#) [→](#) [↻](#) [✖](#) [🏠](#) [📄](#) http://egg.astro.cornell.edu/precursor/detectionsresults.php?sourcen [Go](#) [🔍](#) city + relation + dwarf

User Record Viewer

**A1946: ALFALFA Precursor**

[Query](#) | [View catalog](#) | [SQL Table Schema](#) | [VO Table](#) | [Velocity Distribution](#) | [ALFALFA](#)  
 Galleries: [Optical](#) | 2MASS: [J](#) | [H](#) | [K](#)

**a1946 Detections: Query Results**

*Number of entries returned: 8*

Sourcename	R.A.(J2000)	Dec.(J2000)	$\epsilon_\alpha$	$\epsilon_\delta$	$\epsilon_z$	err stat	err sys	W	$\epsilon_w$	rms	Flux	$\epsilon_f$	Map Flux	LBW	Notes
	hh mm ss.s	dd mm ss	sec	"	km/s	km/s	km/s	km/s	km/s	mJy	Jy km/s	Jy km/s	Jy km/s		
<a href="#">HI014105.8+272007</a>	01 41 05.8	+27 20 07	1.3	18	280	2	0	27	4	2.03	0.64	0.06	0.00	L	*
<a href="#">HI014214.9+262202</a>	01 42 14.9	+26 22 02	1.7	23	364	1	0	21	1	1.82	1.06	0.08	0.00		*
<a href="#">HI014441.4+271707</a>	01 44 41.4	+27 17 07	0.7	10	430	2	0	38	2	1.82	2.02	0.15	2.89		*
<a href="#">HI014640.9+264754</a>	01 46 40.9	+26 47 54	2.3	31	370	2	0	21	3	2.09	0.68	0.06	0.00		*
<a href="#">HI014729.9+271958</a>	01 47 29.9	+27 19 58	0.0	0	351	2	0	117	3	1.88	54.39	3.81	0.00		*
<a href="#">HI014753.9+272555</a>	01 47 53.9	+27 25 55	0.0	0	436	2	0	175	3	1.77	69.25	4.85	0.00		*
<a href="#">HI015519.2+275645</a>	01 55 19.2	+27 56 45	1.0	13	219	1	0	21	2	2.11	0.79	0.07	0.00		*
<a href="#">HI021404.3+275302</a>	02 14 04.3	+27 53 02	0.8	12	594	2	0	81	3	1.91	3.87	0.29	6.28	L	*



**ALFALFA**





## ALFALFA Posters

- Ayala et al. (179.21)
- Giovanelli et al. (179.22)
- Haynes et al. (179.23)
- Kent et al. (179.20)
- Koopmann et al. (179.24)
- Saintonge et al. (187.02)
- Spekkens et al. (179.25)
- Stierwalt et al. (187.03)

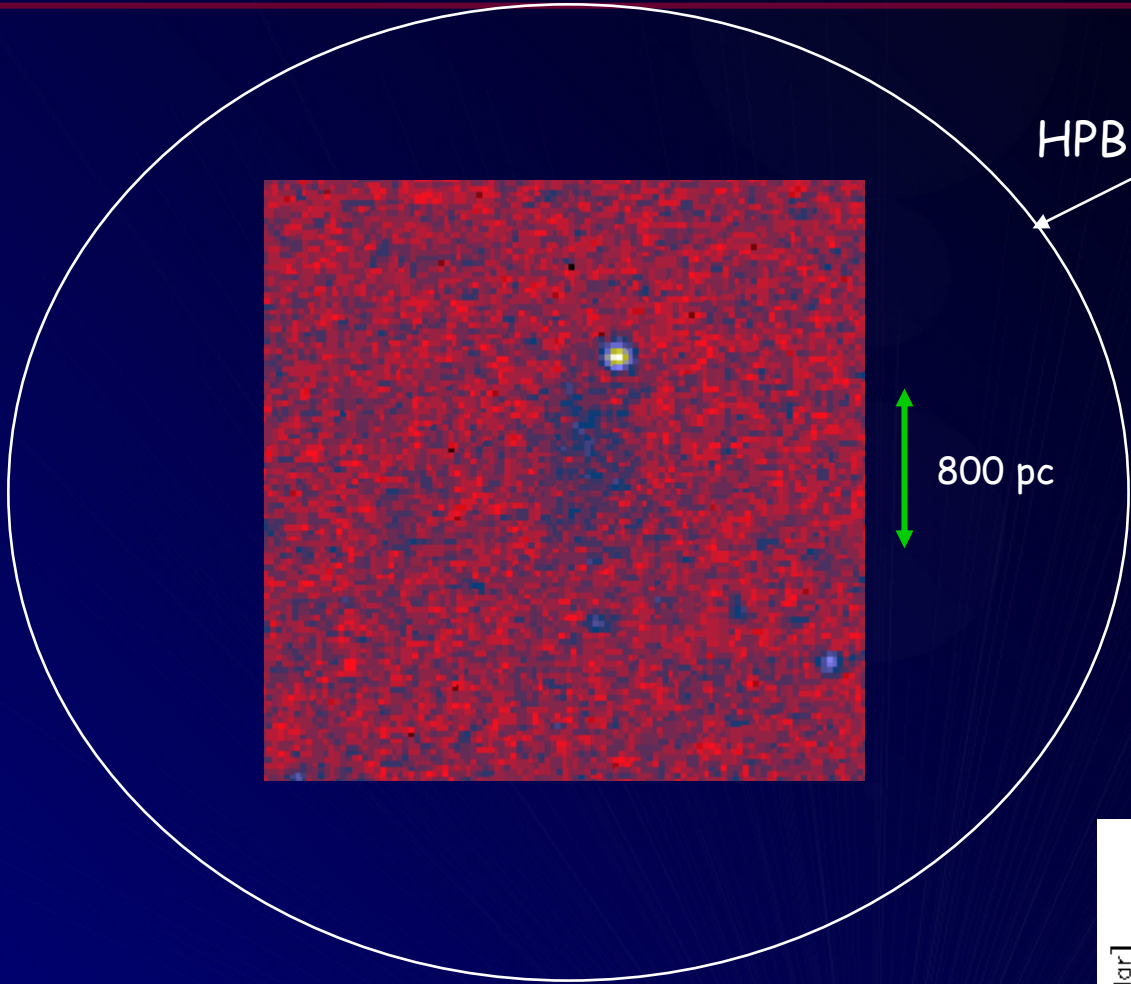




# A Few examples of ALFALFA Detections



**ALFALFA**



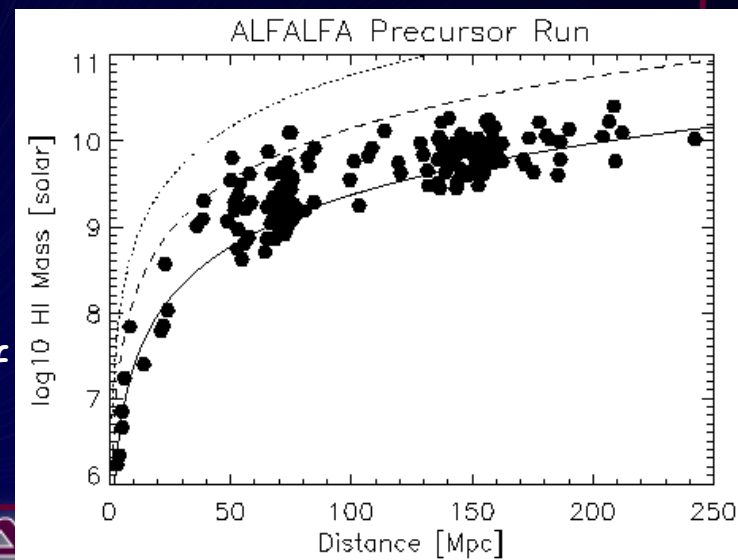
HPBW=3.8'x3.3'

