The redshift of XRF 030528 or from GRB to XRF to XRR

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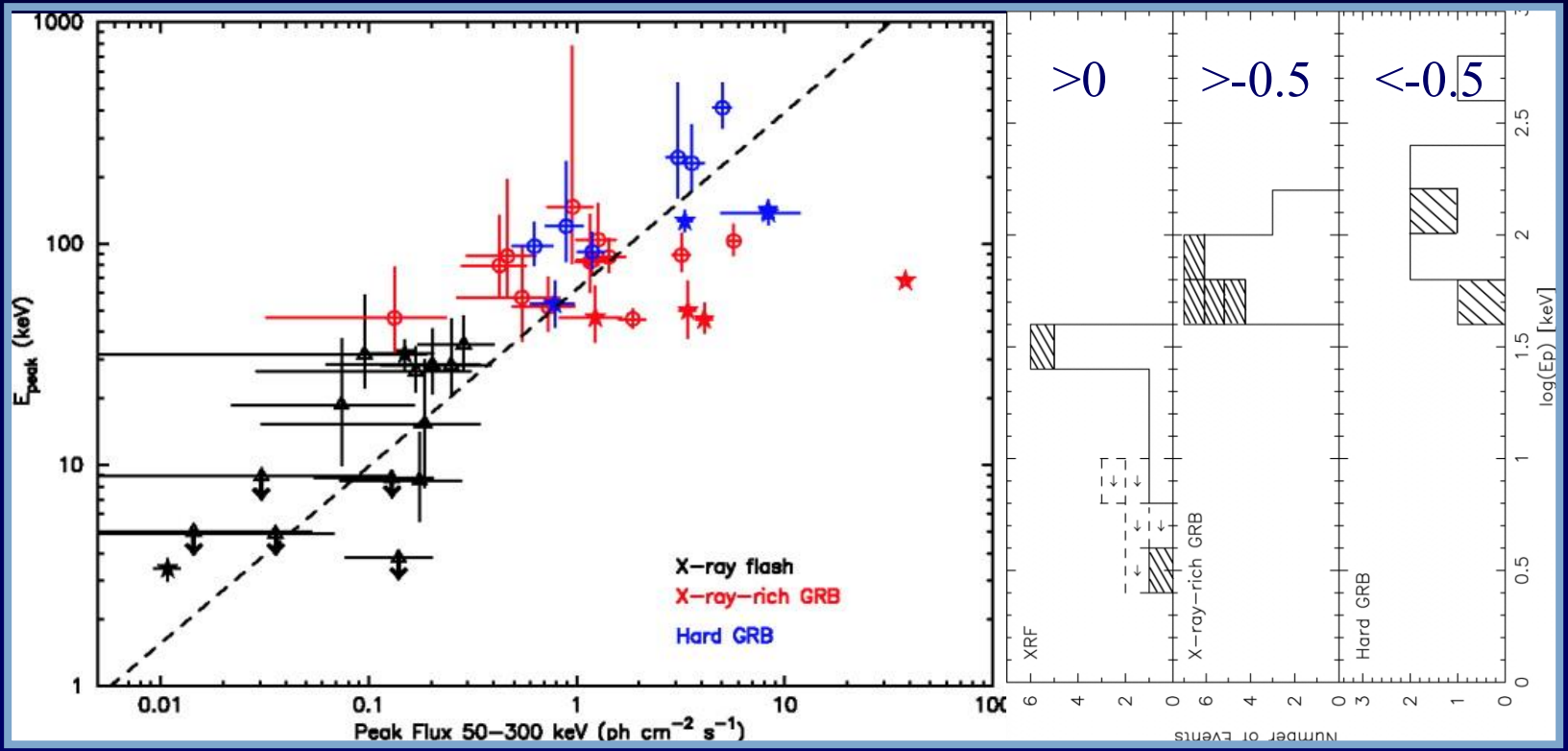
X-ray Flashes - prompt

