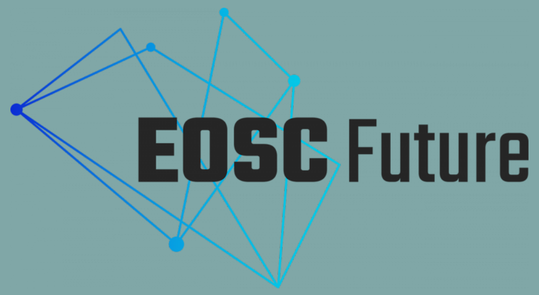
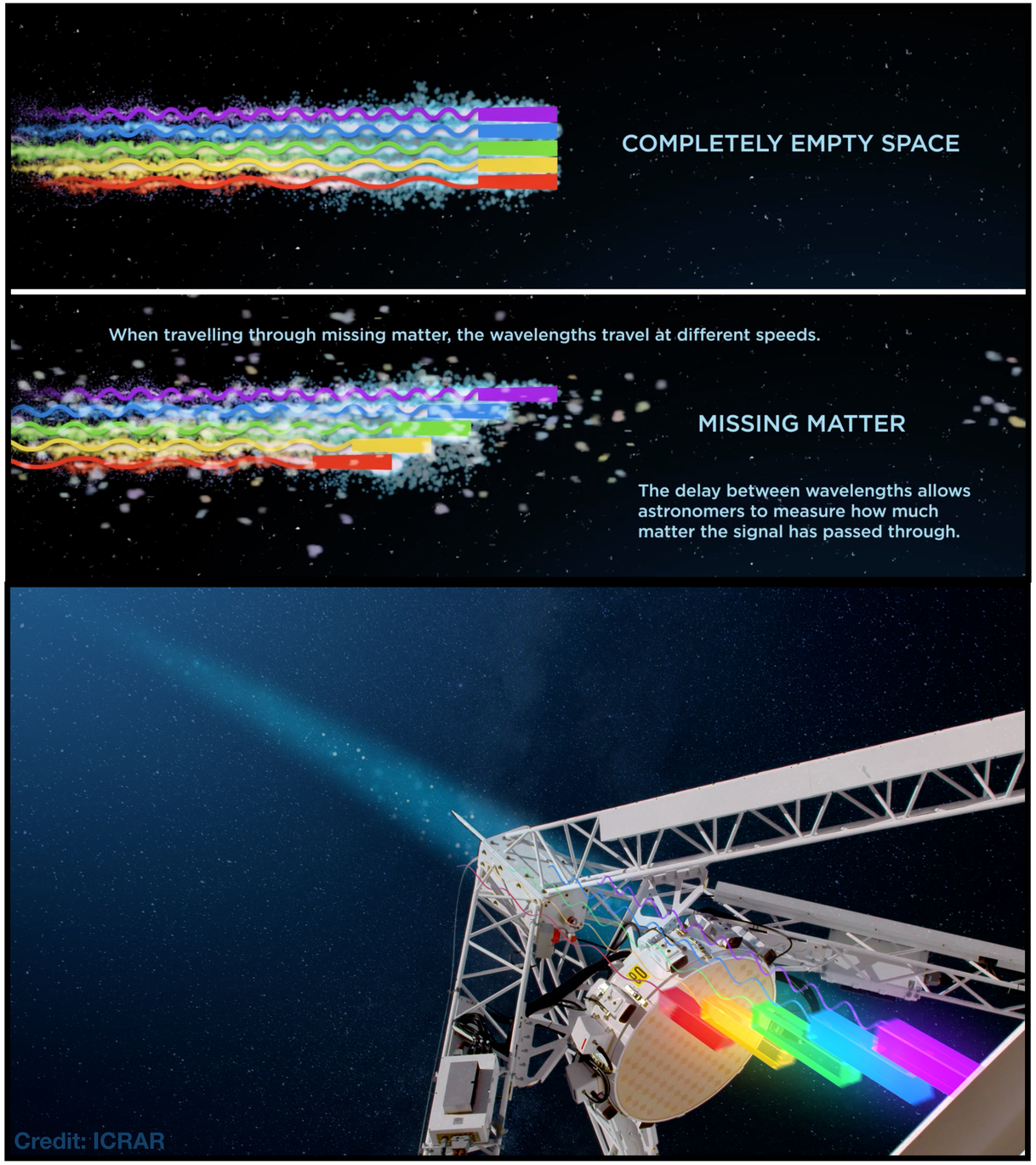
SEEKING LUMINOUS COMPACT RADIO SOURCES IN DWARF GALAXIES