800 pc

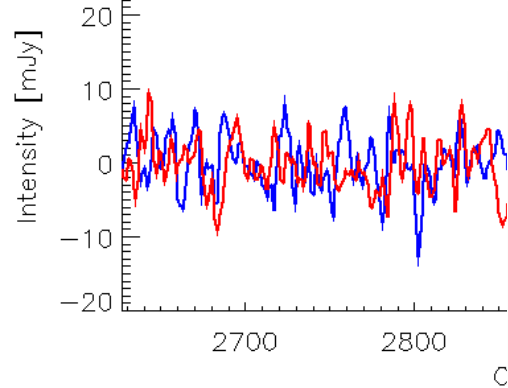
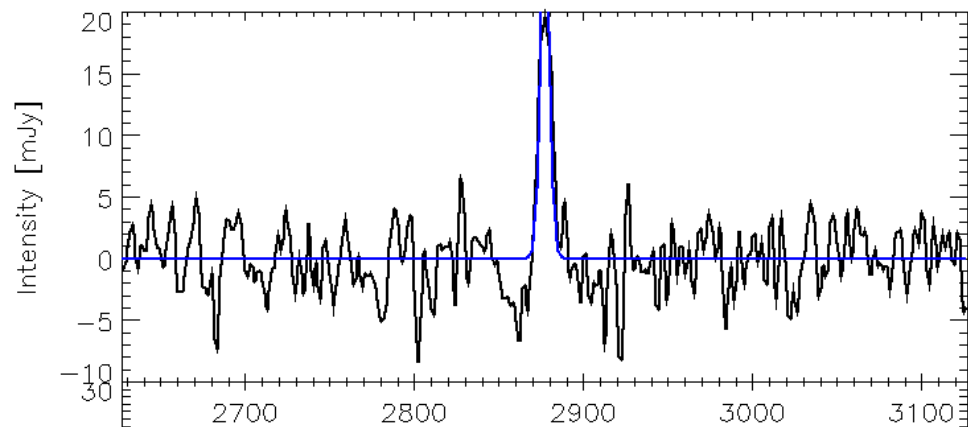
Distance ~ 8 Mpc

$M_{\text{HI}} = 2.8 \times 10^6 \text{ Msun}$

Giovanelli et al. (2005b, AJ 130,2614): results of

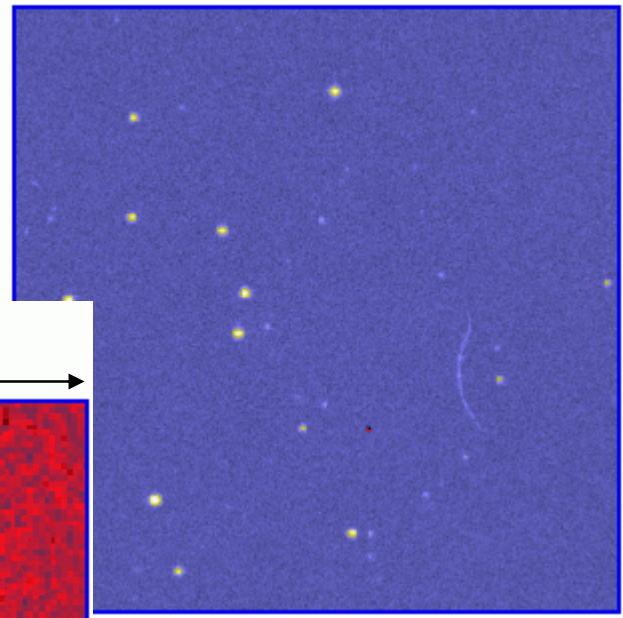


ALFALFA

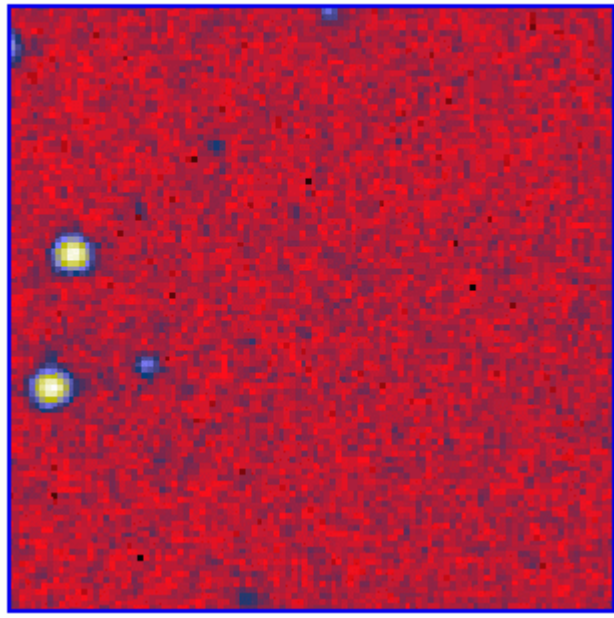


**DSS2 Blue**

← 6 arcmin →



← 2 arcmin →



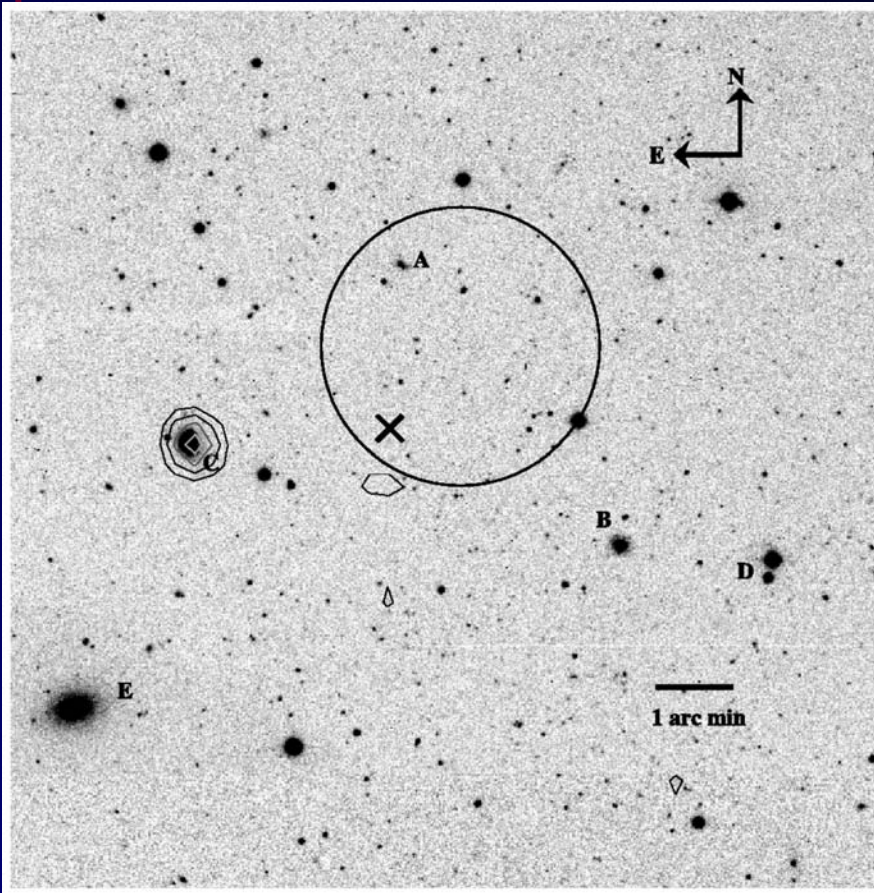
$cz=3264 \text{ km/s}$   
 $M_{\text{HI}} = 3.5 \times 10^8 \text{ Msun}$

See posters by  
Saintonge et al.  
Kent et al.  
Stierwalt et al.



