AnimaScience

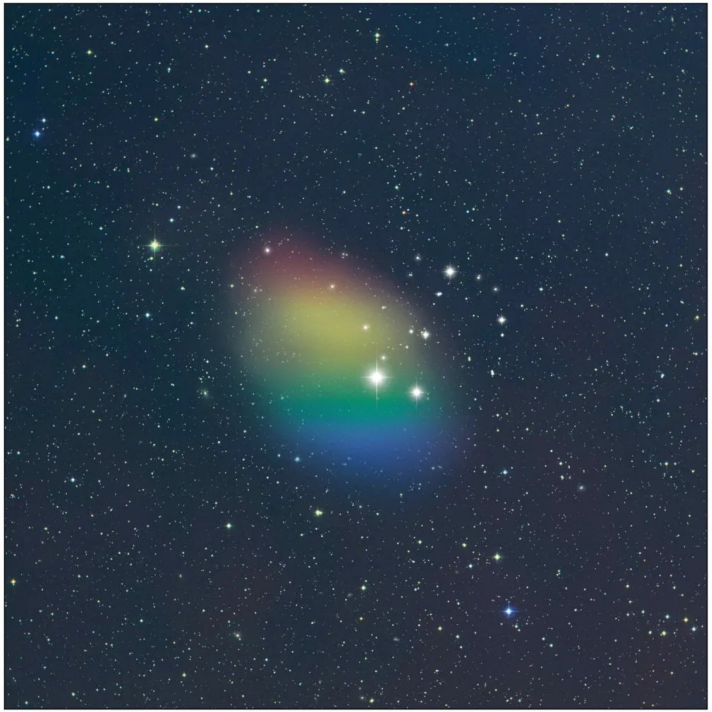
26 janvier 2024

Agenda

- Science news - Dominique
- "Bullshit" news of the month - Emmanuel
- The discovery of the weak neutral currents - Dominique
  - *Sujet proposé par Emmanuel*
- Do we really know what physical units are ? - Vincent

A dark galaxy with gas and ~no stars - J0613+52

Presented at AAS - K. O'Neil



Discovered by chance (pointing error) at the green Bank Telescope (radio)

- HI (neutral hydrogen)
- 270 M Light years distant
- Rotation speed ~200 km/s comparable to the Milky Way
- 1-2 billion solar masses
- Very isolated - no galaxies within millions of ly

Could possibly be a relic of an early clump of matter that never collapsed to trigger the formation of stars

- https://greenbankobservatory.org/astronomers-accidentally-discover-dark-primordial-galaxy/
- https://bigthink.com/starts-with-a-bang/dark-primordial-galaxy/

HI detection

Spin flip between parallel and anti-parallel spin state

- Hyperfine line at 21.106 cm / 1420.405 MHz
- HI line width and shape determined by gas kinetic temperature
- Sensitive to both temperature and amount of gas

See: https://www.bhaveshrajpoot.com/post/hi-21-cm-line-significance-and-detection

Cosmology Ruler - From H. Dole

https://arxiv.org/abs/2401.03929?context=astro-ph.CO

Table 1. Cosmological parameters from Planck Collaboration et al. (2020) (Planck+BAO) and redshift scales used in the bookmark.

Cosmological Parameters:	
H_0	67.66 km/s/Mpc
Ω_M	0.311
Ω_Λ	0.689
Redshift ranges:	
Recto	$z \in [0.1, 1000]$ log scale
Verso	$z \in [0, 30]$ linear scale
Axes:	Line (top to bottom)
Redshift z	1 & 5
age [Gyr] at z	2
lookback time [Gyr] at z	3
angular scale for 1 kpc proper [arcsec]	4

Cosmology Ruler Bookmark
Marque-page cosmologique

$\Omega_m = 0.311\ \Omega_\Lambda = 0.689$
$H_0 = 67.6\,\mathrm{km/s/Mpc}$
(Planck Collab., 2020, A&A, 641, A1)

Age and time in Gyr. Angle (for 1 kpc proper) in arcsec.

Recto: $z \in [0.1, 1000]$ in log scale

H. Dole - Université Paris-Saclay - 2024
arXiv:2401.03929

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Age and time in Gyr. Angle (for 1 kpc proper) in arcsec.

Verso: $z \in [0, 30]$ linear scale

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