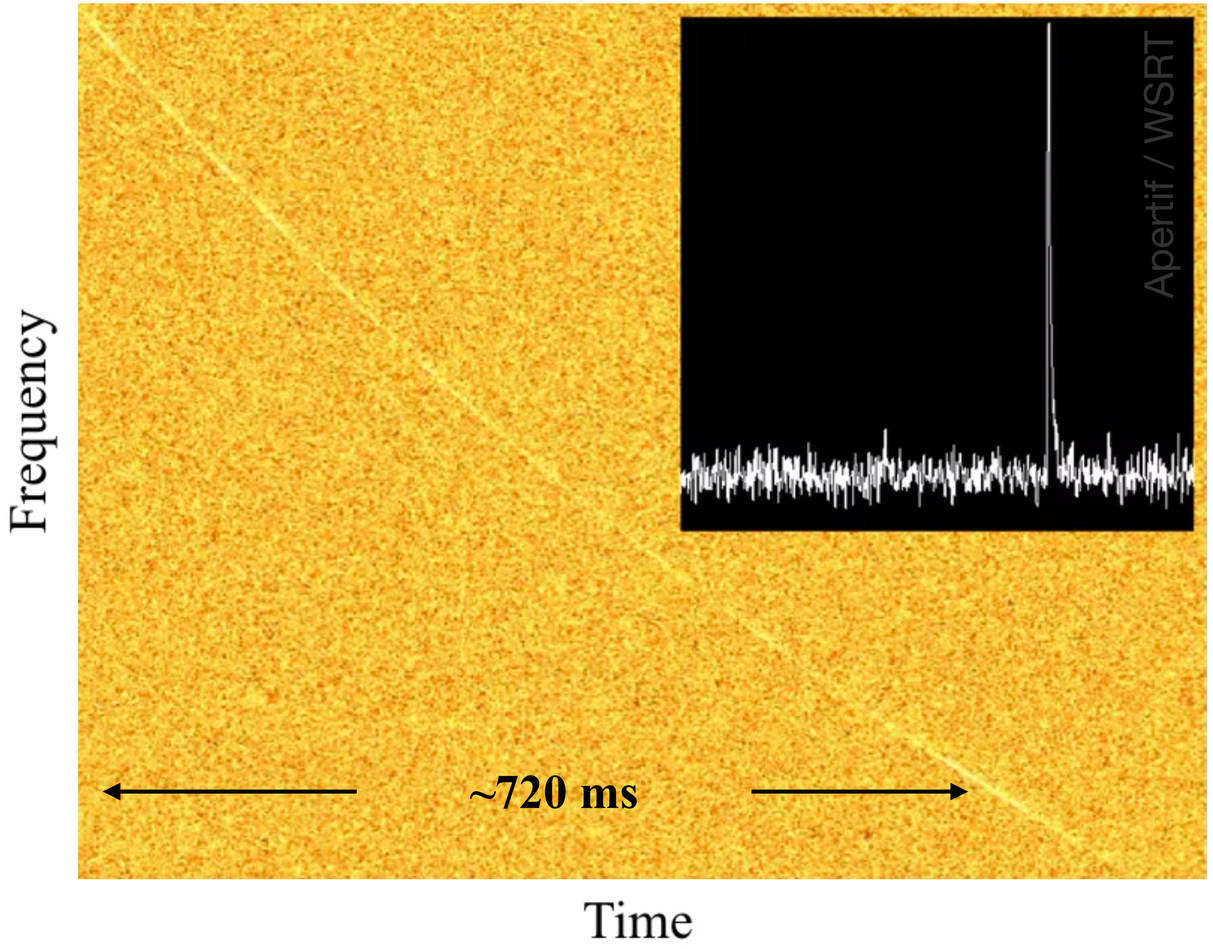
DANY VOHL, ON BEHALF OF THE *COMPACT OBJECTS* TSP



Fast Radio Bursts

Milliseconds duration or less
Extragalactic / cosmological (Lorimer *et al.* 2007)
~10^3 day^{-1} sky^{-1} (Chawla *et al.* 2017)





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Extragalactic / **cosmological** (Lorimer *et al.* 2007)