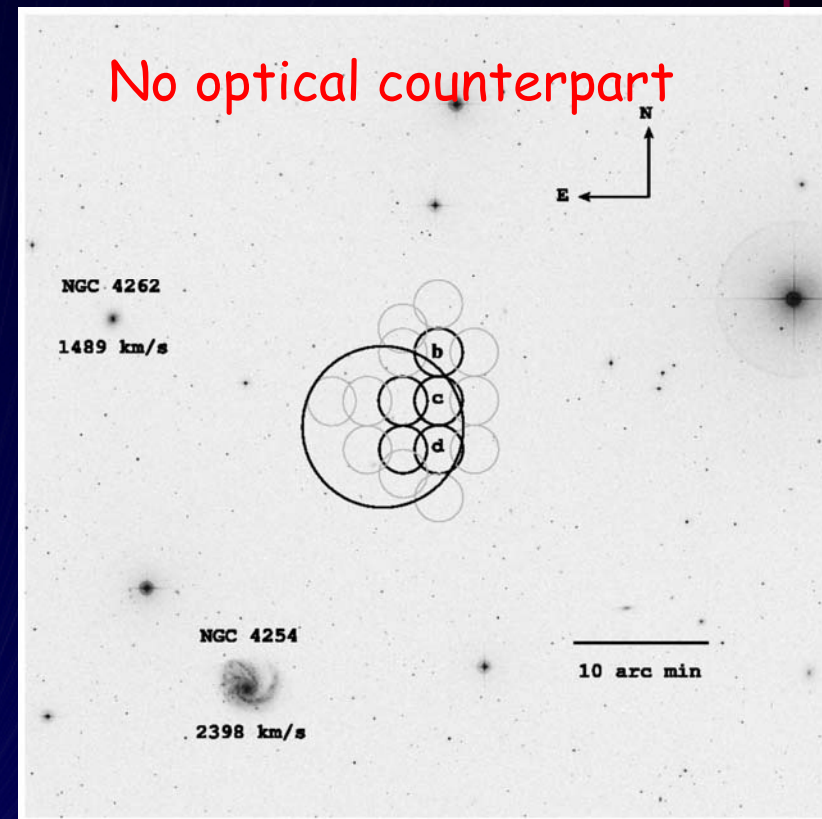
**ALFA**

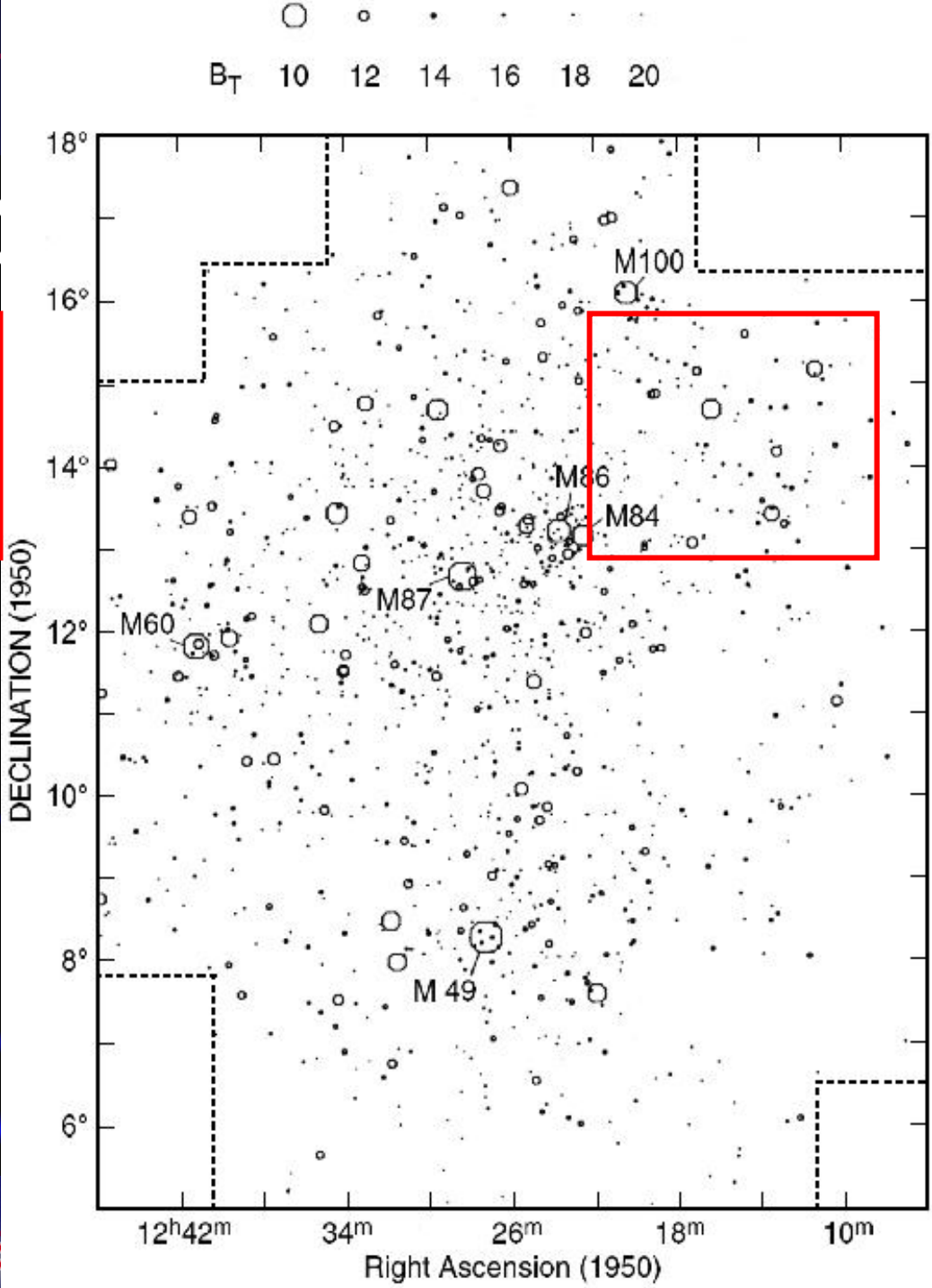
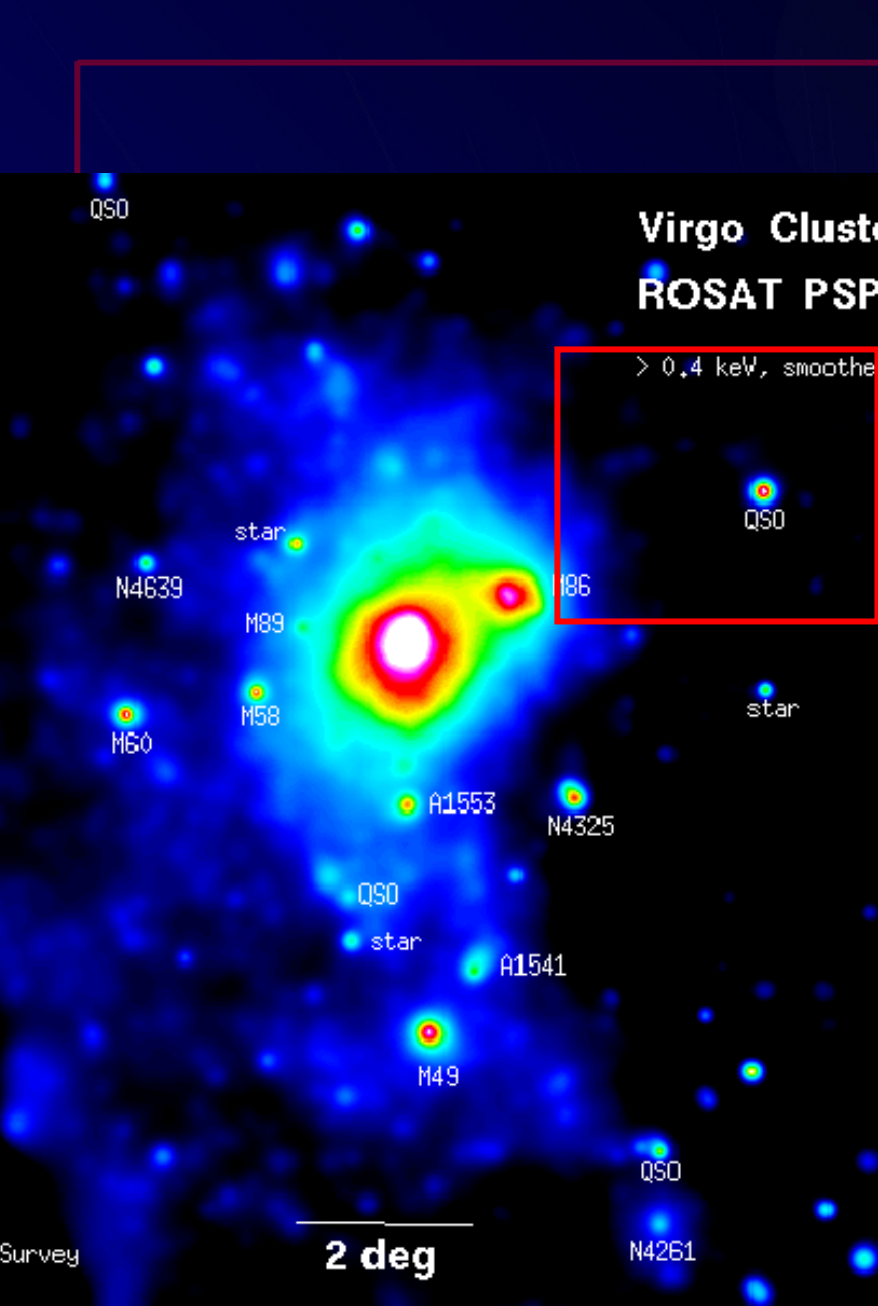
# An isolated "dark cloud" in Virgo?

