

An Update on the Radio Source **WISE J071634.59-190039.2**

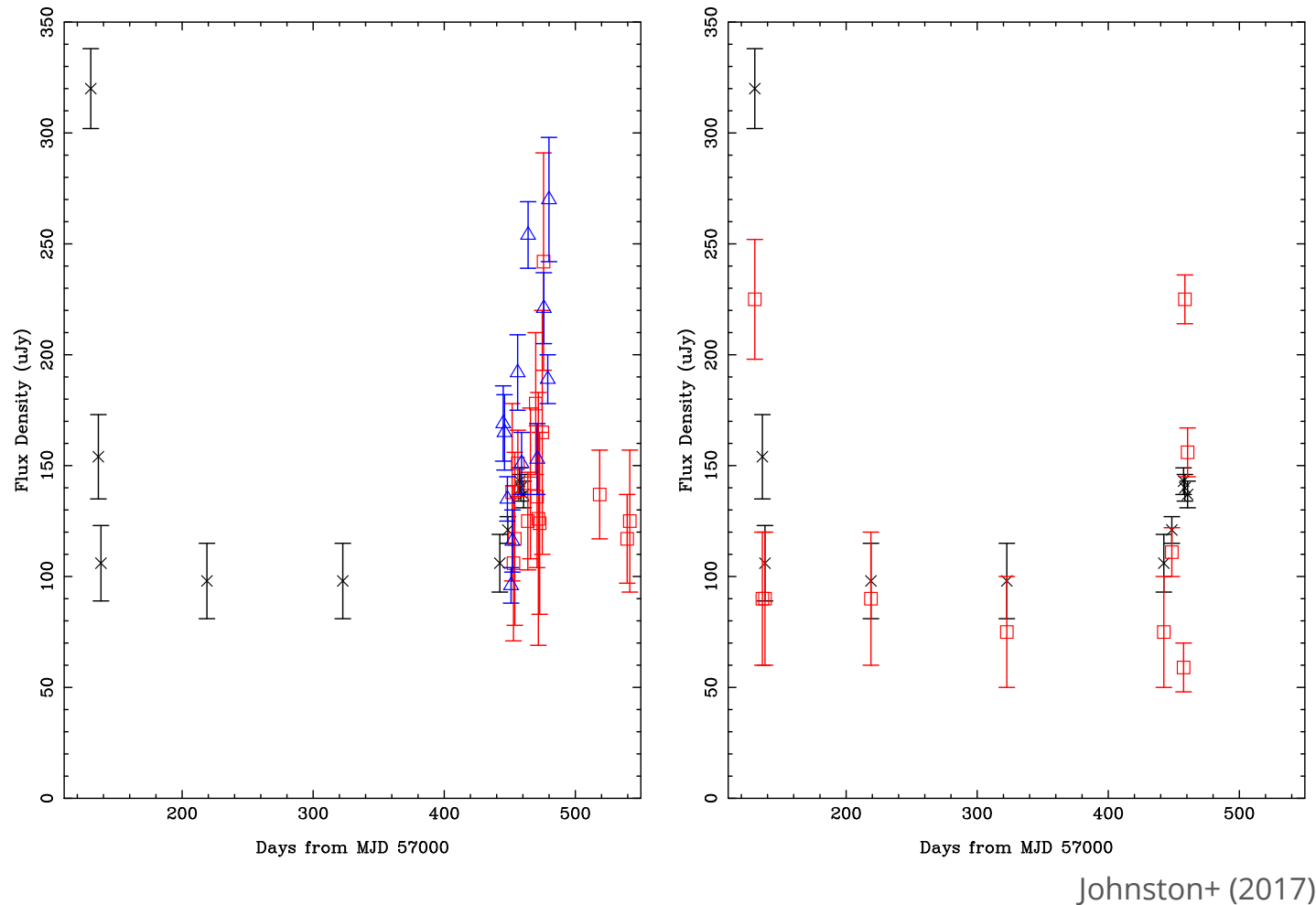
Peter K. G. Williams (CfA) • @pkgw • <http://newton.cx/~peter/>

Aspen FRB Workshop — 2017 Feb 12

Image courtesy NRAO/AUI

W0716 and FRB150418 were claimed to be linked.