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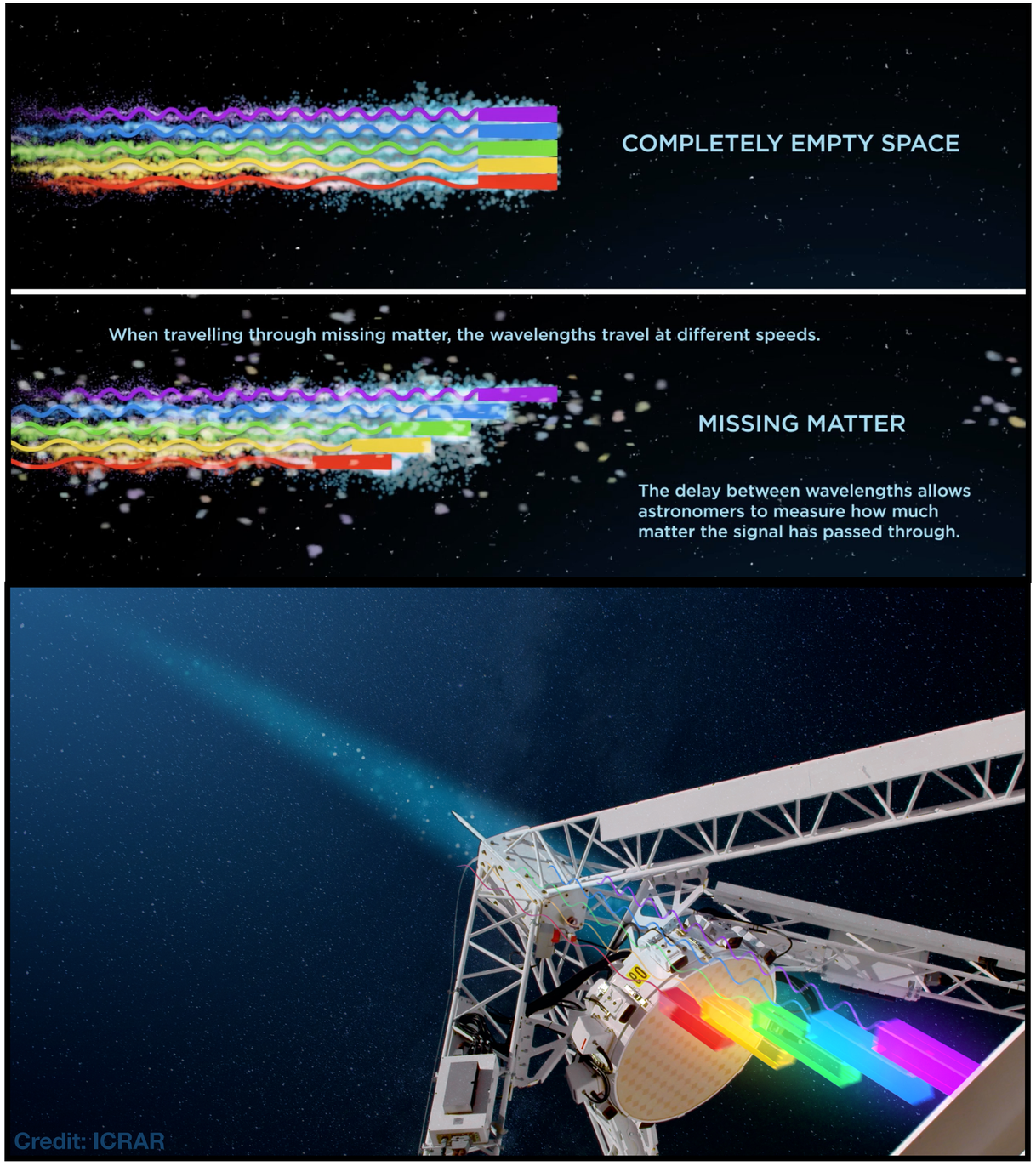
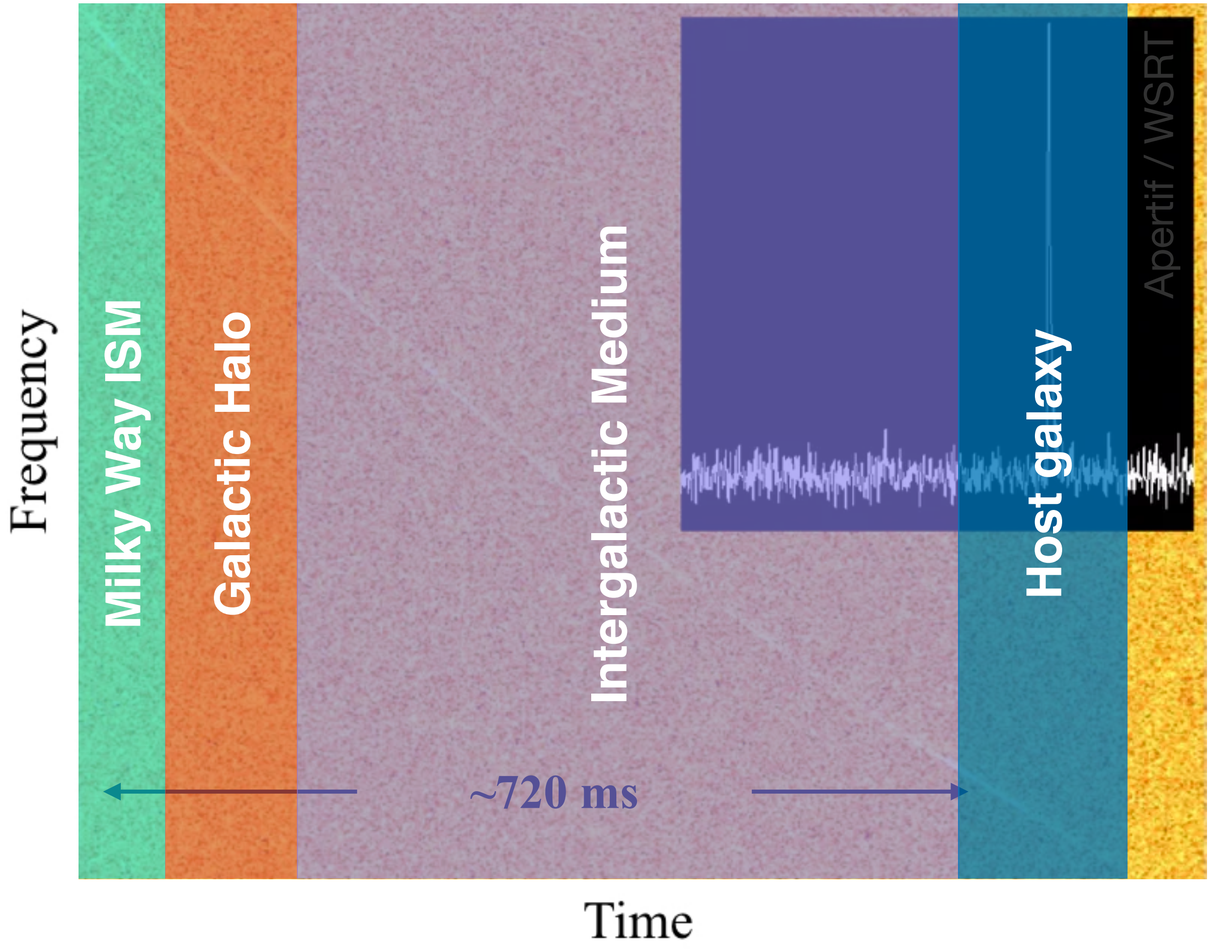