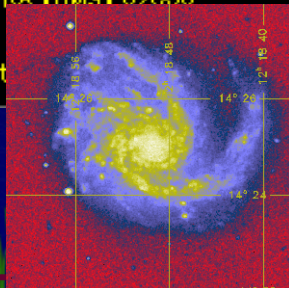
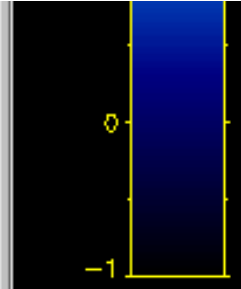
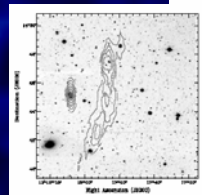
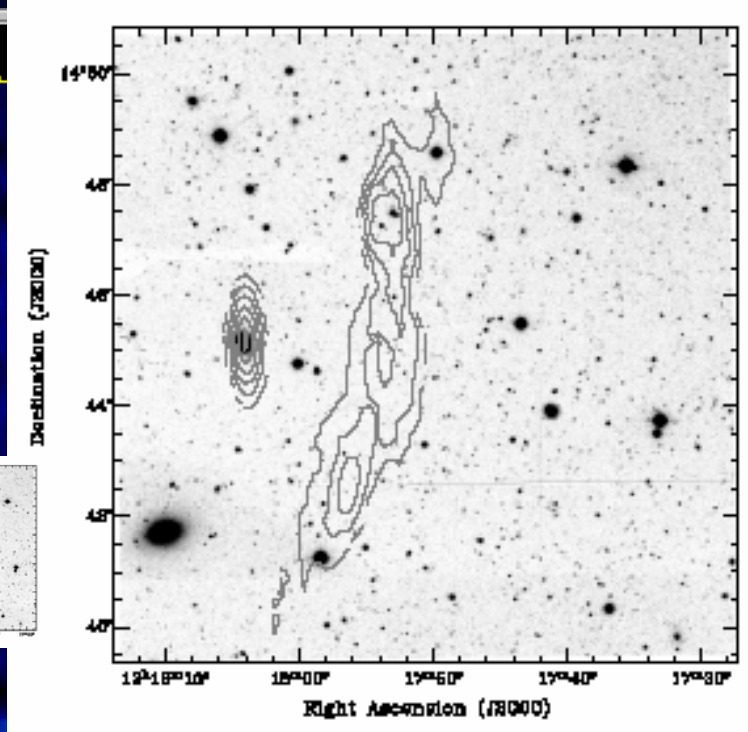
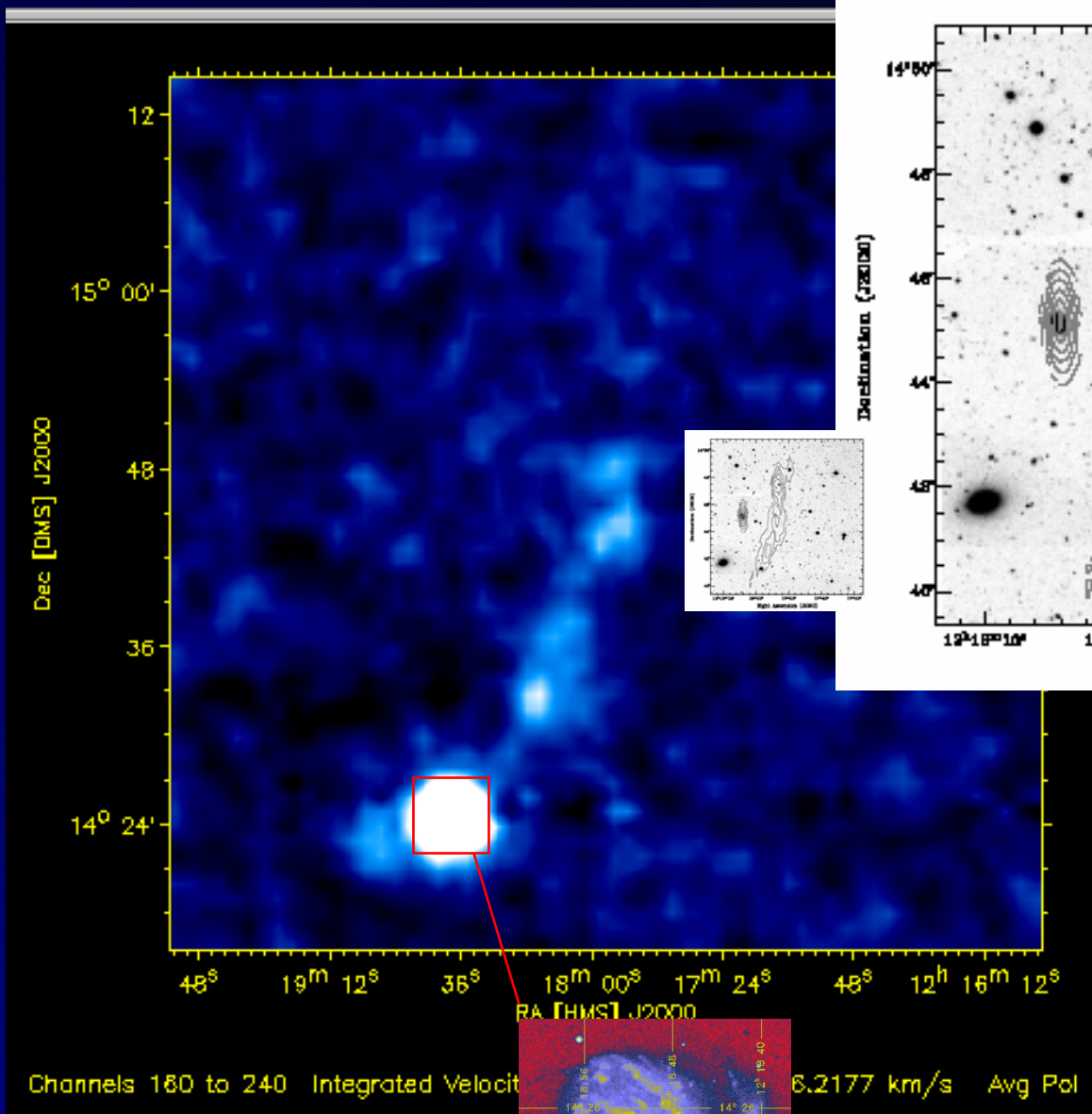


HI mass:  $2 \times 10^8 M_{\odot}$   
 $\Delta V = 220 \text{ km/s}$ ; extends  $> 16 \text{ kpc}$

