

FRB151230の可視光追観測

Optical follow-up observation of FRB151230

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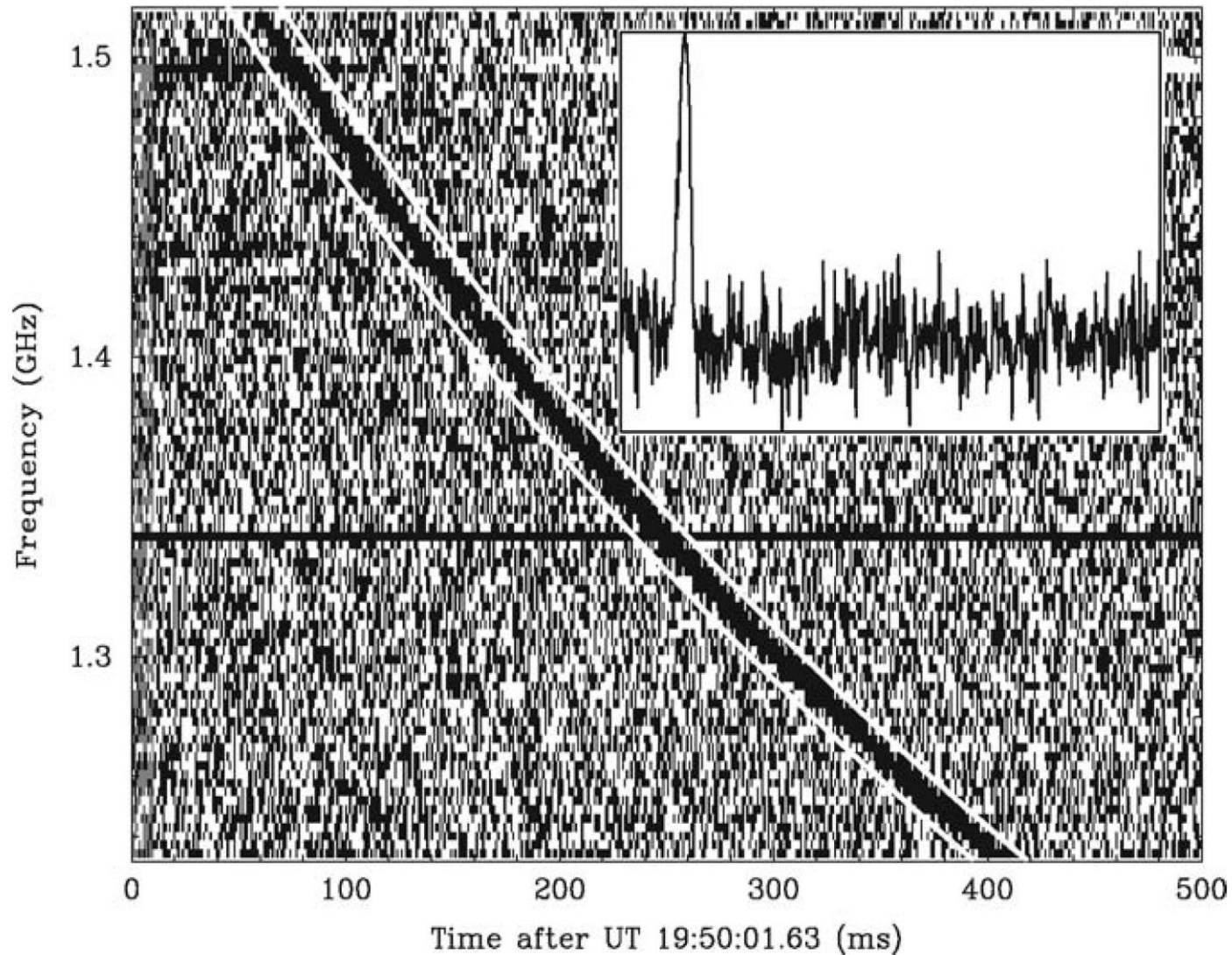