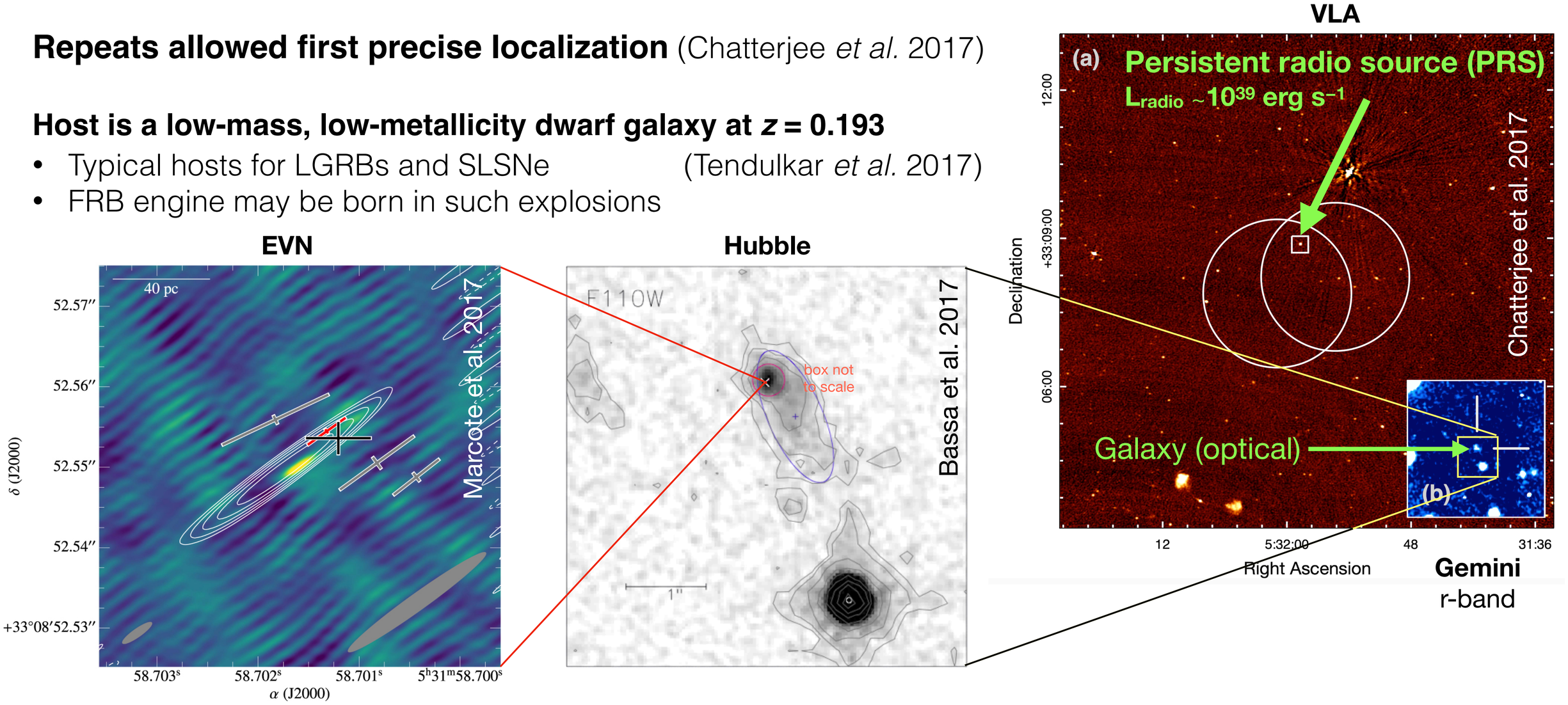


FRB 20121102A (R1 / PRS1)