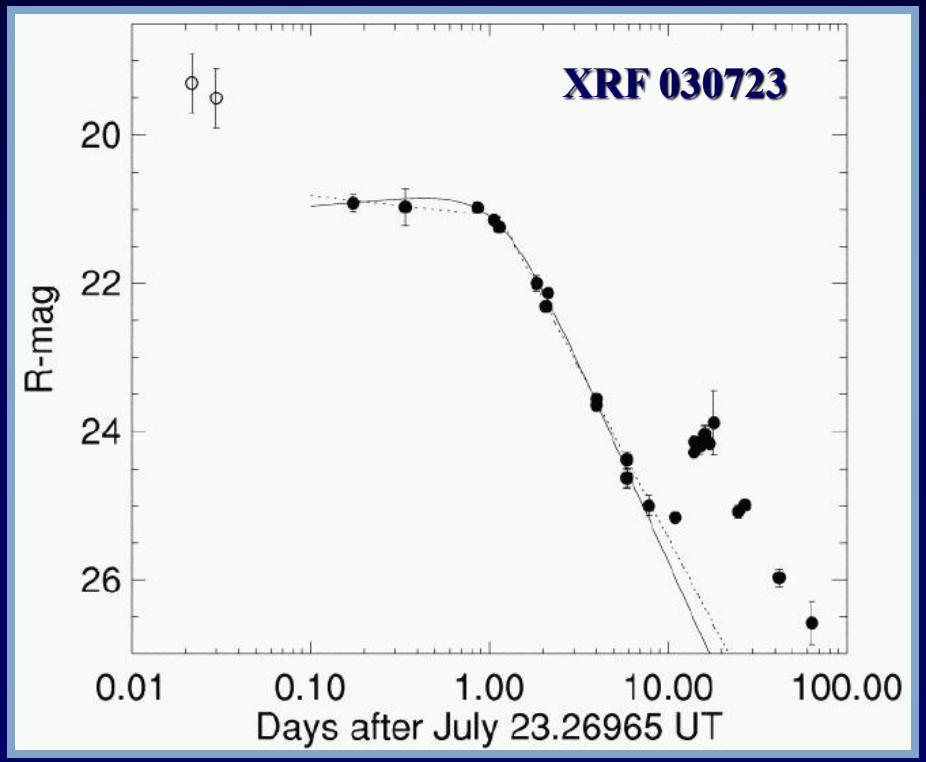
- BeppoSAX WFC (Heise et al. 2001)
- similar to LGRBs except E_{peak}
- HETE-2 observer frame classification:
  $\log(S_x(2\text{-}30\ \text{keV}) / S_\gamma(30\text{-}400\ \text{keV}))$ (Sakamoto et al. 2004)



(Sakamoto et al. 2005)

X-ray Flashes - late

- XRFs/XRRs/LGRBs form continuum
- X-ray, optical, radio afterglows
- underlying supernova (Fynbo et al. 2003, Soderberg et al. 2005)
- late type host galaxies (e.g. Bloom et al. 2003)



(Fynbo et al. 2003)

X-ray Flashes - models

- high baryon loading in the ejecta (e.g. Dermer et al. 1999)
- low contrast between the bulk Lorentz factors of colliding relativistic shells (Barraud et al. 2005)
- off-axis bursts (e.g. Yamazaki et al. 2002)
- high redshift (e.g. Heise et al. 2001)

