Arecibo Galaxy Environments Survey (AGES)

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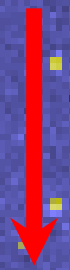
PRIFYSGOL CAERDYDD

Motivation is to search for low mass and/or low column density HI objects



- Baryonic mass density.
- HVCs and dwarf galaxies.
- Isolated HI clouds - dark galaxies.
- Tidal streams and other stripping mechanisms.
- Low column density extent of large galaxies.
- HI mass function – environmental dependence.
- Spatial distribution of HI galaxies.
- Dynamical masses.
- Compare with qso absorption line results.

The Plan (proposal Feb. 2005)

2000 hours requested over 4 years to look at 200 sq deg of sky split into 13 regions centered on nearby galaxies, groups and clusters, but also to 'image' the background volume.

	HIPASS	ALFALFA	AGES
Noise (mJy)	13	2	<1
Area (sq deg)	$2x10^4$	$1x10^4$	$2x10^2$

Mass limit ~ $4x10^4\ d^2_{MPC}\ M_\odot$

Column Density limit ~ $6x10^{18}\ cm^{-2}$

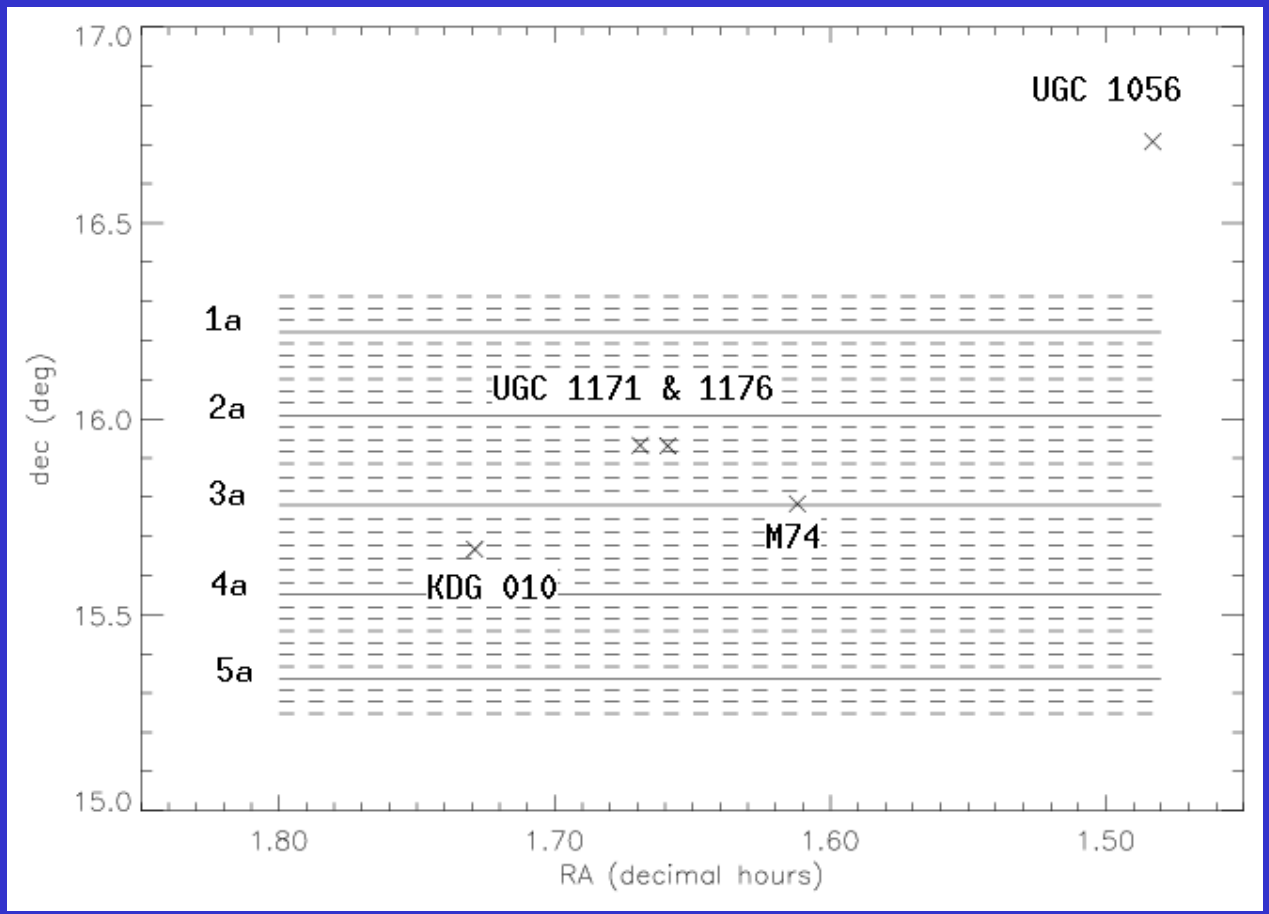
Observing Strategy

Multiple drift scans (20+) such that each beam samples each point on the sky. Nyquist sampled with observations either side of and at the meridian. We are trying to create a roughly gaussian beam at each point on the sky. We have 4x5 and 2x2.5 sq deg areas that we can hopefully match up with ALFALFA tiles.

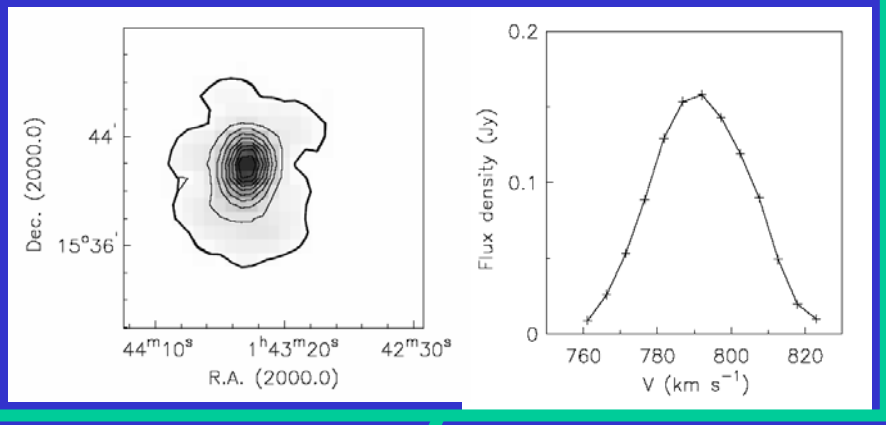
We are using modified versions of the HIPASS software (LIVEDATA and GRIDZILLA) to reduce the data. The result is a calibrated RA, Dec, velocity data cube.

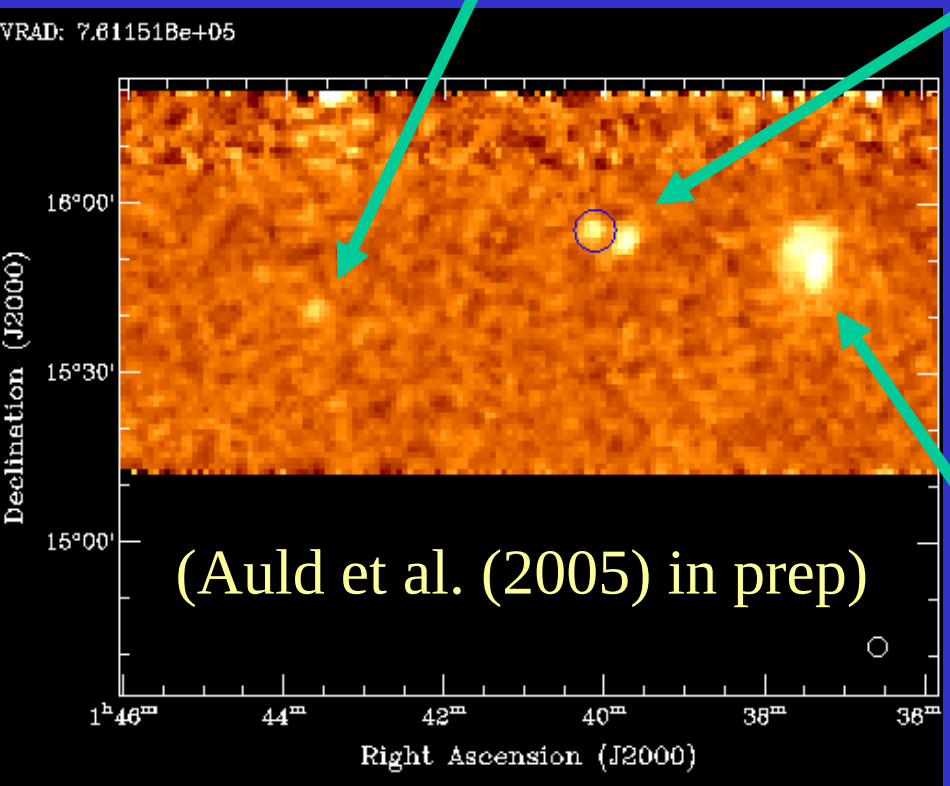
Drift Scan Strategy (precursor)