Repeats allowed first precise localization (Chatterjee *et al.* 2017)

Host is a low-mass, low-metallicity dwarf galaxy at $z = 0.193$

- Typical hosts for LGRBs and SLSNe (Tendulkar *et al.* 2017)
- FRB engine may be born in such explosions



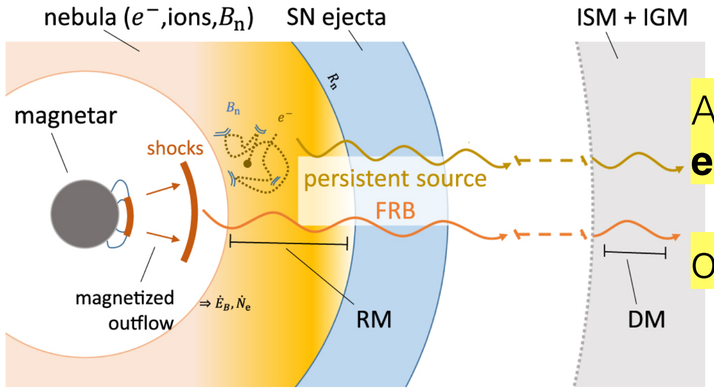
FRB 20121102A observables

Flat spectral index $\alpha = -0.07 \pm 0.03$ (Resmi *et al.* 2021)

High and variable rotation measure (Michilli *et al.* 2018)

Secular changes in DM (e.g. Hessels *et al.* 2019, Platts *et al.* 2021)

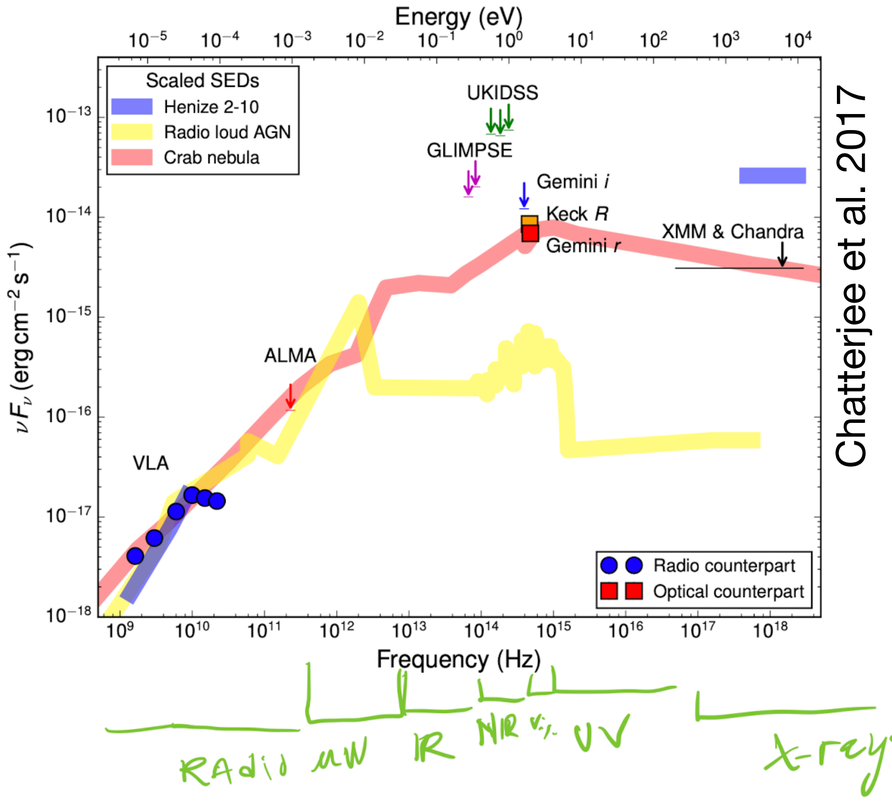
Spectral Energy Distribution (Chatterjee *et al.* 2017)



Margalit & Metzger (2018)