The FRB and variable radio source were discovered by the SUPERB team using Parkes and ATCA ([Keane+ 2016](#)).



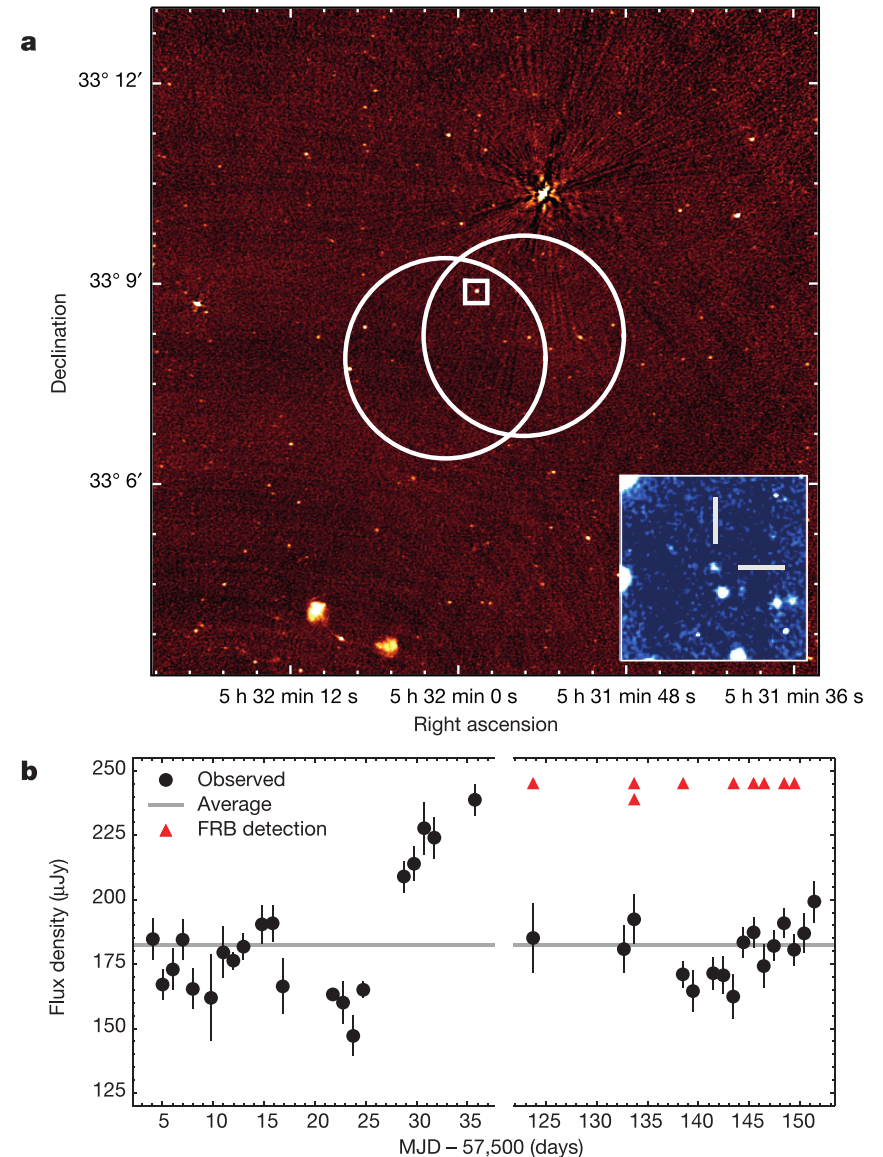
Further follow-up revealed W0716 is a persistently variable source.

We have new data: FRB121102 was localized!

Worth revisiting the potential association between W0716 and FRB150418 in light of this.