Davies et al 2004  
Minchin et al 2005



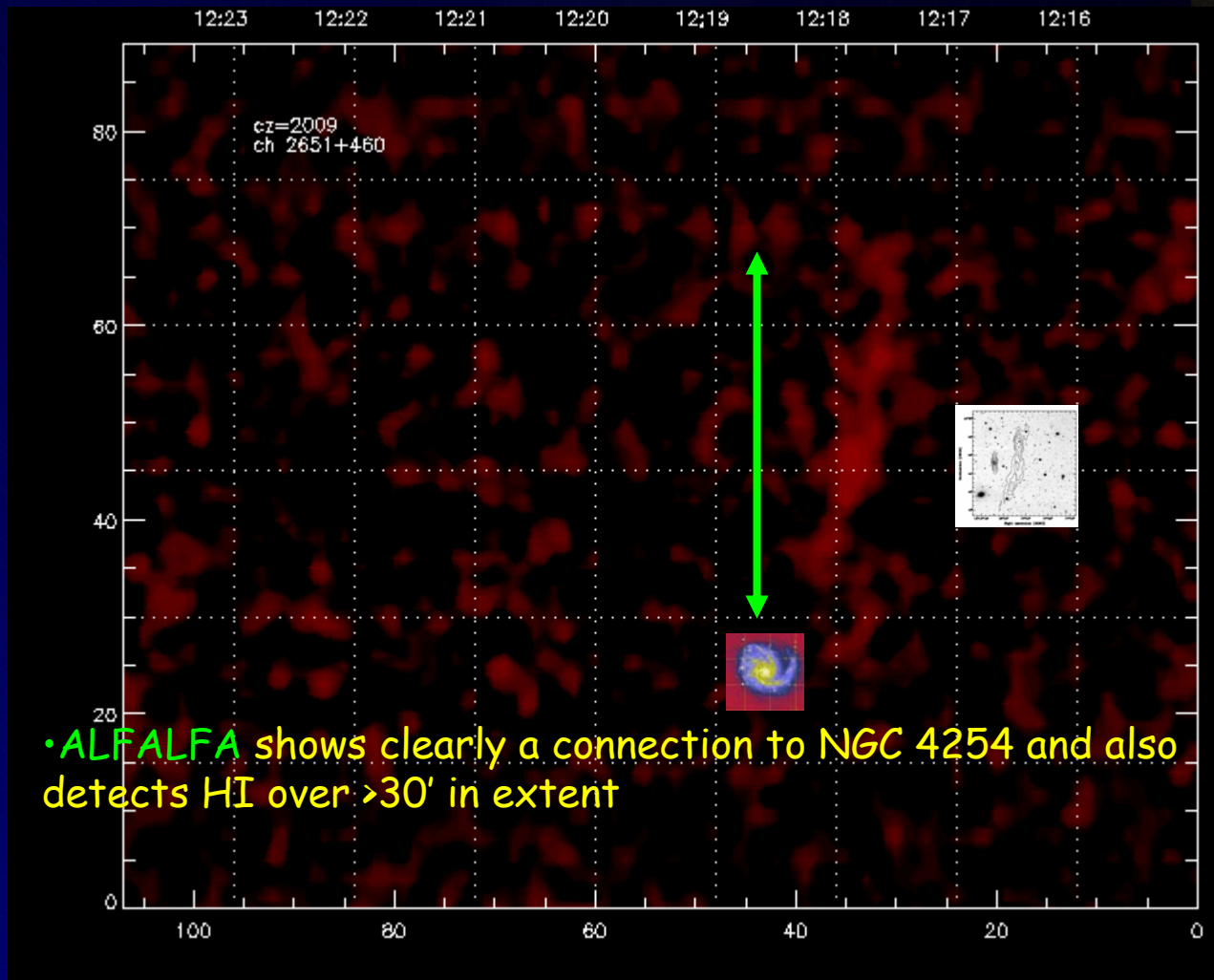




NGC4254/M99  
5.4x4.7 Sac 2407 km/s



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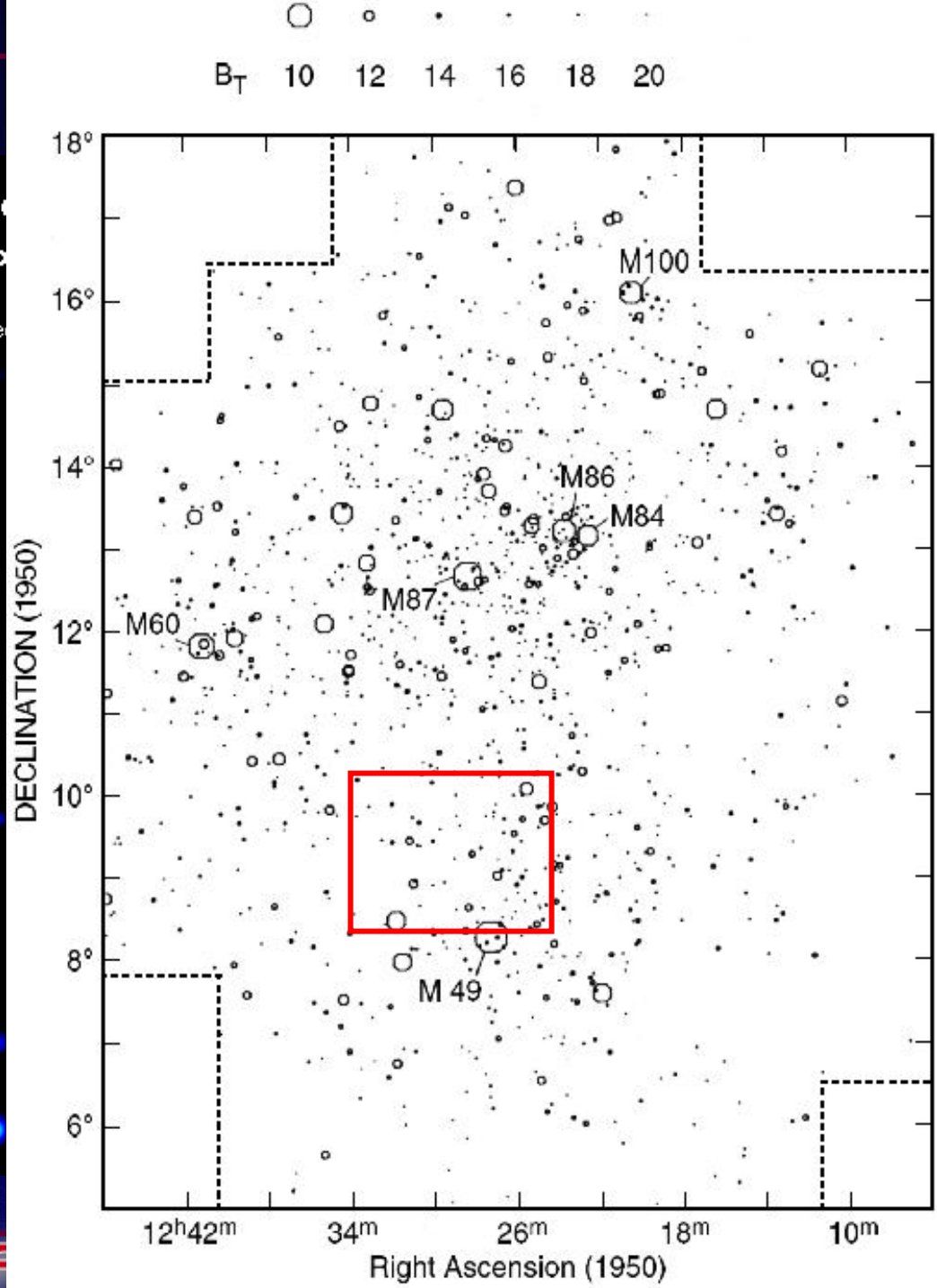
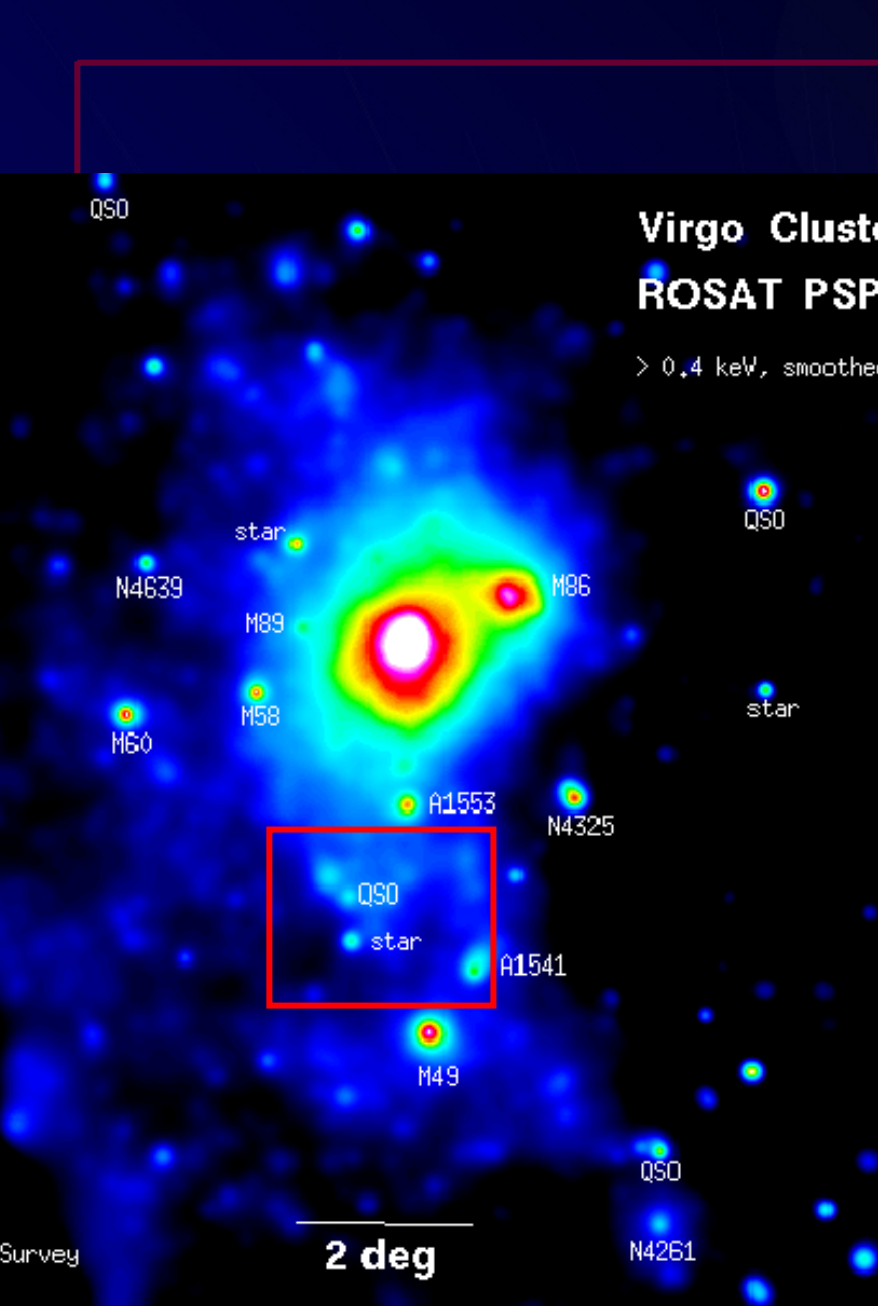