Argue for a **young**, **highly magnetized NS embedded** in an **expanding supernova remnant**

or **low-luminosity accreting massive BH**

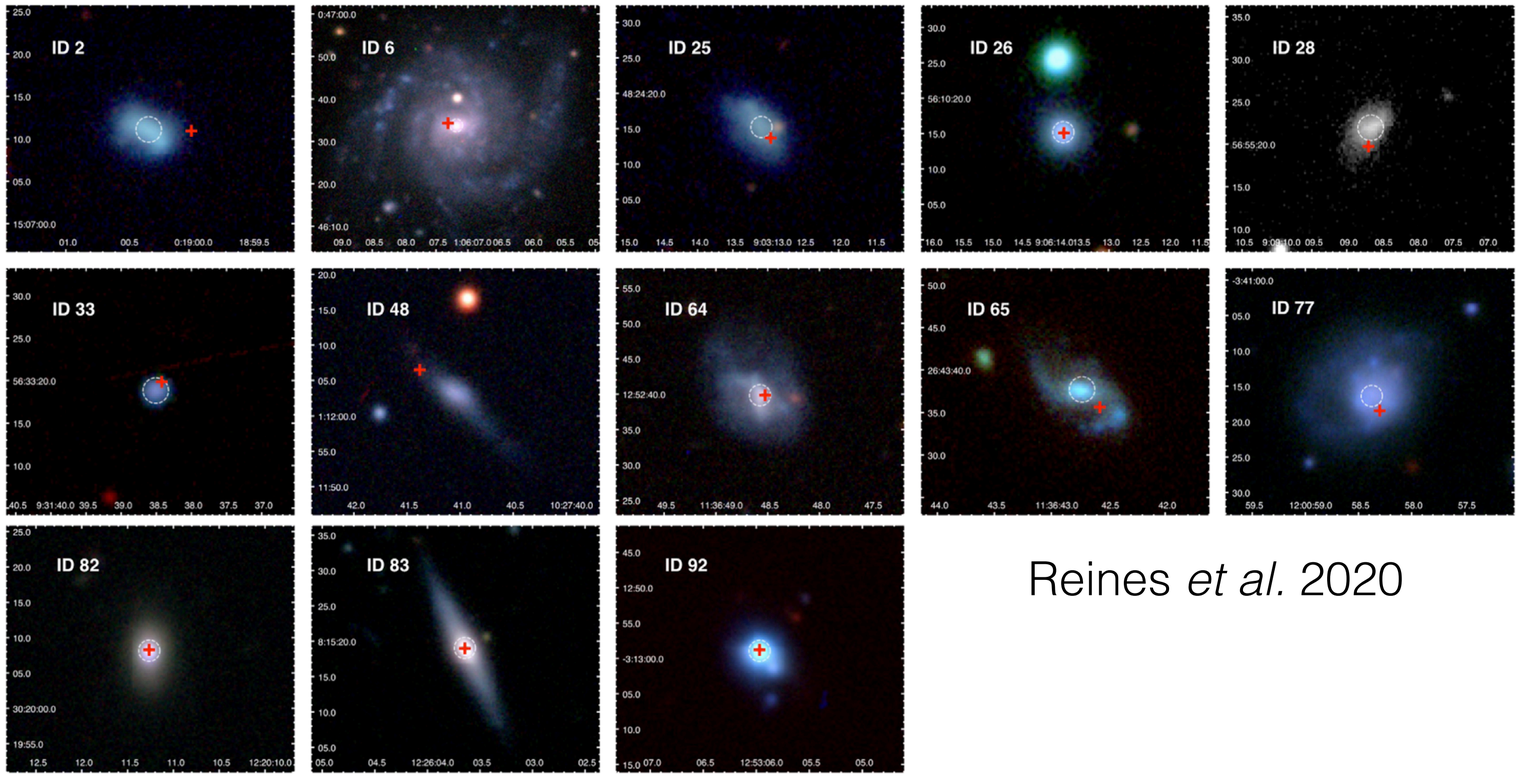


Chatterjee et al. 2017

PRS may be a calorimeter — e.g. estimate the energy output of the central FRB engine

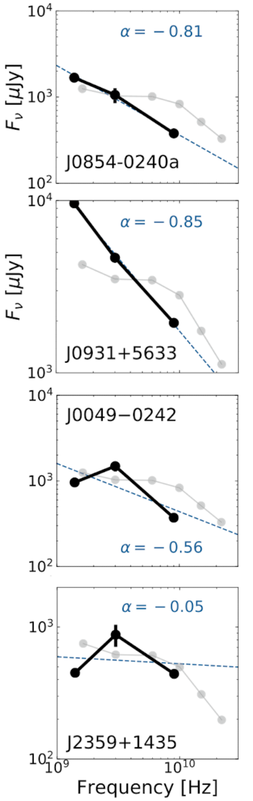
IMBH in dwarf galaxies & PRSs

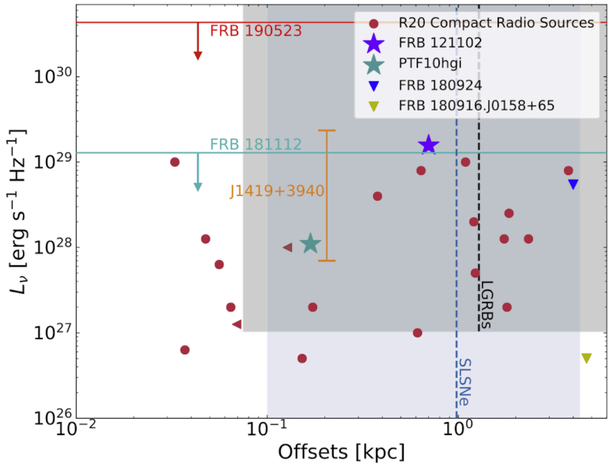
Interest to search for intermediate mass black holes in dwarfs