The attention-getting piece: FRB121102 is associated with a persistent, variable, compact radio source.

Standard caveats about extrapolating from a sample size of one apply.



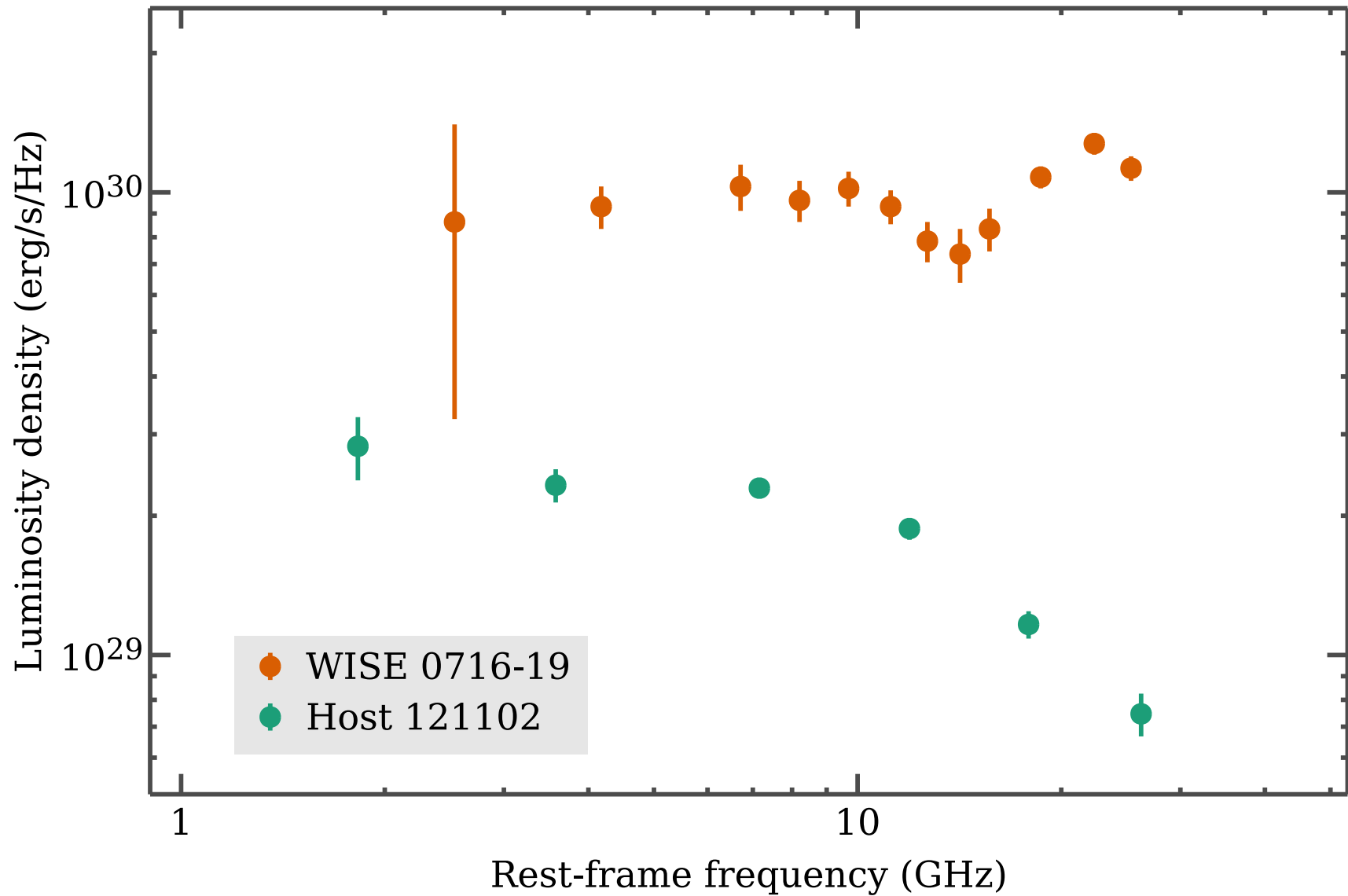
Chatterjee+ (2017)

The two galaxies do not look very similar.

