

PSR B1509-58
(CXC)

3C58
(CXC)

Status report:

Standard candle working group

Non-Thermal SNR category

— Restart from a year-long hibernation —

CLOSE-UP OF TORUS

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G21.5-0.9 (CXC)

Road map (period) [lead]

1. Agree on the data set (today) ... Need to add/remove sources/instruments from the list?
2. Collect data (~ 1 yr).
3. Assign people for every targeted sources and instruments (today).
4. Agree on spectral models, energy ranges, extraction regions, etc. (this week).
5. Generate src/bkg spectra, ARF, RMF (~ 1 yr).
6. Compile the results (~ 1 yr) [MT]
7. Write reports (~ 2 yr) [MT et al.].

Short brush-up (1/2)

- Targets: Spectra (by current missions)
 - with a constant flux ... to be standard candles.
 - with flat power-law ... for covering a wide energy range (0.1-100 keV).
 - at several different brightnesses ... to cover a large dynamic range in flux.
- Purpose and Immediate Goals
 - Norm. and power among instruments.
 - ... Fill in blanks of the comparison tables.
 - Constrain abundance models (lead Kaastra)
 - ... Reduce grating spectroscopy data.

Sample table (Crab)

Satellite	Det	xsect	Abun	E-band for fit	NH 10^{21}cm^2	ph. Index	Norm (2-10) $10^{-8}\text{erg/cm}^2/\text{s}$	χ^2_ν	Observed Flux ($10^{-8}\text{erg/cm}^2/\text{s}$)			
									0.5-2	2-10	20-50	50-100
Suzaku	XIS	bcmc	wilm	1.0-10.0	4.61 ± 0.10	2.070 ± 0.008	2.239 ± 0.012	1.19	-	2.170	-	-
			angr	1.0-10.0	3.19 ± 0.07	2.077 ± 0.008	2.244 ± 0.012	1.19	-	2.169	-	-
	PIN	angr	12.0-70.0	3.19 (fixed)	2.110 ± 0.007	2.267 ± 0.023	1.03	-	-	1.039	-	
RXTE	HEXTE	bcmc	angr	20-240	3.19 (fixed)	2.087 ± 0.008	1.929 ± 0.027	0.99	-	-	0.928	0.657
XMM	pn	bcmc	angr	1.0-10.0	$2.41^{+0.03}_{-0.07}$	$2.107^{+0.004}_{-0.009}$	$1.876^{+0.003}_{-0.006}$	1.31	-	1.827	-	-
INTEGRAL	SPI	bcmc	angr	22-100	3.19 (fixed)	2.123 ± 0.014	\pm	0.7	-	-	1.04	0.73
RXTE	PCA			3-50	3.19 (fixed)	2.114	2.4018	2.63	-	2.320	1.09	-
Swift	BAT	bcmc	angr	30-100	3.19 (fixed)	2.10 ± 0.06	1.74 ± 0.25	0.82	-	-	0.82	0.57

Short brush-up (2/2)

Targets	N_H	Γ	F_{2-10}	Remarks (Status)
	10^{21} (cm^{-2})		(10^{-11} erg $\text{s}^{-1} \text{cm}^{-2}$)	
Crab	3.2	2.1	2200	PWN. Too bright. PL broken? (Table filled. Keep the numbers updated.)
G21.5-0.9	21	1.8	4.4	PWN. Large N_H . Contaminating thermal emission. (Some progress by Plucinsky [Chandra] and Guainazzi [XMM]).
3C58	3.2	2.2	1.0	PWN. Faint. (QL presented by MI at 3 rd IACHEC.)
PSR1509-58	8.8	1.8	7.3	PWN. P=150ms pulsation. Different spectra between the on/off pulse phases. (QL presented by MI at 3 rd IACHEC.)
PKS2155-304	~ 0.1	~ 2.5	~ 10	Blazer. Unpredictable variations. N_H low. PL broken. (Table filled. Draft in progress by MI).

Any updates in this category?

- (Fill in if any on site).

Data sets (pointed obs. only)

Obs.	Inst.	Crab	G21.5	3C58	PSR1509	PKS2155 (*1)
Suzaku		9	2	0	1	4
XMM		13	1	1	4	4
Chandra	ACIS	14	81 (3)	4	8	0
	HRC	0	38	3	1	0
	ACIS (+gr)	26	0	0	0	1
	HRC (+gr)	6	0	0	0	2
Swift		7	10	0	3	0
INTEGRAL		84	1	1	6	0
RXTE		821	1	148	251	0
Fermi		?	?	?	?	0

*1 : Coordinate observations only.

Do we need to add/remove sources/instruments from the list?