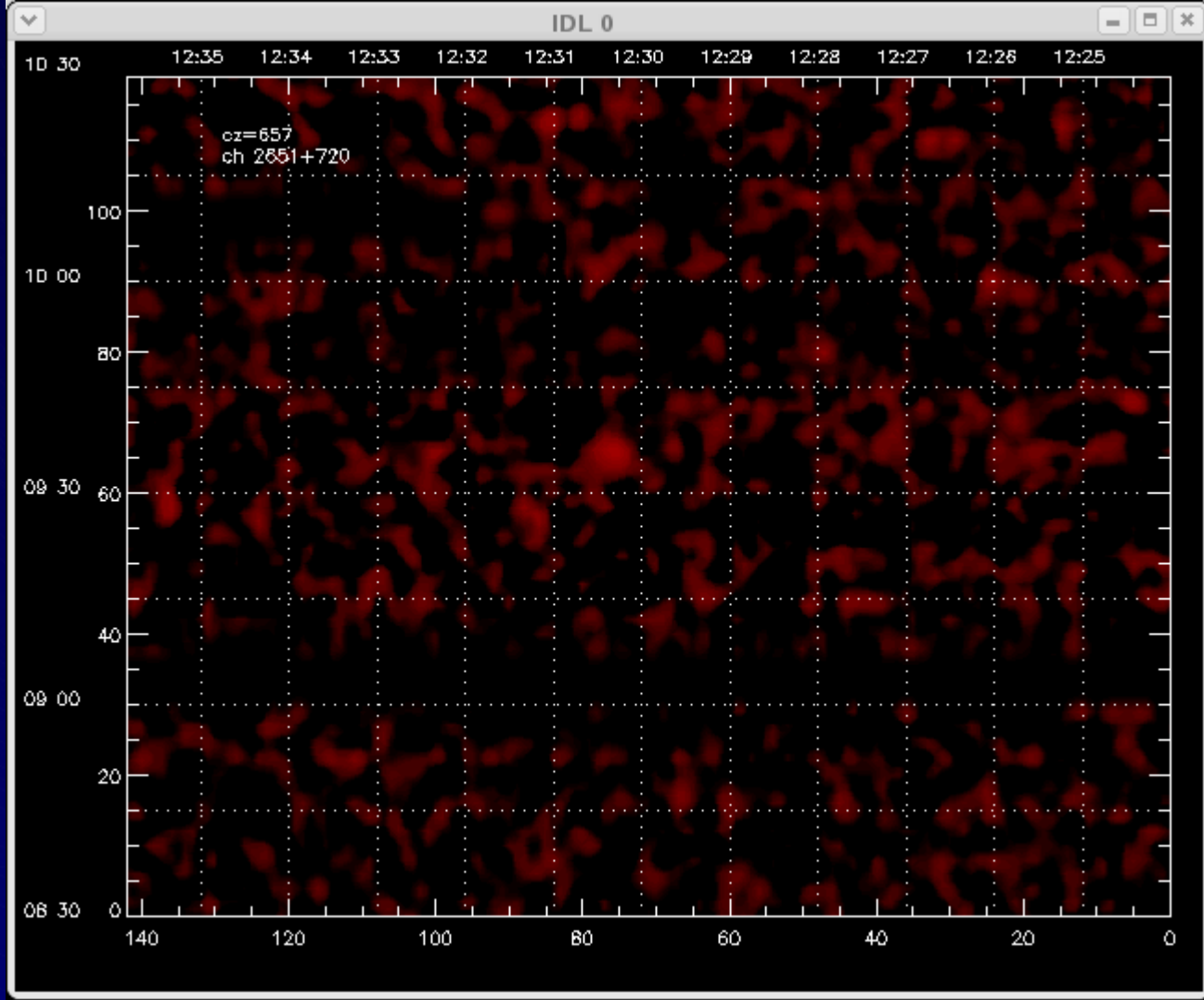
See poster by Haynes et al. for details



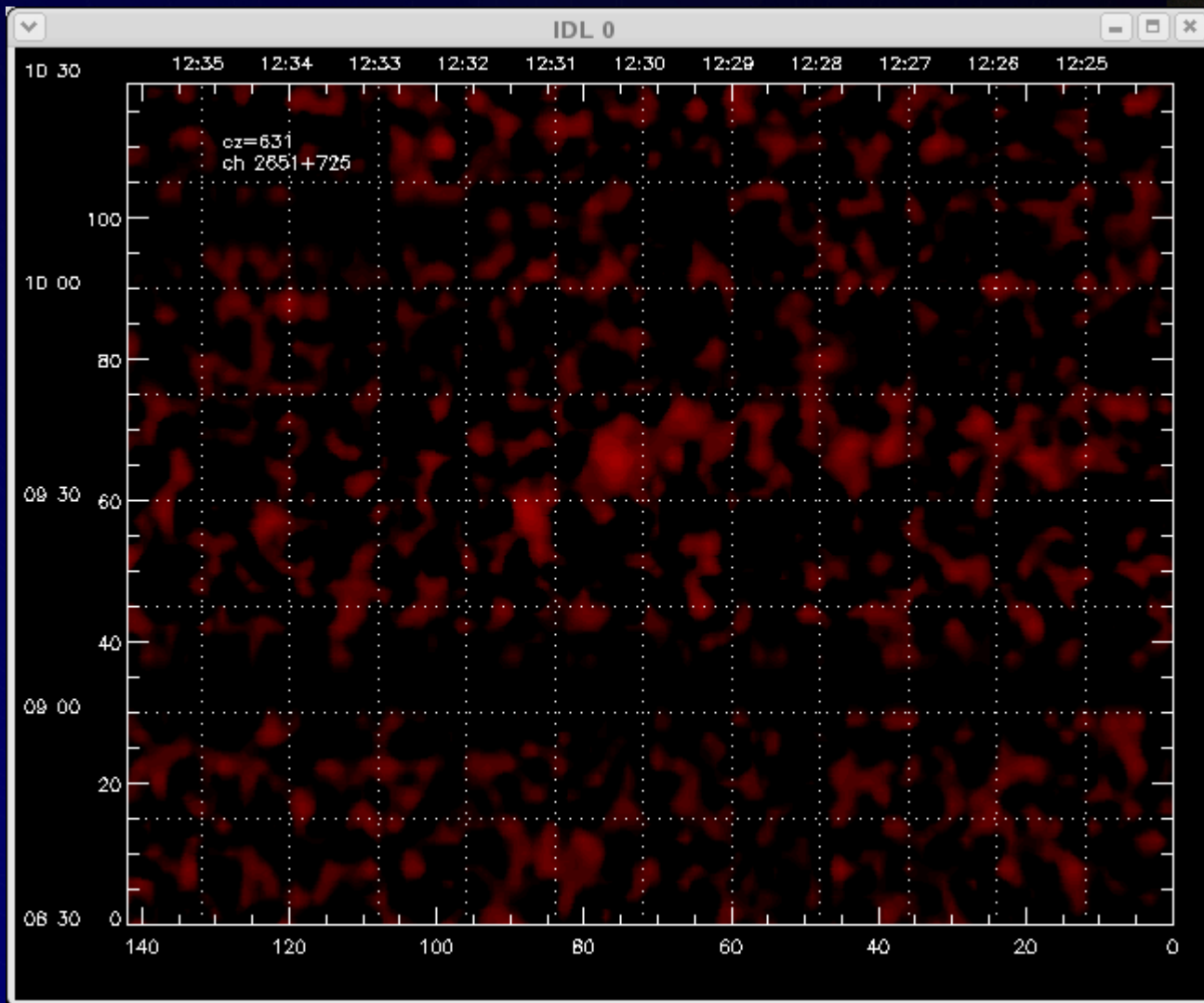
ALFALFA