27th Mar 2018

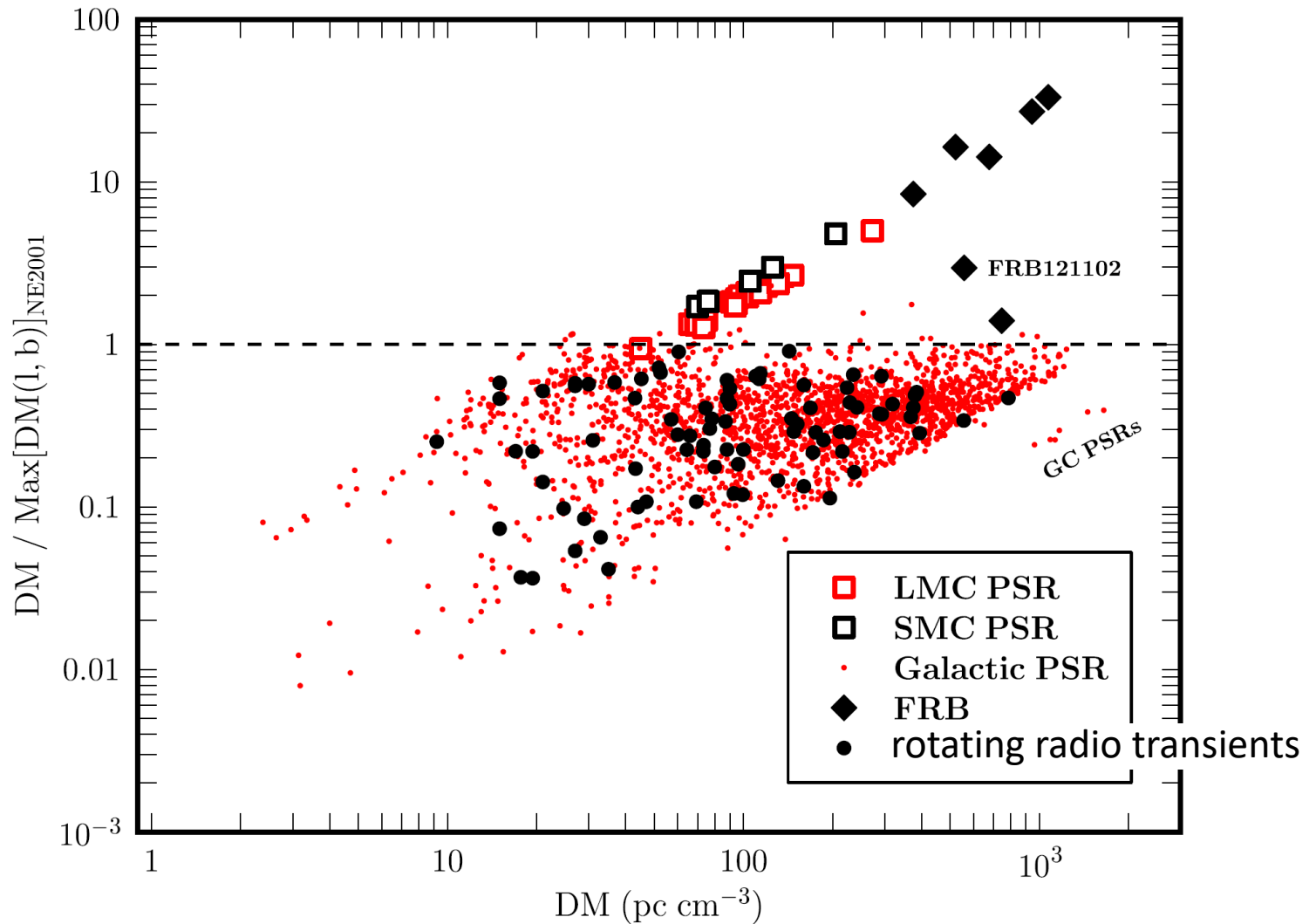
マルチメッセンジャー天文学研究会2018

Fast Radio Burst 010724

Bright millisecond radio transients with high dispersion measure