W0716 is a passive elliptical. The 121102 host is a low-metallicity, star-forming dwarf.

Property	W0716	Host 121102	Unit
Redshift	0.49	0.19	—
$M_{r'}$	-21.6	-17.0	mag
Diameter	~22	$\lesssim 4$	kpc
M_*	10^{11}	$10^{7.7}$	$M_{\odot}$
SFR	$\lesssim 0.2$	0.4	$M_{\odot}/\text{yr}$
L_X	$\lesssim 10^{43.8}$	$\lesssim 10^{41.5}$	erg/s

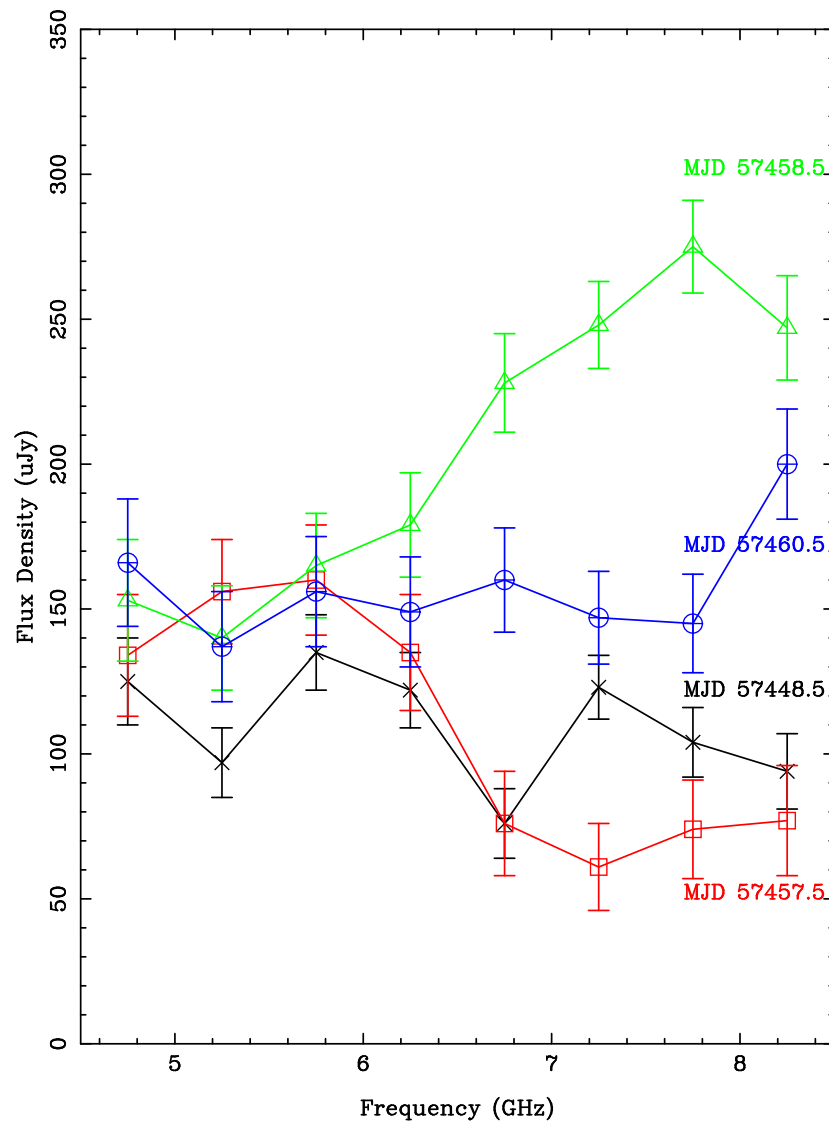
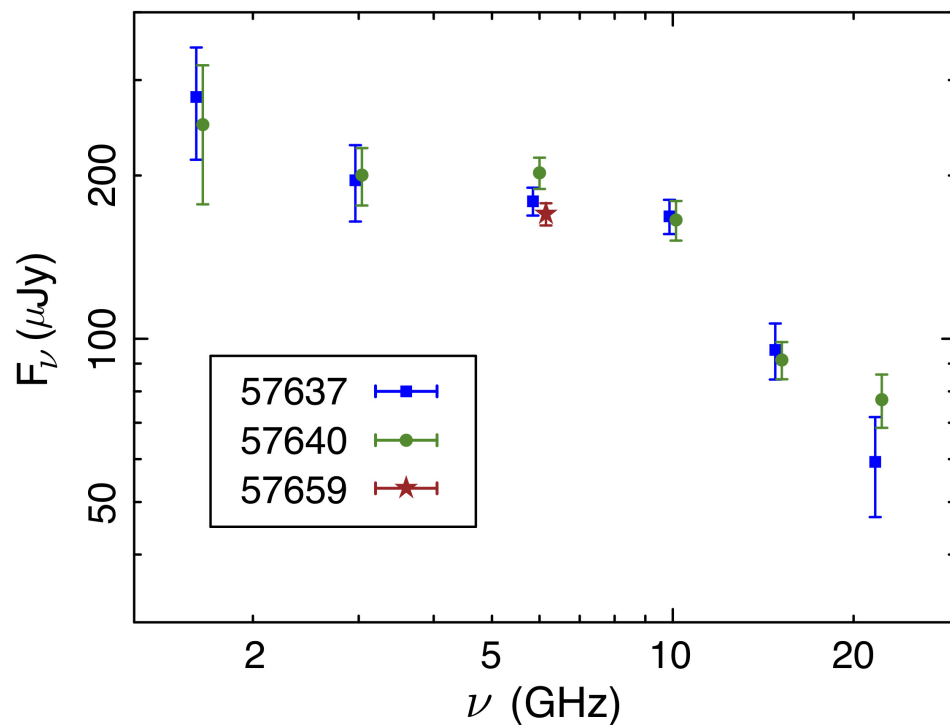
The two radio sources have similar luminosities.