Reines *et al.* 2020

Similar to PRSs?



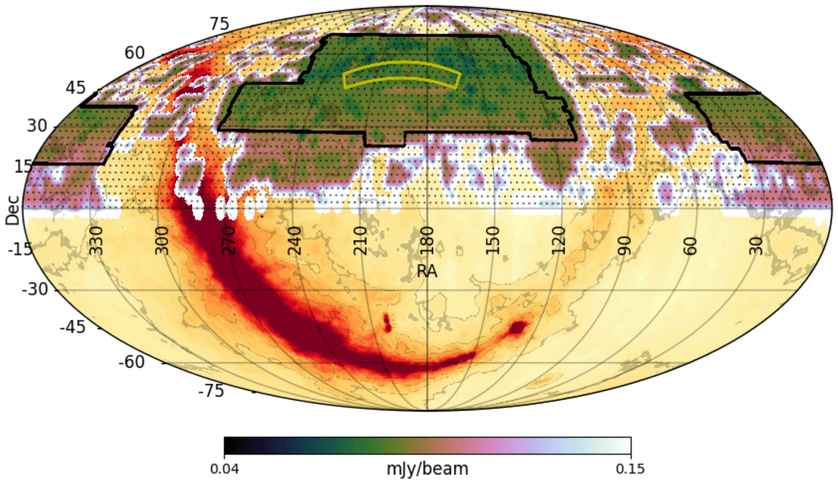


Eftekhari *et al.* 2020

Search for PRS signature in survey data

Compact radio sources coincident with **dwarf galaxies** above **expected L-SFR**

- **LoTSS 2nd data release** (Shimwell *et al. 2022; 144 MHz)*
  - > **4 million radio sources** over ~5500 deg^2 covered
  - **6 arcsec PSF** for RMS sensitivity of 20 μJy/beam
  - **0".2 astrometric uncertainty** (comparable to optical surveys)
  - Point source completeness to 90% at 0.8 mJy/beam



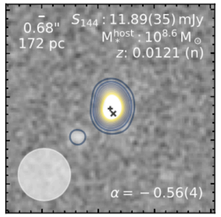
Shimwell+22

  - **Census of the local Universe** (CLU; Cook *et al.* 2019)
    - **Compilation of all known galaxies out to 200 Mpc**
    - **270 000 sources** over 3π of the sky
      - ***z* < 0.0471**
    - Provides various physical properties: e.g.
      - **Mstar** (from WISE1), **SFR** (GALEX FUV flux)

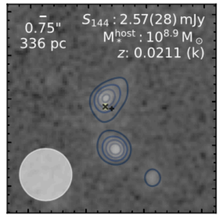
$d_\perp \leq (2+\epsilon)''$

$d_\perp \in ((2+\epsilon), (6+\epsilon)]''$

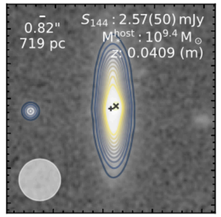
ILT J003532.36+303008.0
CLU J003532.3+303008



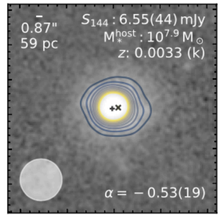
ILT J125915.34+274604.2
SSTSL2 J125915.27+274604.1



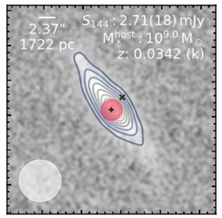
ILT J231715.38+184339.0
2MASX J23171540+1843385



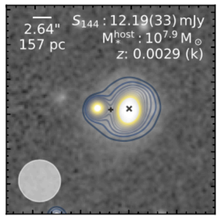
ILT J021835.45+262040.9
LAMOST J021835.51+262040.7



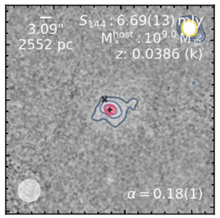
ILT J143050.99+410642.6
SDSS J143051.12+410640.8



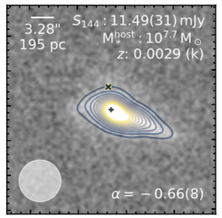
ILT J220737.01+231516.0
CLU J220737.20+231515.8