Dispersion measures of FRBs



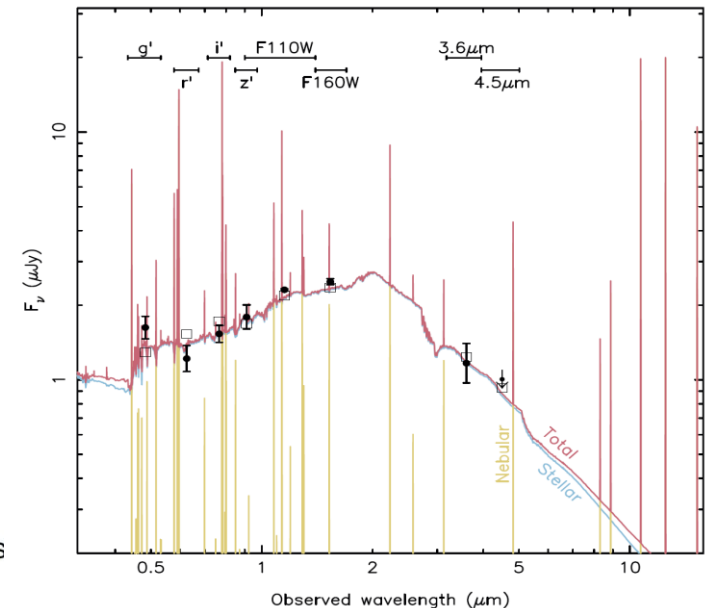
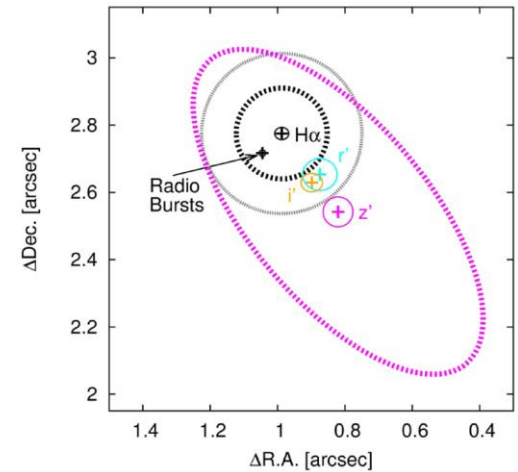
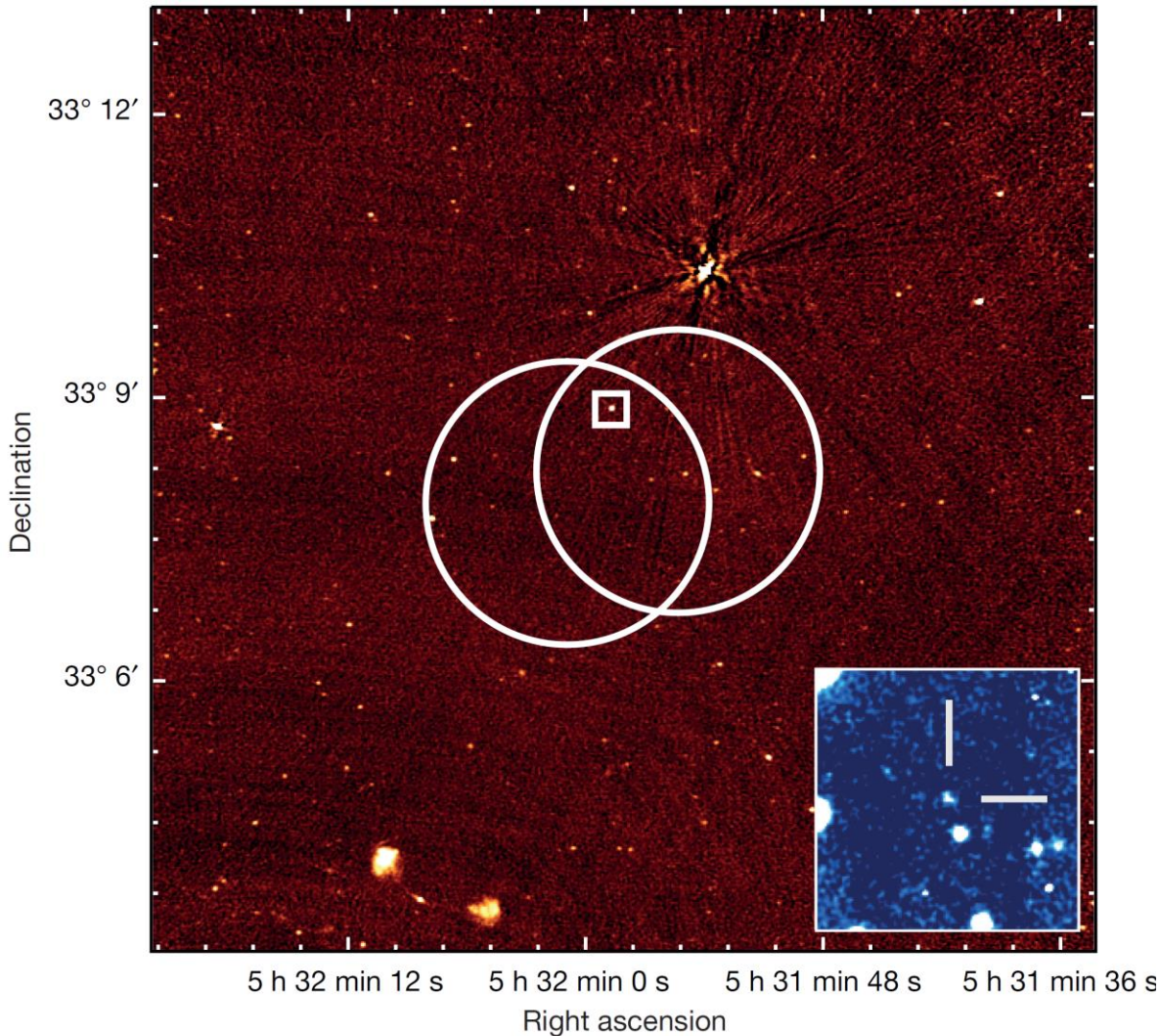
Origin of FRBs