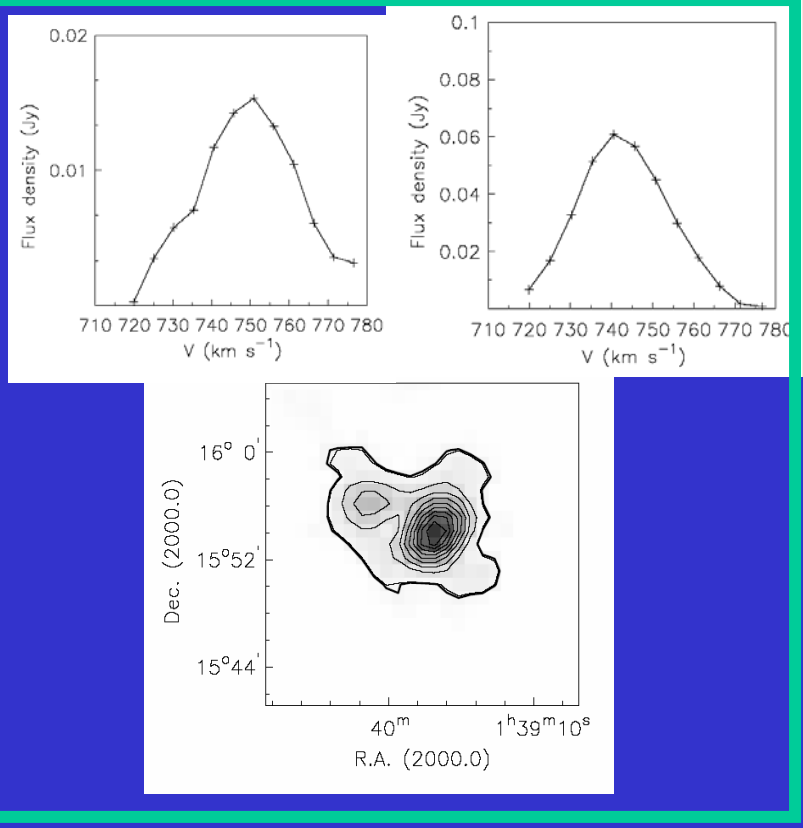
Sky coverage 1° (dec) x 5° (RA)

