

The Dark Galaxy J0613+52

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Serendipitous Discovery

- HI survey of low surface brightness galaxies
 - Goal: Determine gas and dynamical masses
 - Multi-telescope survey;
 - Many objects observed more than once

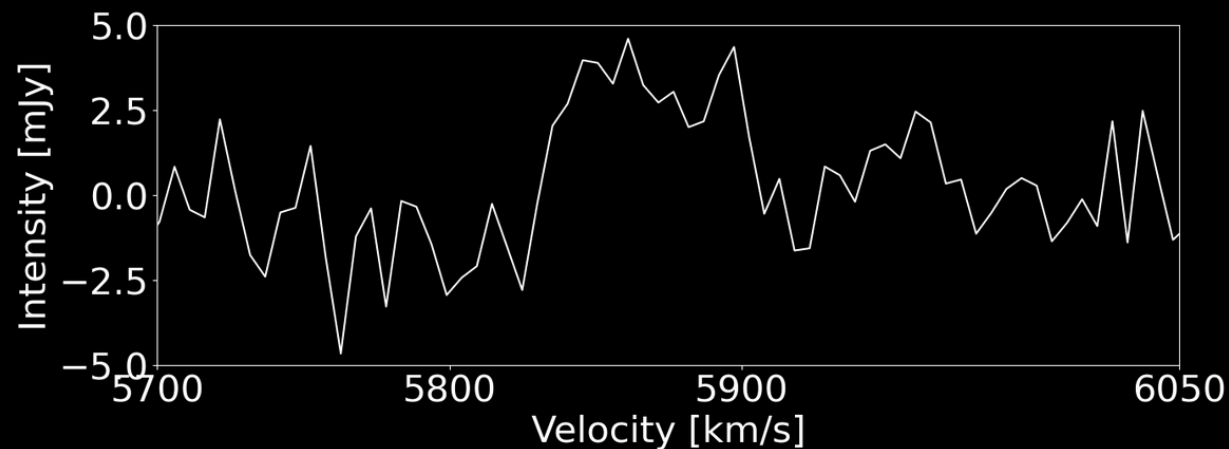


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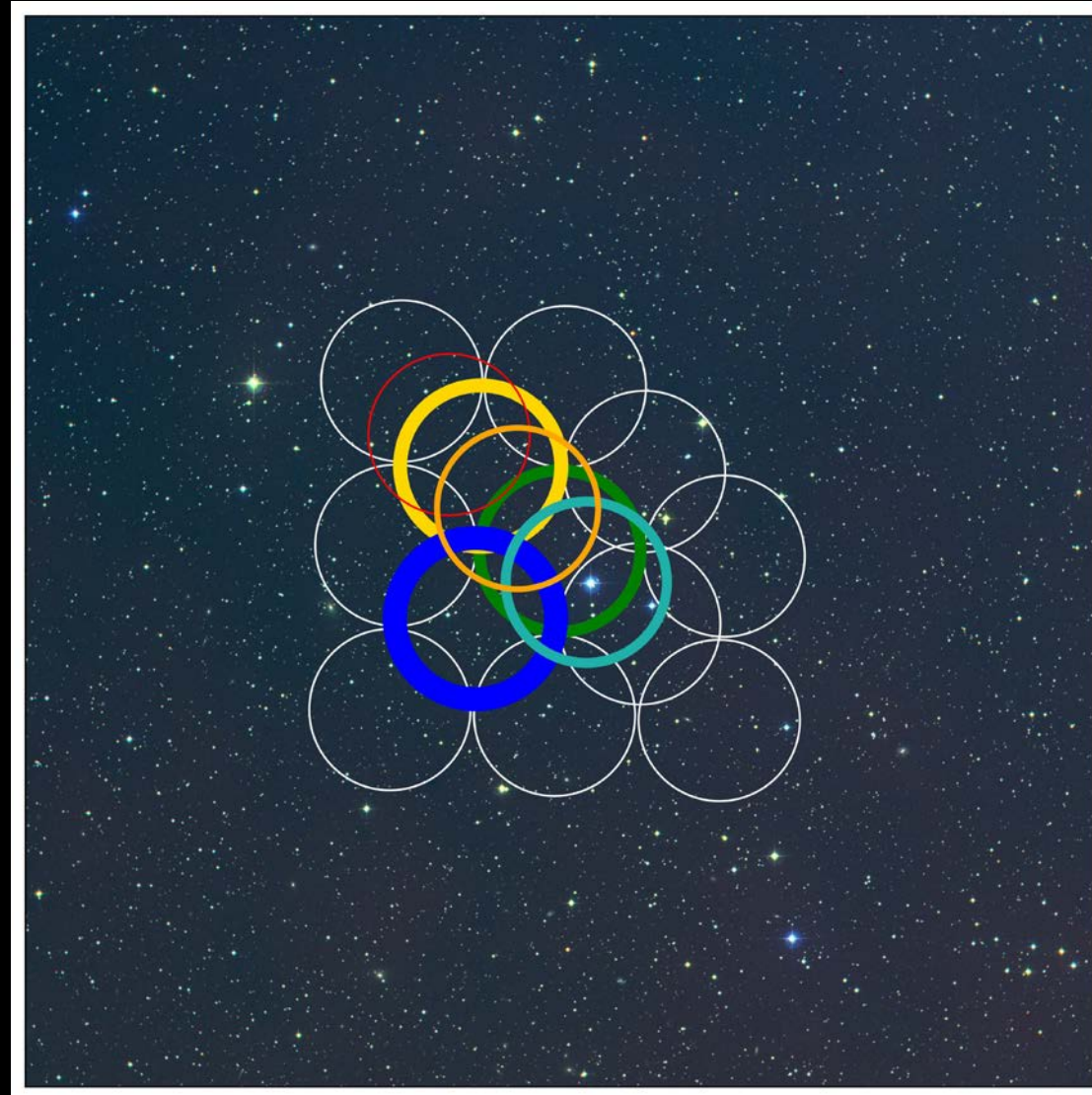
- Discrepancy between Nançay and GBT results
 - GBT catalog source declination mis-typed
- New source in previously unobserved part of sky
 - No known galaxy within 112 Mpc