- Mergers of double neutron star binaries (Totani 2013)
- Mergers of double white dwarf binaries (Kashiyama et al. 2013)
- Collapse of rotating supermassive neutron stars to black holes (Falcke & Rezzolla 2014; Zhang 2014)
- Galactic exotic compact objects (Keane et al. 2012; Bannister & Madsen 2014)
- Interaction between the supernova shock and magnetosphere of a neutron star (Egorov & Postnov 2009)
- Compact objects in young supernovae (Connor et al. 2016; Piro 2016)
- Supergiant pulses from extragalactic neutron stars (Cordes & Wasserman 2016)
- Giant flares from magnetars (Thornton et al. 2013; Pen & Connor 2015).

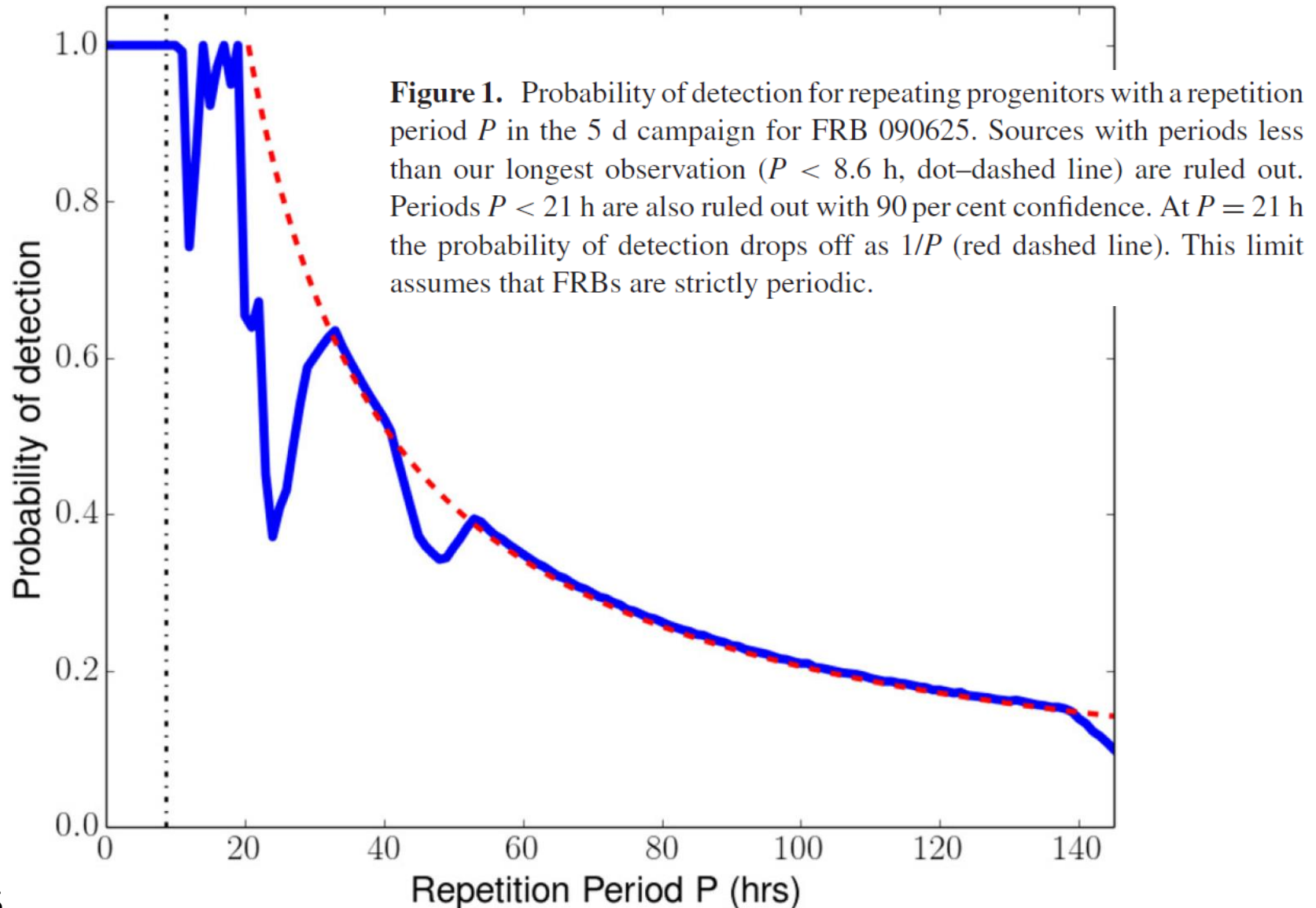
Repeating FRB121102

Chatterjee+17; Bassa+17; Kokubo+17

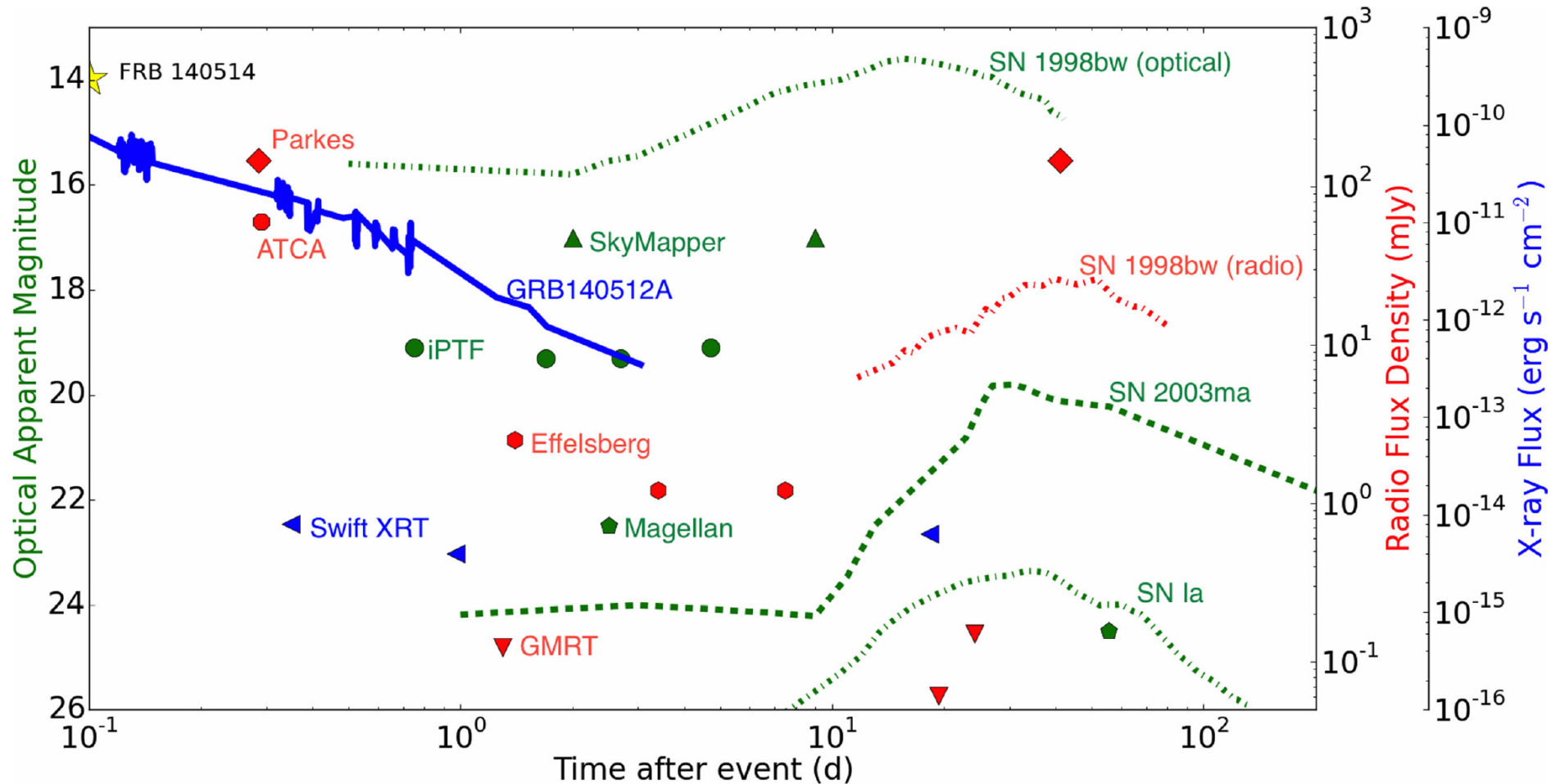
The projected location of FRB 121102 within the star-forming region supports the proposed connection of FRBs with **newly born neutron stars or magnetars**.