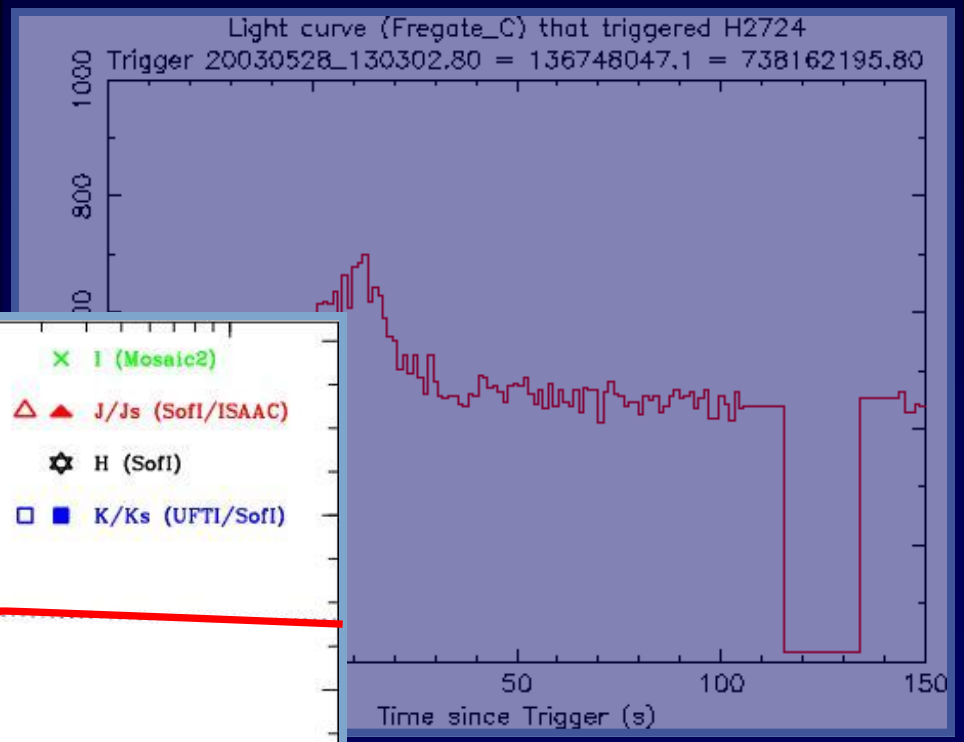
Distance Scale is important:

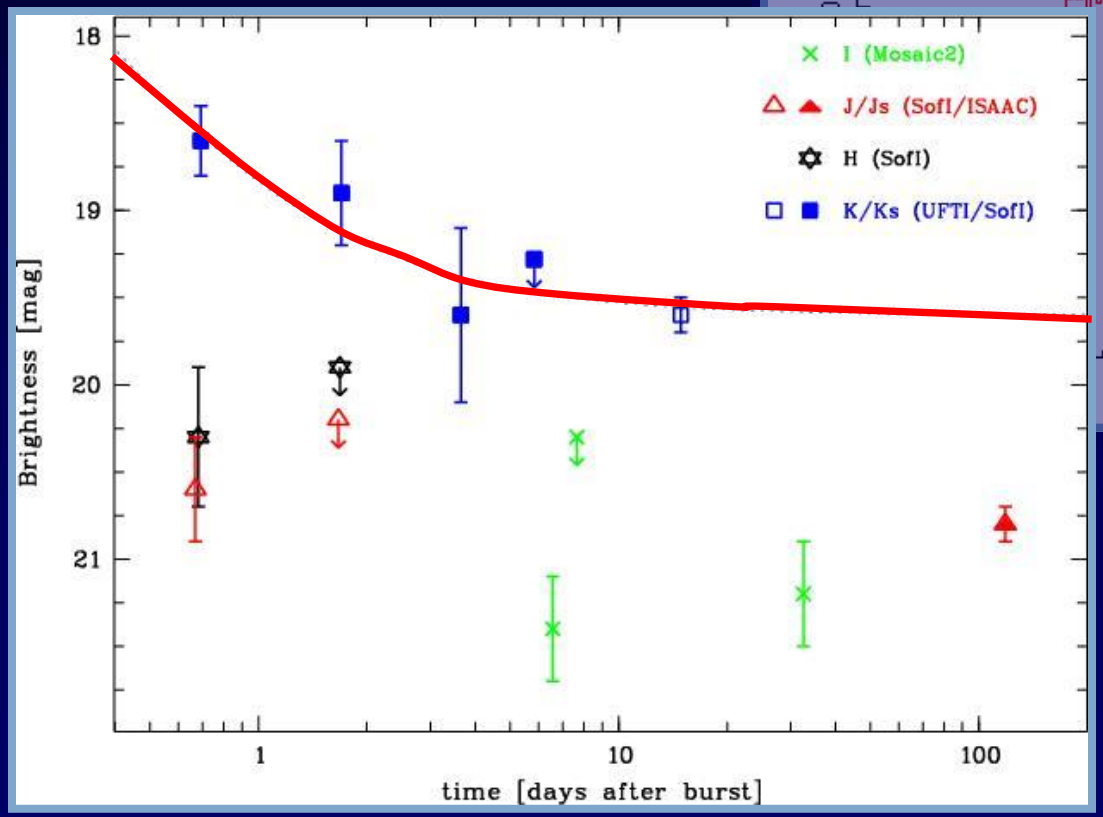
XRF 020903: z=0.251 (Soderberg et al. 2004)
XRF 030429: z=2.66 (Jakobsson et al. 2005)

011030 (<3.5); 020427 (<2.3); 030723 (<2.3);
040701 (0.2146 ??)