What is it?



What is it? (And where?)



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Distance	M_{HI}	W_{20}
83.1 ± 0.4 Mpc	$1.69 \pm 0.15 \times 10^9 M_{\odot}$	$196 \pm 15 \text{ km s}^{-1}$

$\mu_g(0)$	L_g	M_{HI}/L_g
$> 25 \text{ mag arcsec}^{-2}$	$< 4.3 \times 10^8 L_{\odot} (?)$	$> 4 M_{\odot}/L_{\odot}$

Assumes:

- $H_0 = 70 \text{ km/s/Mpc}$
- $D_{\text{gal}} \sim 30''$ with $\mu_g = 25 \text{ mag arcsec}^{-2}$

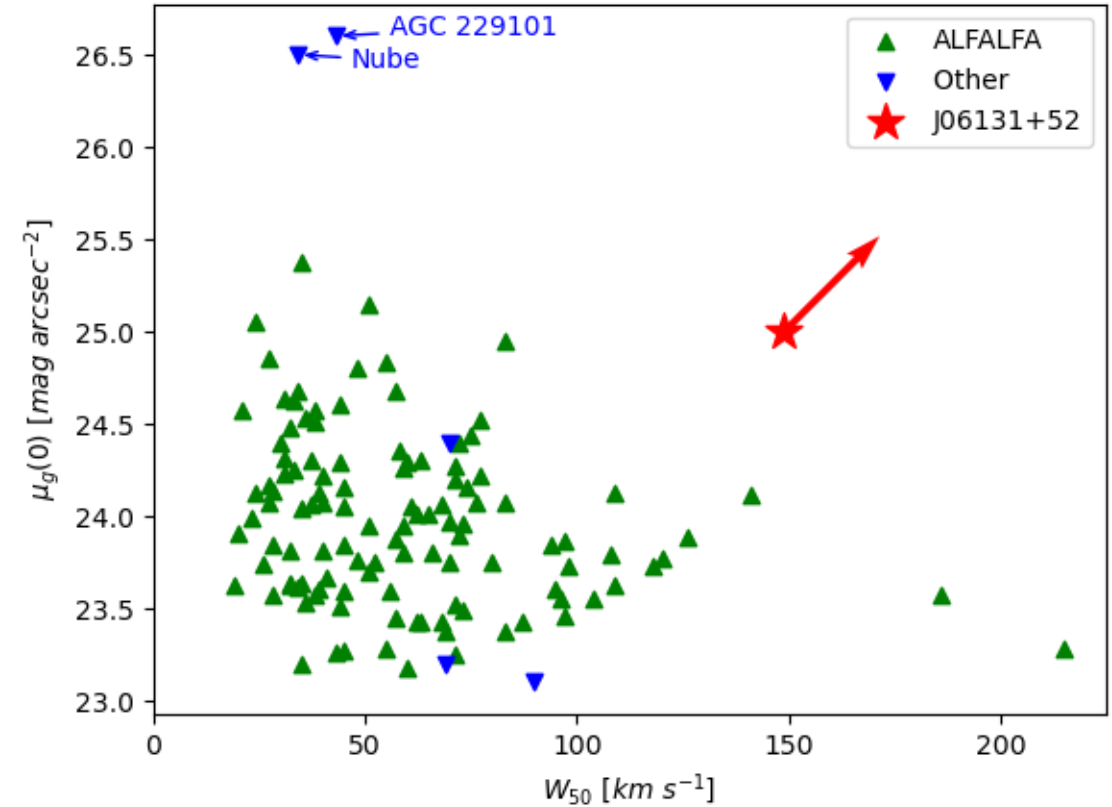
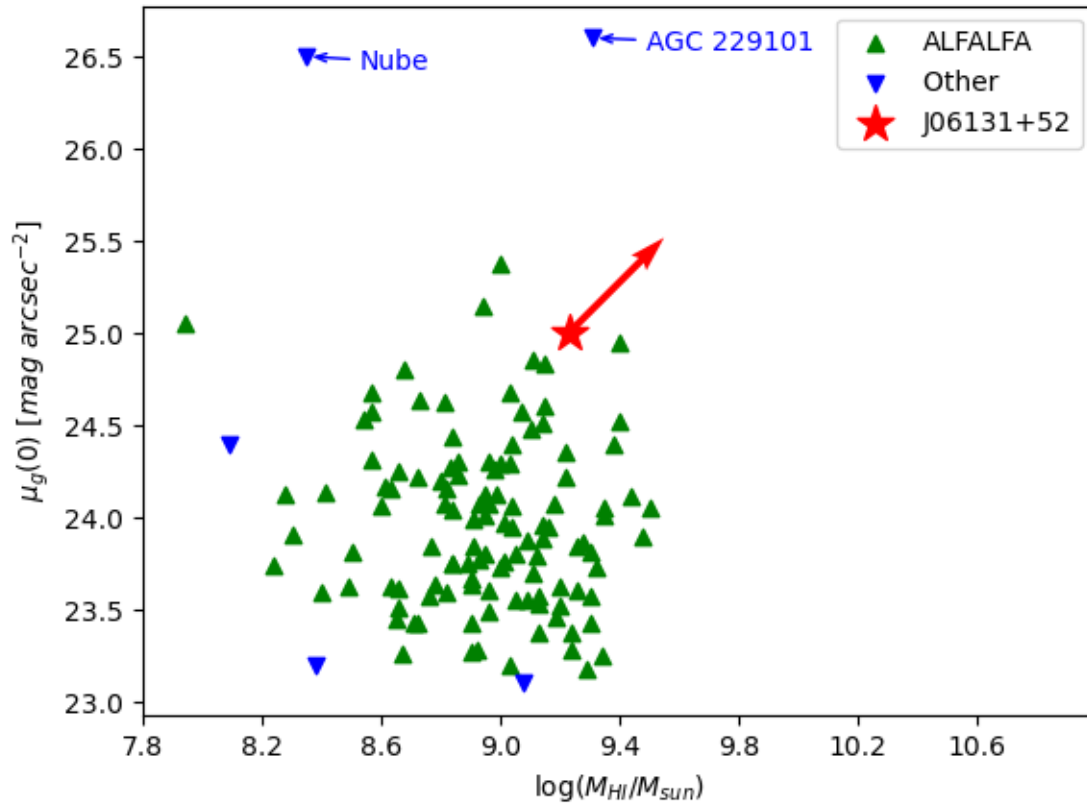
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'Normal' Spiral Galaxies

J0613+52:

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- Low surface brightness (dark?)
- Isolated & undisturbed
- Why is it unevolved?
 - Gas and dynamical mass normal for spiral galaxy
 - Gas too diffuse for ready star formation
 - No interactions to spur star formation or tear galaxy apart
- 1st discovery of nearby primordial galaxy?

Is J0613+52 Unique?

- Dark(ish) galaxies are uncommon
 - None found with Arecibo searches (ALFALFA, AGES, AULDS)
 - Objects like J0613+52 must be rare
- Full sky survey with GBT may uncover more
 - Needs high sensitivity
 - Cover sky area outside Arecibo swath
 - May be possible with ALPACA!



Summary – J0613+52:

- Lowest surface brightness non-dwarf galaxy found
- Isolation likely cause of low star formation
- May be 1st discovery of a nearby primordial galaxy

- *Questions? koneil@nrao.edu*