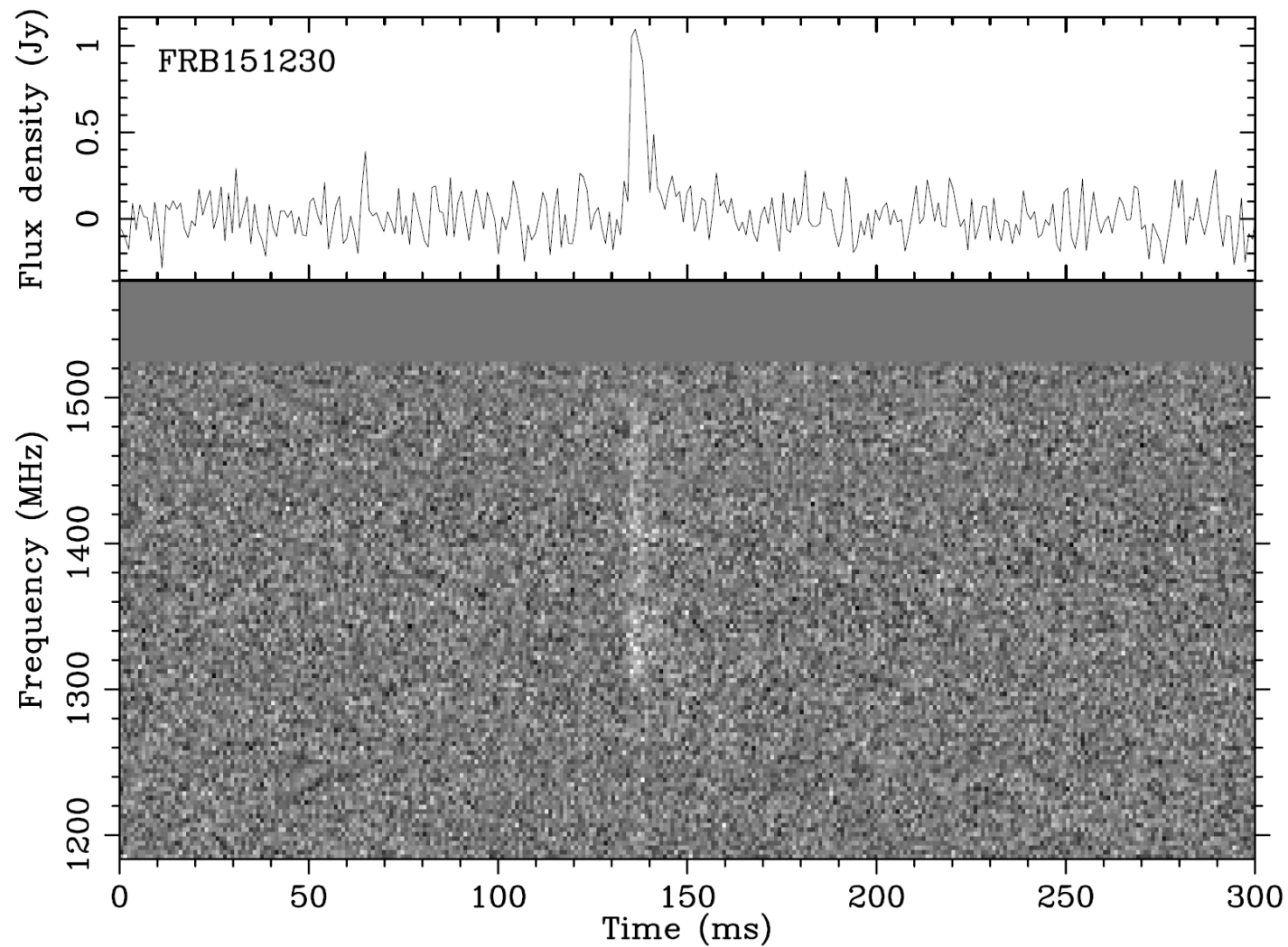
No repeating bursts for other FRBs



Multiwavelength follow-up of FRBs