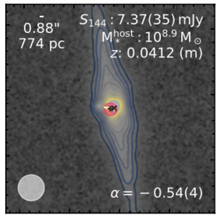
ILT J090406.54+530314.6
SDSS J090406.38+530311.8



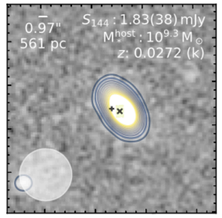
ILT J023058.18+232412.6
CLU J023058.15+232409.3



ILT J075257.15+401026.3
UGC 04068



ILT J165252.24+391151.7
CLU J165252.32+391152.0



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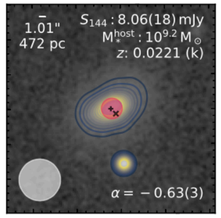
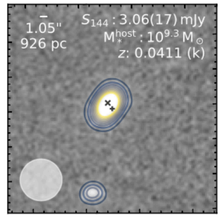
2MASS J16224461+3213007



ILT J153943.52+592730.7
CLU J153943.44+592729.8



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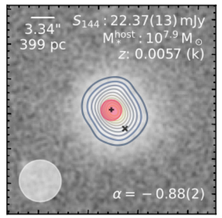
2MASS J14052457+6134020



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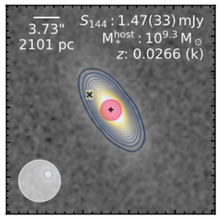
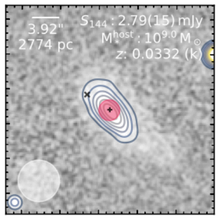
2MASS J13002220+2814499



ILT J122250.31+681434.2
SDSS J122249.71+681431.8



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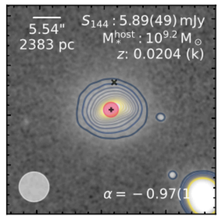
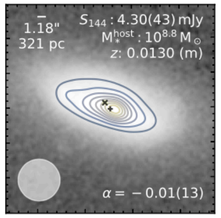
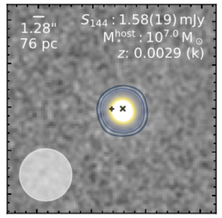


ILT J015915.79+242500.6
KUG 0156+241



ILT J131858.22+332859.9
CLU J131858.32+332859.8



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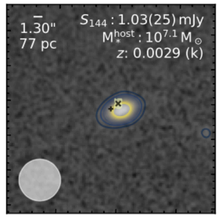

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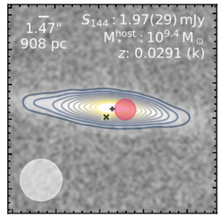
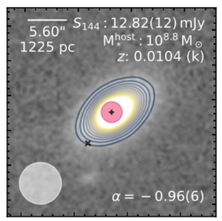


ILT J113634.77+592533.3
SBS 1133+597



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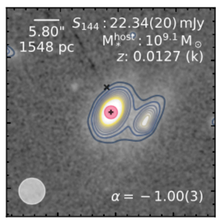

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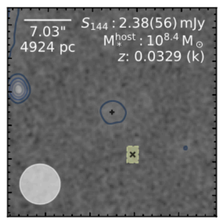

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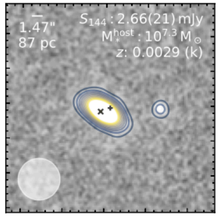

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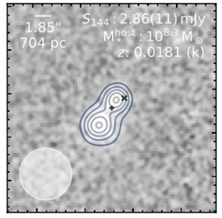

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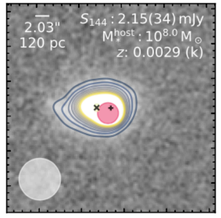

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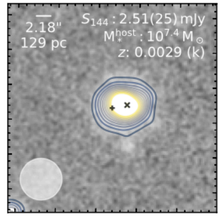
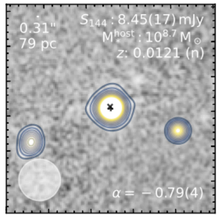
CLU J110704.32+391811.8



$\mathrm{AGN}_{\mathrm{WISE}}$

ILT J161111.24+360401.0
CLU J161111.2+360400



ILT J143037.30+352053.3
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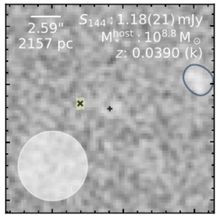

arXiv:2303.12598

ADDED VALUE BY EOSC

- **Additional access to remote compute**
  - For our team
  - For students
- **Great help by the technical team**
  - Kudos to, e.g., Enrique Garcia, Elena Gazzarrini, and Yan Grange
- **Discoverability and interconnection of services, datasets, etc.**
  - E.g. EOSC market place

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