XRF ~~GRB~~ 030528

- T_{90} = 49.1s (30-400 keV)
- E_{peak} = 32±5 keV
- log (S_X / S_γ) = 0.04

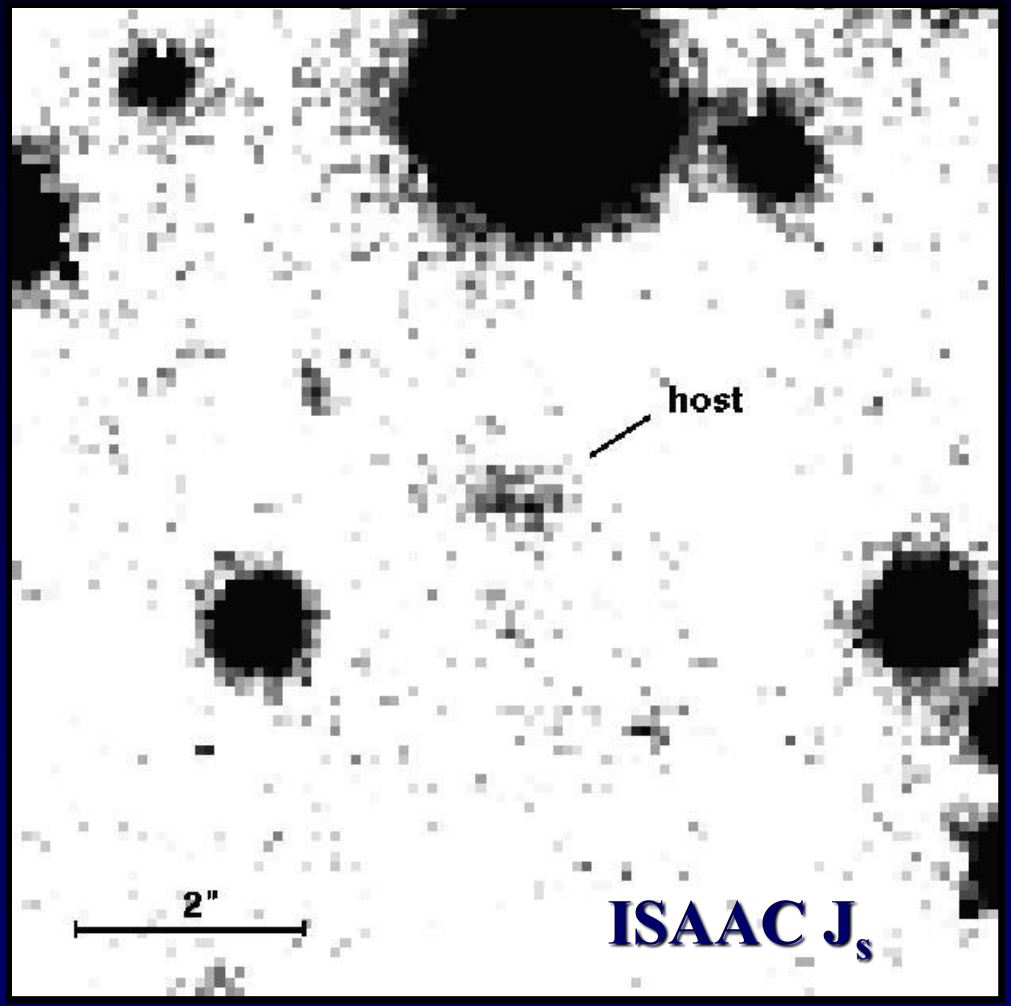




(AR et al. 2004)