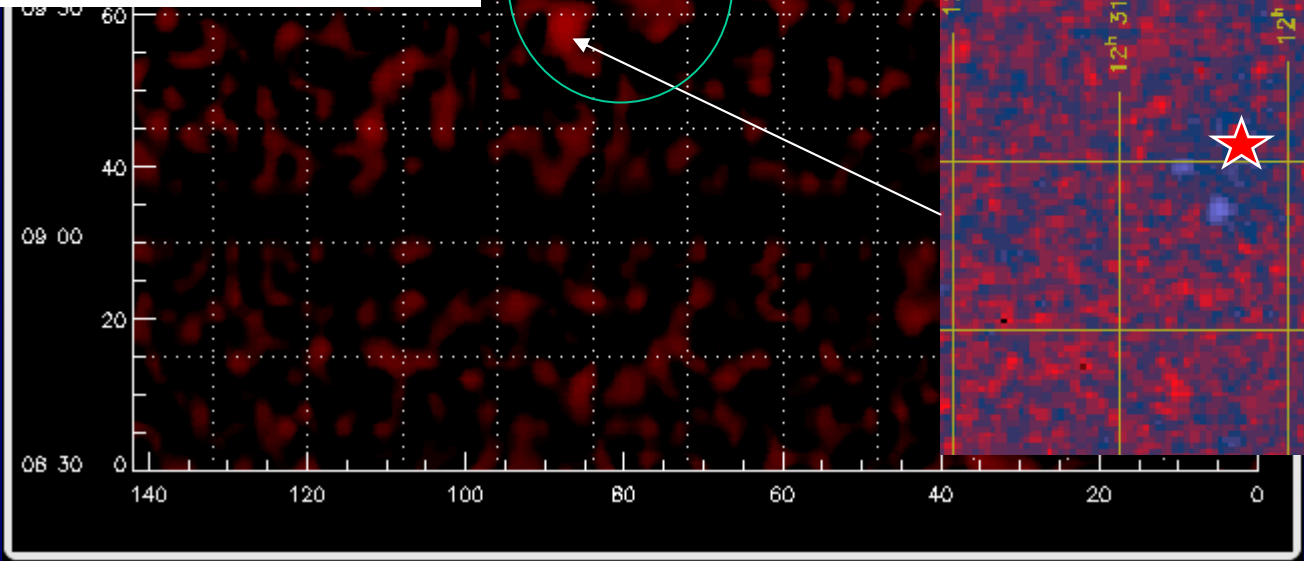
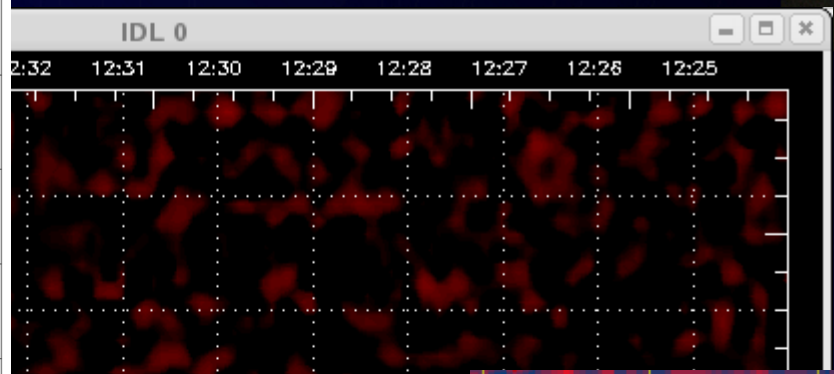
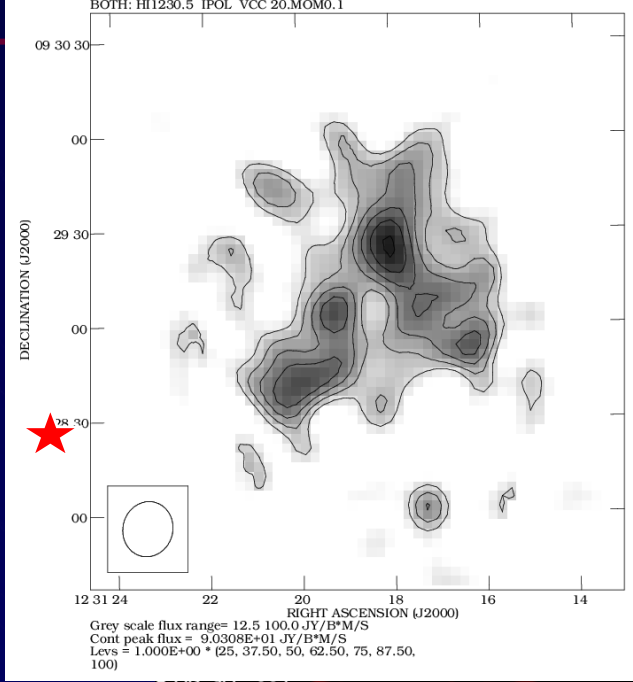