FRB151230



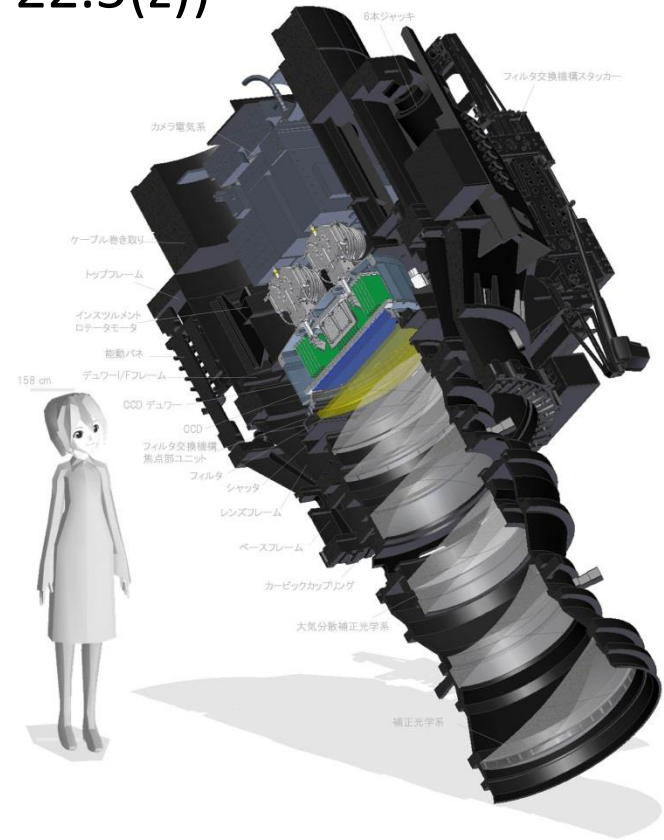
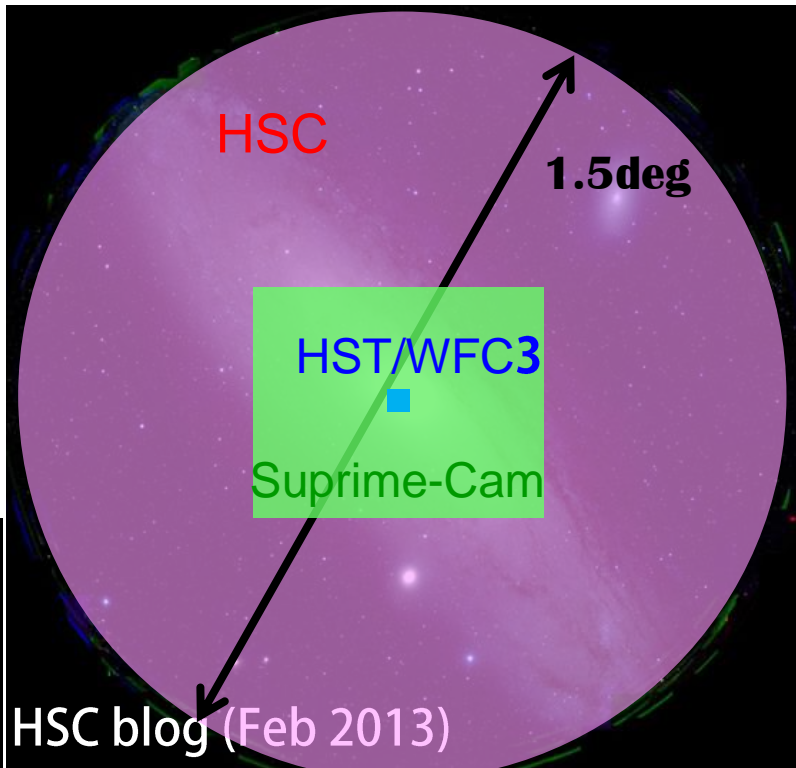
FRB YYMMDD**FRB 151230**