$F \propto t^{-1.2} \bullet \nu^{-(>0.4)}$

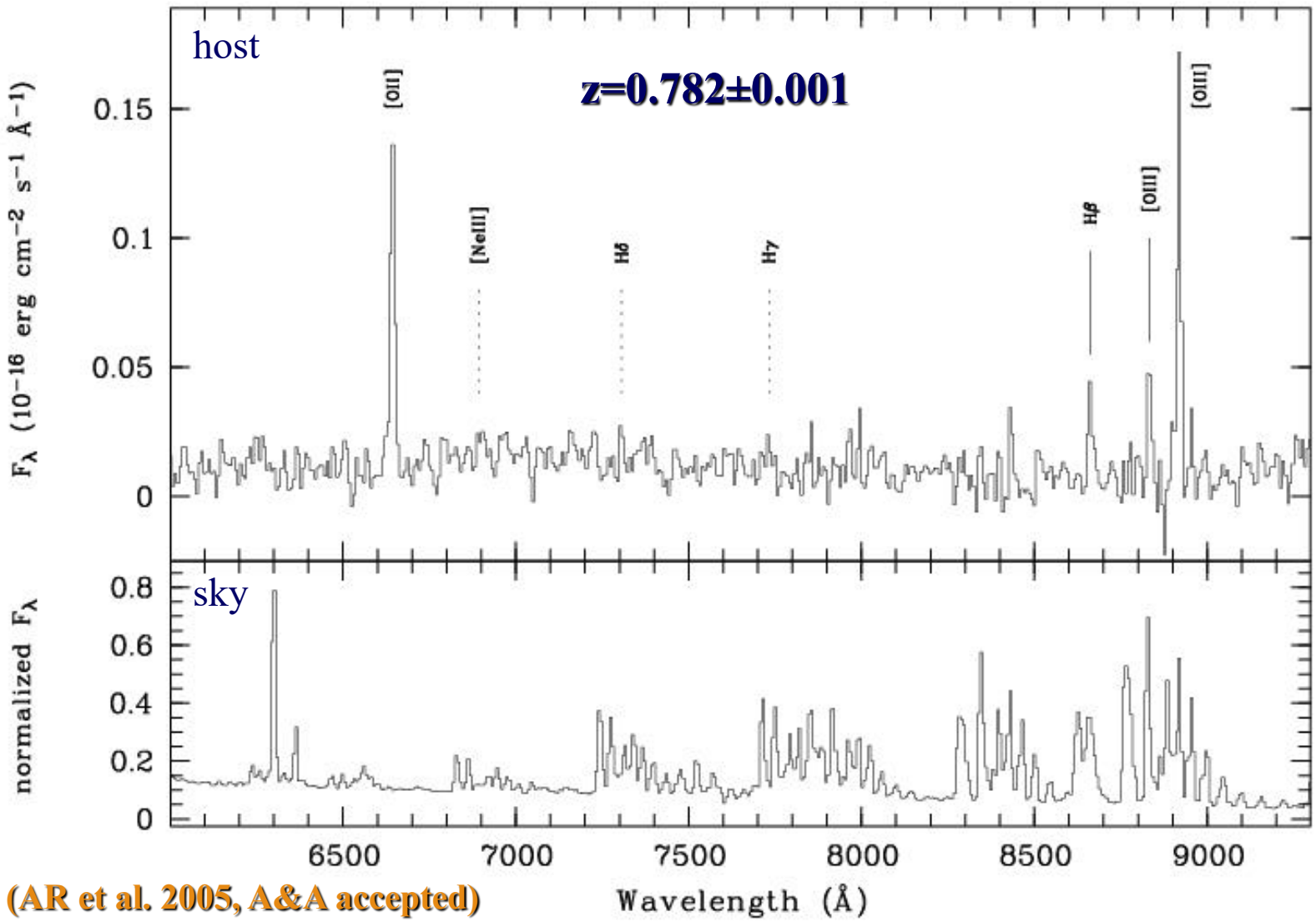
Host Galaxy - Photometry



$V = 21.9 \pm 0.2$
$R = 22.0 \pm 0.2$
$I = 21.3 \pm 0.3$
$J = 20.8 \pm 0.1$
$H < 20.3$
$K = 19.9 \pm 0.7$