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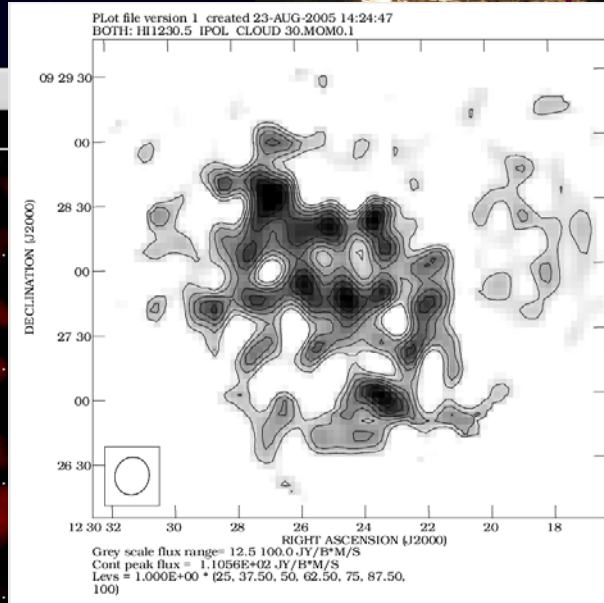
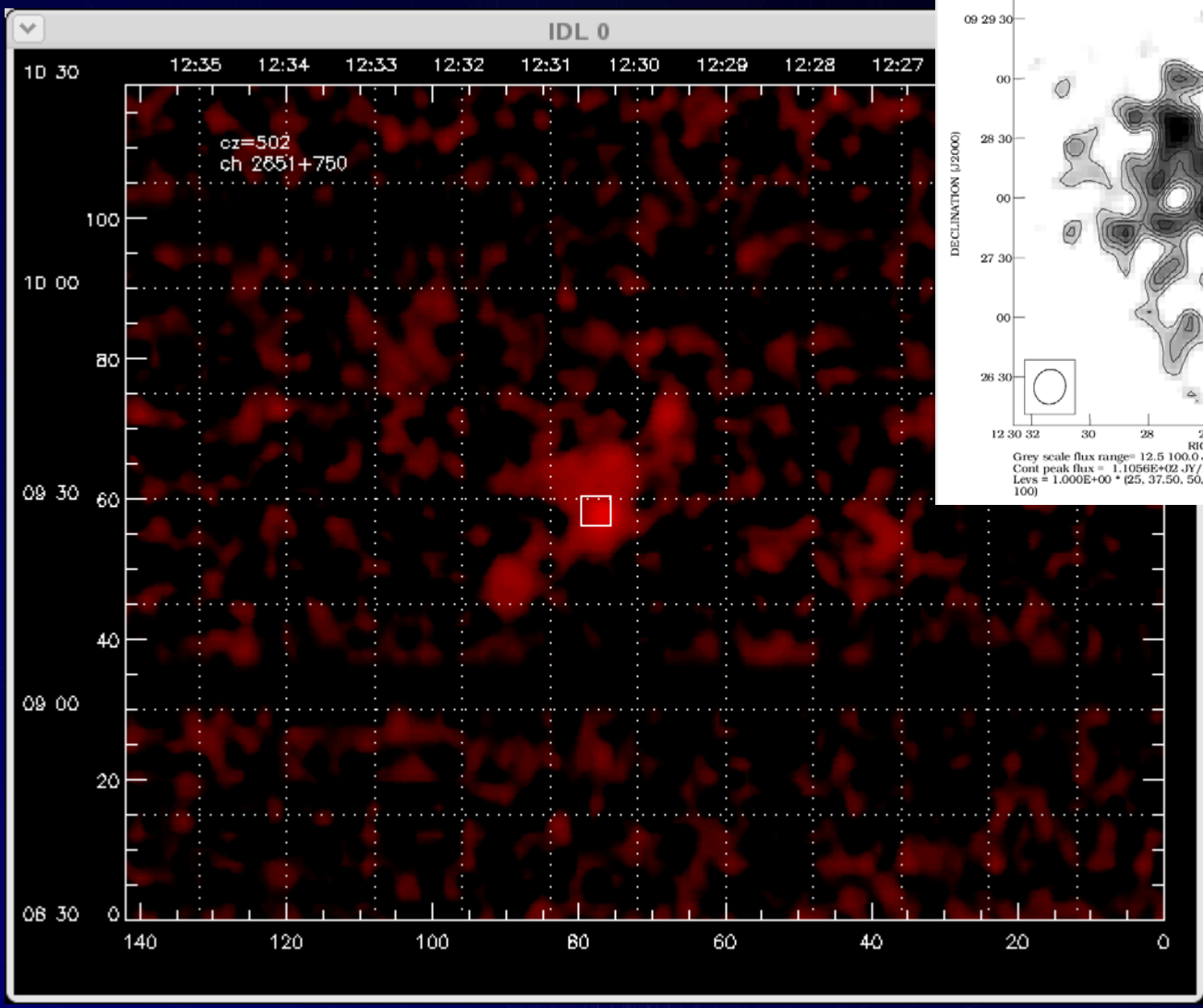


ALFALFA



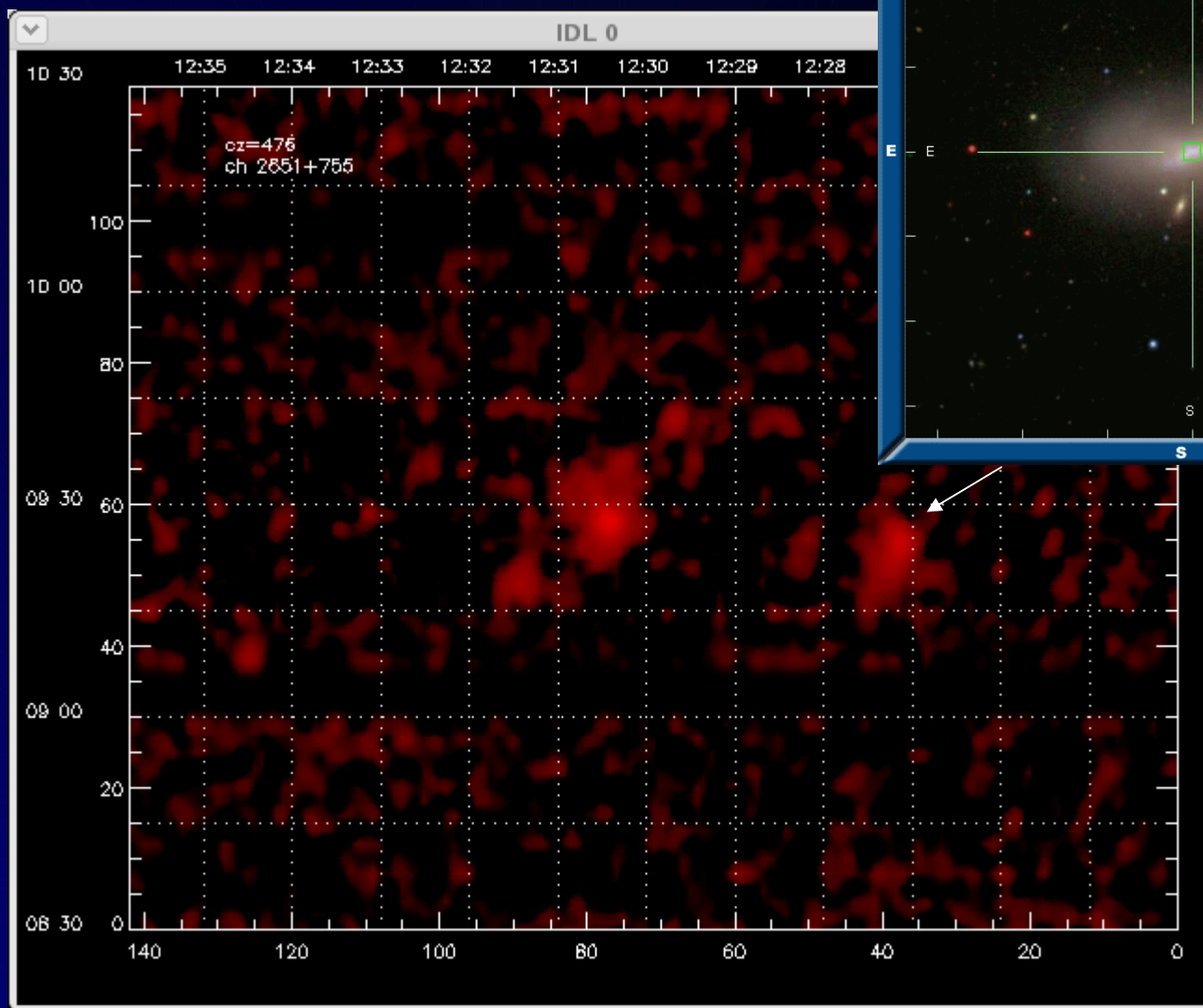
VCC1357  
0.2x0.1  
I?  
603 km/s





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See posters by Giovanelli et al. and Spekkens et al.  
for details



NGC4424  
3.6x1.8  
SBa:  
476 km/s



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# Virgo Clouds or MW HVCs?

Note: Additional slides shown in PPT



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