Event time at 1.4 GHz UTC	2015-12-30 16:15:46.525
Parkes beam number	04
RA, DEC (J2000)	09:40:50, -03:27:05
(ℓ , b)	239.0°, 34.8°
Signal to noise ratio, (S/N)	17
Dispersion measure, DM (pc cm^{-3})	960.4 \pm 0.5
Scattering time at 1 GHz (ms)	18 \pm 6
Measured width, W50 (ms)	4.4 \pm 0.5
Instrumental dispersion smearing (ms)	1.2
Observed peak flux density, S_{peak} (Jy)	0.42 \pm 0.03
Measured fluence (Jy ms)	>1.9 \pm 0.3


DM _{Gal} (pc cm^{-3})	~38
Max. inferred z	0.8
Max. comoving distance (Gpc)	2.7
Max. luminosity distance (Gpc)	4.8
Max. isotropic energy (10^{33} J)	1.0 \pm 0.2
Average luminosity (10^{36} W)	0.2 \pm 0.04

Subaru/Hyper Suprime Cam

- Hyper Suprime-Cam (HSC)
 - Diameter: 8.2m, FoV: 1.77deg², ~900M pixels
 - m_{lim} (5σ) w/ 1min: **24.5(i)**, **23.8(z)**
(DECam 1min: 23.3(i), 22.5(z))



Optical follow-up observation

		Dec 29	Dec 30	Dec 31	Jan 01 ☉	Jan 02
		 FRB151230			Obs HiCIAO+AO188	Obs HiCIAO+AO188
			S15B-088 Shinnaka HDS	S15B-088 Shinnaka HDS		
Jan 03	Jan 04	Jan 05	Jan 06	Jan 07	Jan 08 ☉	Jan 09
Obs HiCIAO+AO188	UH-31A1 Jedicke HSC	UH-31A2 Jedicke HSC	S15B-137 Day 8 S15B-009 Totani HSC	Keck Wittman HSC	StrObs HSC	GTO Day 11 S15B-009 Totani HSC
Jan 10	Jan 11	Jan 12	Jan 13	Jan 14	Jan 15	Jan 16 ☉
StrObs HSC	StrObs HSC	S15B-137 Day 14	S15B-073 Okamoto HSC	StrObs HSC	S15A-134I Silverman FMOS	
S15B-056 Okabe HSC	S15B-056 Okabe HSC	S15B-009 Totani HSC				

Hawaiian Standard Time