SED consistent with late type galaxy at $z<4$

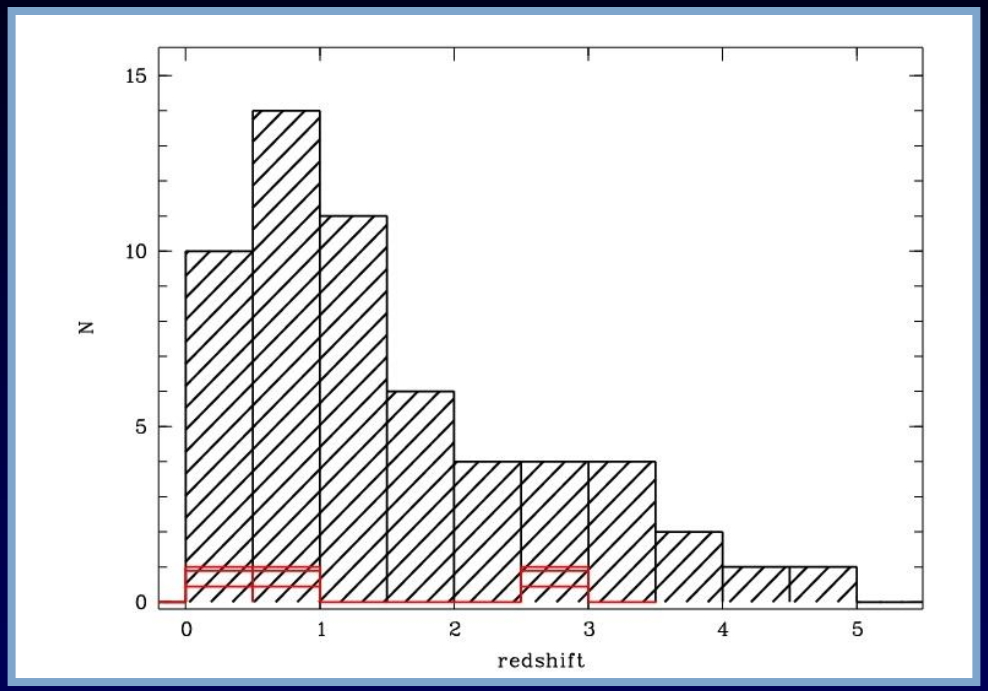
VLT/FORS2 LSS (2 hrs 300V April/May05)



(AR et al. 2005, A&A accepted)

Arne Rau - Santorini 2005

030528 in the rest frame



030528: $E_{peak,obs}$ = 32±5 keV ⇒ $E_{peak,rest}$ = 57±9 keV

$\log(S_x/S_\gamma)_{obs}$ = 0.04 ⇒ $\log(S_x/S_\gamma)_{rest}$ = -0.17

XRF_{obs} ⇒ XRR_{rest}

030429: XRF_{obs} ⇒ XRR/GRB_{rest}

020903: XRF_{obs} ⇒ XRF_{rest}

Summary

- z=0.782
- observer frame XRF $\Rightarrow$ rest frame XRR
- rest frame classification scheme required
- host properties (AR et al. 2005, A&A accepted)
- Do we expect also short XRFs ?

Host Properties

- metallicity from emission lines: $R_{23}=\log(([OIII]+[OII])/H_\beta)$ $0.1<Z<0.6$
- absolute magnitudes

	M_{AB} [mag]	L/L_*
U	-20.5 ± 0.1	1.2 ± 0.2
B	-20.7 ± 0.1	0.5 ± 0.1
R	-21.1 ± 0.1	0.35 ± 0.05
J	-21.4 ± 0.1	0.25 ± 0.05
K_s	-21.6 ± 0.1	0.17 ± 0.05

- stellar mass: $9\cdot10^9$ M_{sun} (Brinchman & Ellis 2000) to $2\cdot10^{10}$ M_{sun} (Bell et al. 2005)
- size: ~11 kpc

Star Formation

[OII]: $SFR(M_s\ yr^{-1}) = 1.4 \pm 0.4 \cdot 10^{-41} L_{[OII]}$ (Kennicut 1998)

$SFR(M_s\ yr^{-1}) = 8.4 \pm 0.4 \cdot 10^{-41} L_{[OII]}$ (Rosa-Gonzalez 2002)