Assignments (1/2)

Obs.	Inst.	Lead (Sources). Gothic for agreed.
Suzaku	XIS	Ishida (Crab), Kohmura (PKS2155), Tsujimoto (others)
	HXD/PIN	Ishida (Crab), Kohmura (PKS2155), Tsujimoto (others)
	HXD/GSO	Yamada (all)
XMM	EPIC/MOS	Read (all)
	EPIC/pn	Guainazzi (all)
	RGS	Kaastra (all)
Chandra	ACIS	Plucinsky (G21.5)
	HRC	David (G21.5)
	ACIS+grating	No data
	HRC+grating	No data
Swift	XRT	Beardmore (all)
	BAT	Sakamoto (all)

Assignments (2/2)

Obs.	Inst.	Lead (Sources). Gothic for agreed.
INTEGRAL	IBIS	Natalucci
	SPI	Jourdain & Roques (Crab)
	JEM-X	Brandt
RXTE	ASM	
	PCA	Jahoda (all)
	HEXTE	
Fermi	GBM	
	LAT	

Discussion (1/4) Publication plan

- PKS2155 (MI, PASJ; MS, ApJ?), E0102 (PP, A&A) are in progress. They will be good prototypes.
- Information needs to be kept updated (otherwise, our entire activity becomes useless).
- Keep in mind that our products to be useful in the future.
- A paper should come out with a public web page (twiki also for NT-SNR by Plucinsky?).
- Two separate papers for Crab and other fainter flux calibrators?
 - Crab is too bright for <10 keV instruments. It is mainly for >10 keV instruments.
 - The paper of Crab lead by ? Contact with Weisskopf.
 - The paper of fainter flux calibrators lead by MT?

Discussion (2/4) Crab updates

- Progress at this conference.
 - INTEGRAL/SPI.
 - RXTE/PCA.
 - Others?
- Any new data? Suzaku?
- Please send your data to MT.
- Use a more realistic modified power-law model ("grbm"). Sakamoto offers his model ("crabm"). Also talk to Weisskopf for a model with a physical background.
- MT will update the table and circulate the result to the

Discussion (3/4) Fainter Flux Calib.

- Good to concentrate on a few sources, hopefully one like E0102 as a soft-band line calibrator.
- Pros & cons.
 - G21.5-0.9 ... a simple morphology. N_H large. Internal calibrator for Chandra, XMM (1 on-axis, 6 off-axis), Swift. Spatial variation? Suzaku data prospective. Extraction regions need to be commonly used.
 - 3C58 ... too faint? Morphology too complex. Thermal contamination. Bright in the soft-band.
 - PSR B1509-58 ... Hard. Good for Astro-H/HXI, SXI. Spectral variation in a pulse phase?
 - PSR B0540-69... 2mCrab 1-10 keV. N_H low. Thermal contamination

Discussion (3/4) Fainter Flux Calib.

- Common energy bands.
- Common extraction regions.
- Common spectral models.

Discussion (4/4) Others.

- Any other items that you want to discuss in the NT-SNR category?

Summary (1/4)

- The chair was changed. Category reactivated.
- Progress in the last year.
 - Calibration updates in INTEGRAL/SPI (Jourdain, Roques), RXTE/PCA (Jahoda), etc.
- Plans for the coming year's activity.
 1. Compile the results of Crab.
 2. Establish fainter flux calibrators.

Summary (2/4): Crab

All A/I's should be completed by the next meeting.

- A modified PL should be used instead of a simple PL.
 - A/I: Provide the gradually-braking PL (Sakamoto).
 - A/I: Refer to Weisskopf paper (Guainazzi).
 - A/I: Refit the spectra with the new model and send it to Tsujimoto (all).
- The comparison table and materials to be made public in a web page.
 - A/I: Setup a wiki page for Crab (Plucinsky).
 - A/I: Put the contents (Tsujimoto)
- Absolute flux?
 - Limit the scope of this category to relative flux.
 - A/I: INTEGRAL/SPI offers absolute flux value? (Jourdain, Roques)

Summary (3/4): Fainter Calibrators

All A/I's should be completed by the next meeting.

- Faint flux and power calib. necessary (Crab too bright for imaging inst.).
- We use G21.5-0.9.
 - Suzaku data will be added (Ishida).
 - NH large (10^{22} cm⁻²). A soft band calib. to be combined.
 - Too faint (2 mCrab) for non-imaging inst.. A super-hard band calib. to be combined.
 - Contaminating point-like and diffuse sources.
 - A/I: Setup a wki page (Plucinsky, Tsujimoto).
 - A/I: A guidance of src/bkg extraction (Plucinsky, Tsujimoto).
 - A/I: Send src/bkg spectra, ARF, RMF to Tsujimoto ... ACIS (Plucinsky), HRC (L. David), XIS (Tsujimoto), MOS (Read), pn (Guainazzi), PCA (Jahoda), XRT (Beardmore), BAT (Sakamoto), SPI (Jourdain, Roques), HXD (Yamada)
 - A/I: Consider good soft & superhard-band calibrators (all).

Summary (4/4) Publication Plan

All A/I's should be completed by the next meeting.

- Two separate papers.
 - Crab : main focus on non-imaging instruments. Lead: TBD.
 - G21.5-0.9 and others: main focus on imaging instruments < 10 keV. Lead Tsujimoto.
- A/I: Circulate a draft of G21.5-0.9 (Tsujimoto).