Derived from Vedantham+ (2016), Chatterjee+ (2017)

W0716 is much more variable.

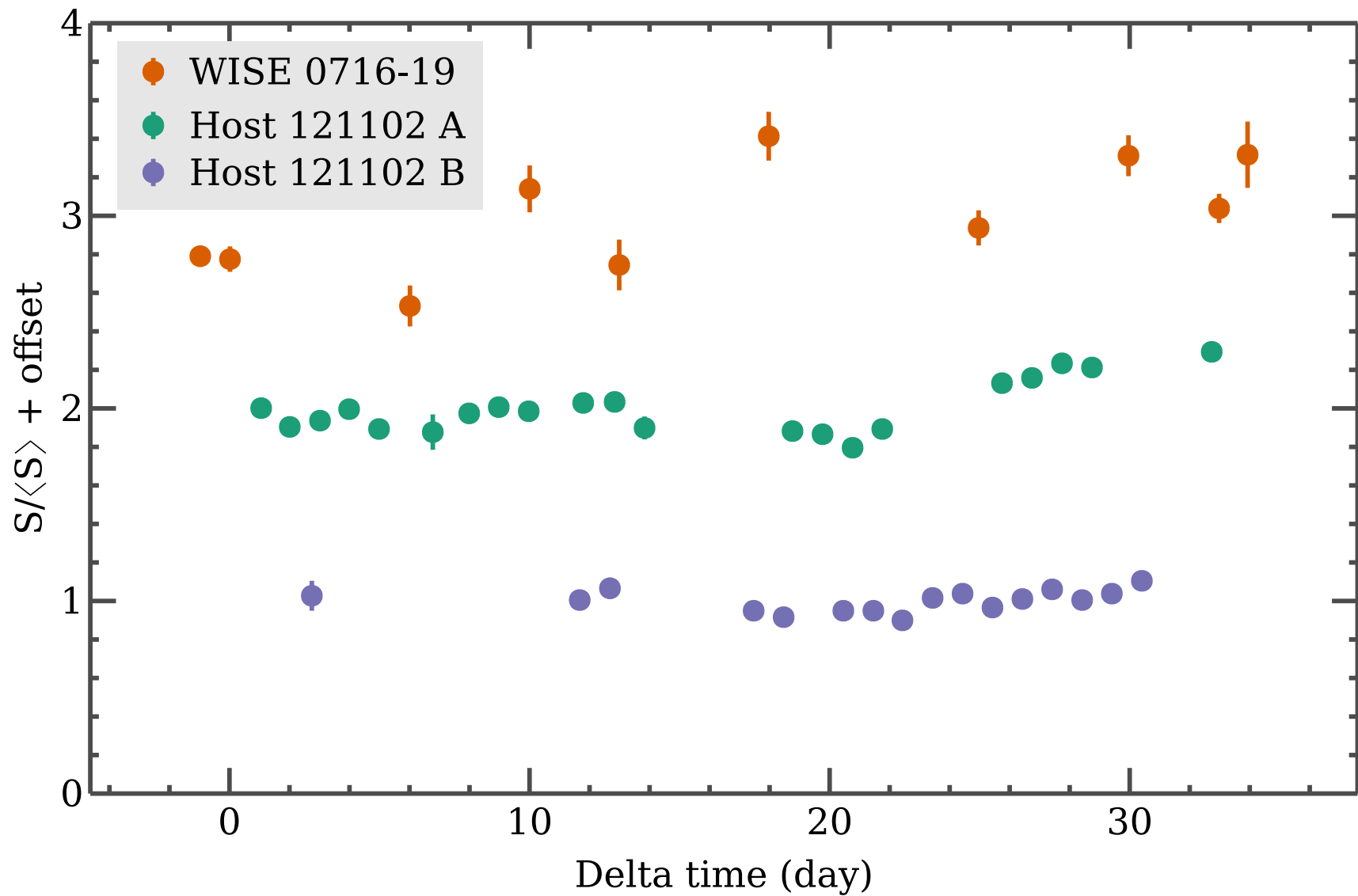
The shape of W0716's spectrum ($\rightarrow$) varies much more dramatically than that of the 121102 host ($\downarrow$).



Johnston+ (2017)