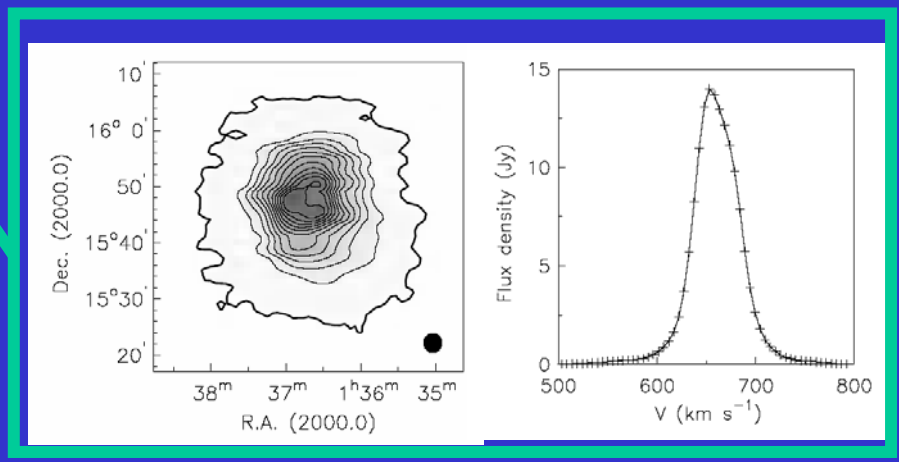


Preliminary Results

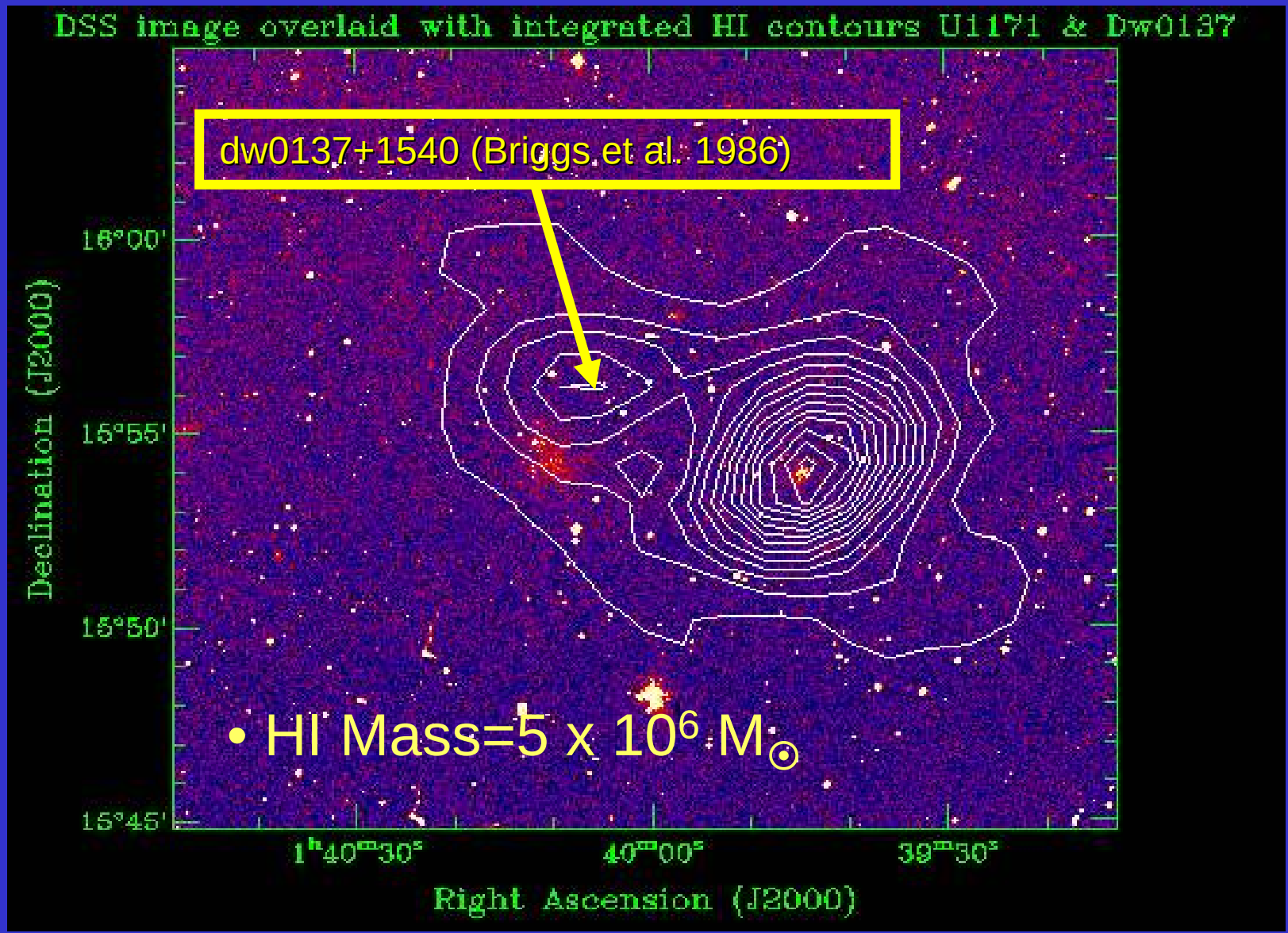




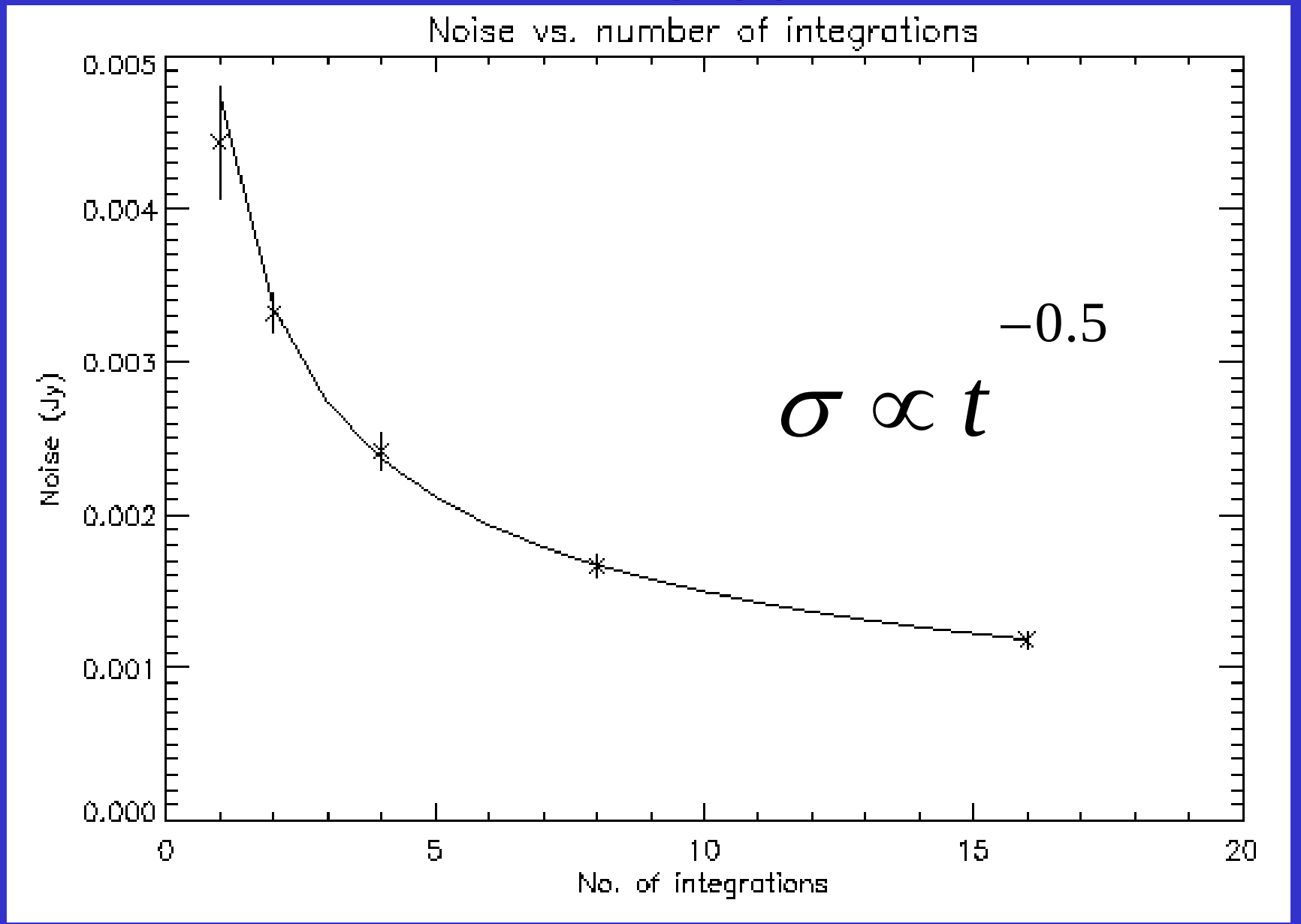


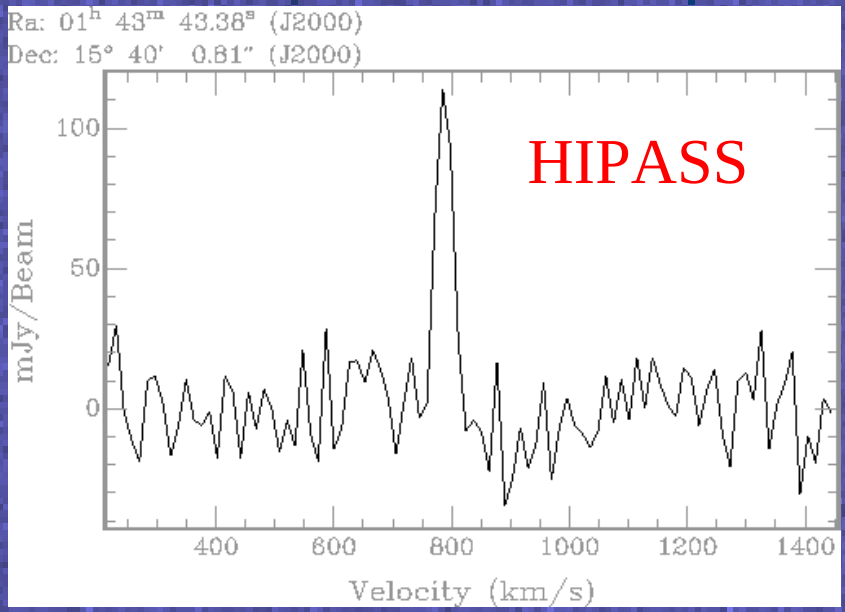


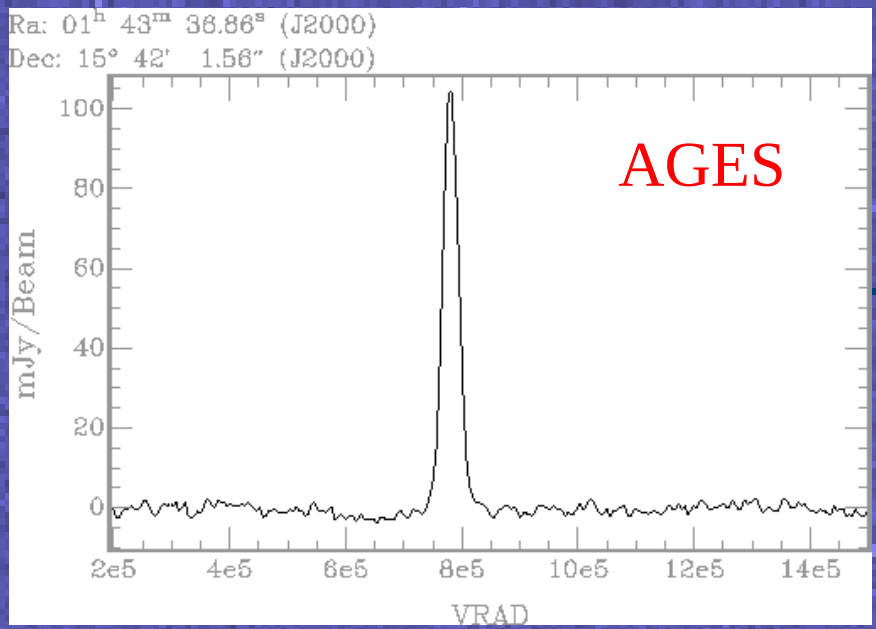
DSS: UGC1171, UGC1176 & Dark Companion



Noise


Noise vs. number of integrations
0.005
0.004
0.003
0.002
0.001
0.000
Noise (Jy)
0
5
10
15
20
No. of integrations
$\sigma \propto t^{-0.5}$


Ra: 01h 43m 43.38s (J2000)
Dec: 15° 40' 0.81" (J2000)
HIPASS
mJy/Beam
100
50
0
400
600
800
1000
1200
1400
Velocity (km/s)


Ra: 01h 43m 36.86s (J2000)
Dec: 15° 42' 1.56" (J2000)
AGES
mJy/Beam
100
80
60
40
20
0
2e5
4e5
6e5
8e5
10e5
12e5
14e5
VRAD

Technical Issues

1. Our calibration agrees well with HIPASS (10-20%).
2. Gain variations with zenith distance have to be implemented in LIVEDATA.
3. RFI rejection as far as we can see is good (median filtering to get bandpass and for gridding). Bandpass is very stable over the whole scan because telescope does not move. We find the well known lines (and the 'birdie')..
4. Pointing errors – test on known continuum sources puts them in the correct pixels (1 arc mim). Formally a 10+/-25 arc sec off-set in both RA and Dec (consistent with zero).

Technical Issues (cont.)

5. Our beam in the final cube is very close to circular (slight elongation in RA) – we do not envisage cleaning.
6. The noise is very close to gaussian.

We are really looking forward to starting.