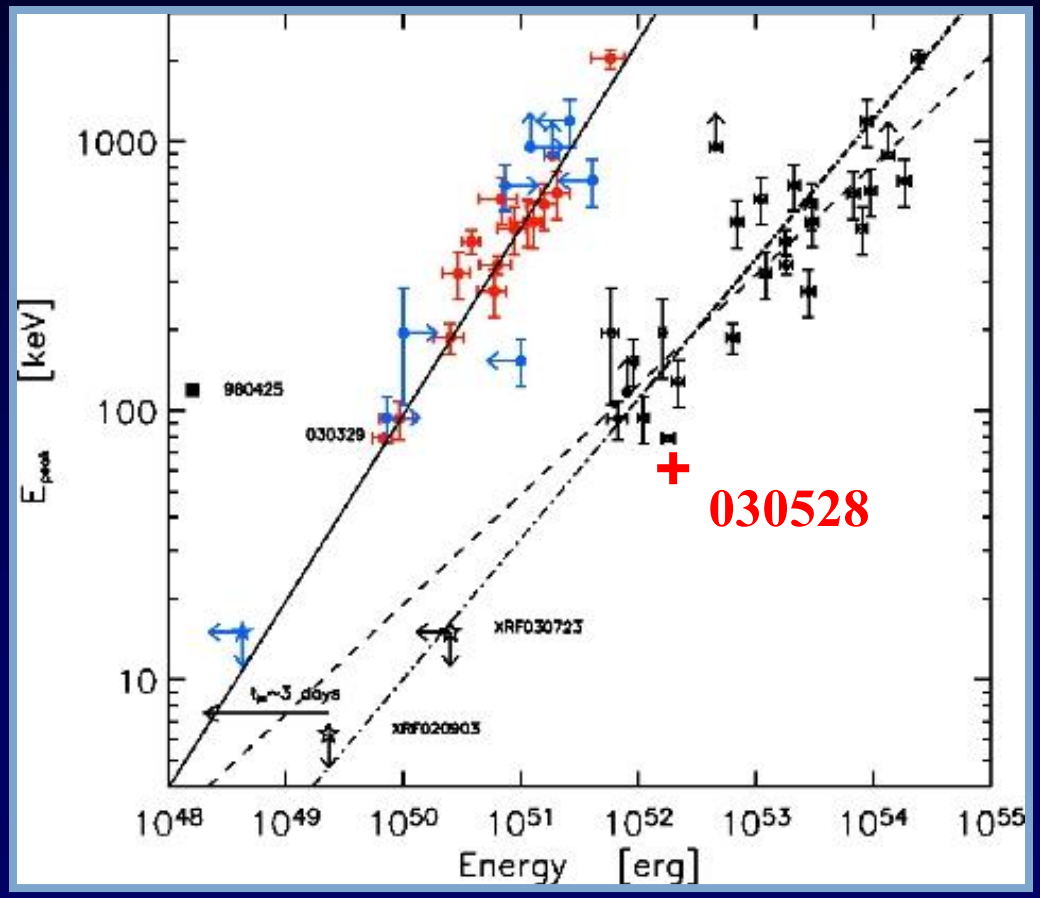
UV: $SFR(M_s\ yr^{-1}) = 1.4 \pm 0.4 \cdot 10^{-28} L_{\nu,UV}$ (Kennicut 1998)

$SFR(M_s\ yr^{-1}) = 6.4 \pm 0.4 \cdot 10^{-28} L_{\nu,UV}$ (Rosa-Gonzalez 2002)

		SFR	SSFR	SFR
		$[M_s\ yr^{-1}]$	$[M_s\ yr^{-1}]$	$[M_s\ yr^{-1}\ M_s^{-1}]$
[OII]	K98	6 ± 2	12 ± 3	$2 \cdot 10^{-10}$
	RG02	37 ± 4	74 ± 6	$12 \cdot 10^{-10}$
UV	K98	4 ± 1	8 ± 2	$1 \cdot 10^{-10}$
	RG02	17 ± 3	34 ± 4	$5 \cdot 10^{-10}$

Energetics

$E_{iso,\gamma} = 2.0 \pm 0.7 \times 10^{52}$ erg (2-400keV)



(Ghirlanda et al. 2004)