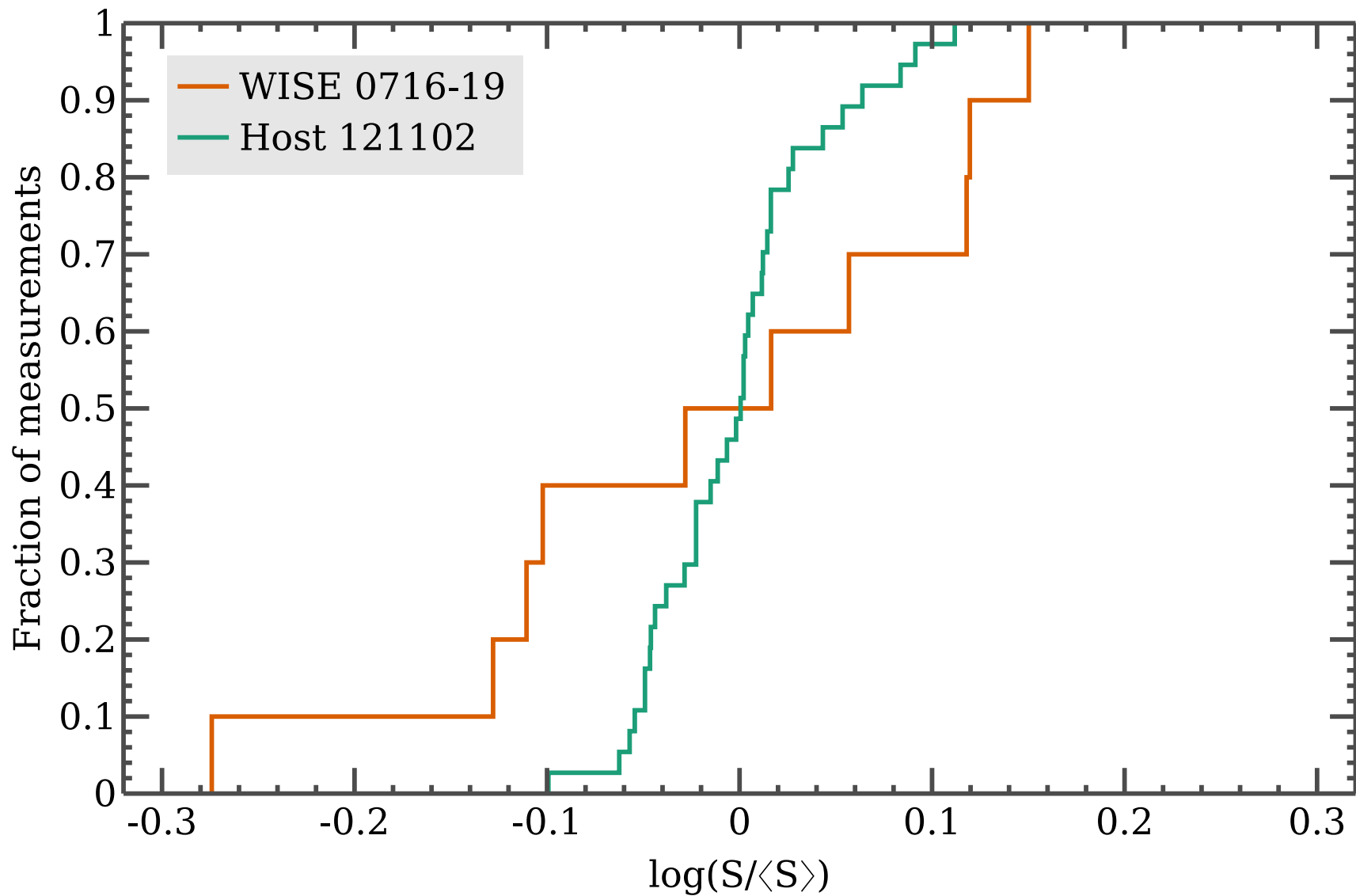
Chatterjee+ (2017)

W0716 is much more variable.



Derived from PKGW & Berger (2016), Chatterjee+ (2017)

W0716 is much more variable.



Derived from PKGW & Berger (2016), Chatterjee+ (2017)

EVN data give more insight into the radio sources.

Property	W0716	Host 121102	Unit
L_v	10^{30}	$10^{29.5}$	erg/s/Hz
T_B	$\gtrsim 10^{8.5}$	$\gtrsim 10^{7.7}$	K
Variability	High	Moderate	—
Size	$\lesssim 1.2$	$\lesssim 0.7$	pc
Spectrum	Flat?	Flat + turnover	
Host offset	?	~700?	pc

If the variability is due to scintillation, there is not much to distinguish the two sources.

Here's a summary.

- The two host galaxies are dissimilar.
- The clearest difference between the two radio sources is likely due to an *extrinsic* factor.
- It remains true that W0716 looks a whole lot like an AGN.
- More data could potentially strengthen the circumstantial case for associating W0716 and FRB150418 ...
- ... but direct localizations are vastly more preferable!

Thanks for your attention!

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HTML talk info: <http://tinyurl.com/htmltalk> • *Design credits:* Hakim El Hattab ("white" theme), Julieta Ulanovsky (Montserrat font), Steve Matteson (Open Sans font) • *Tech credits:* [git](#), [reveal.js](#), Firefox developer tools.