



Swift: Catching Gamma-Ray Bursts on the Fly



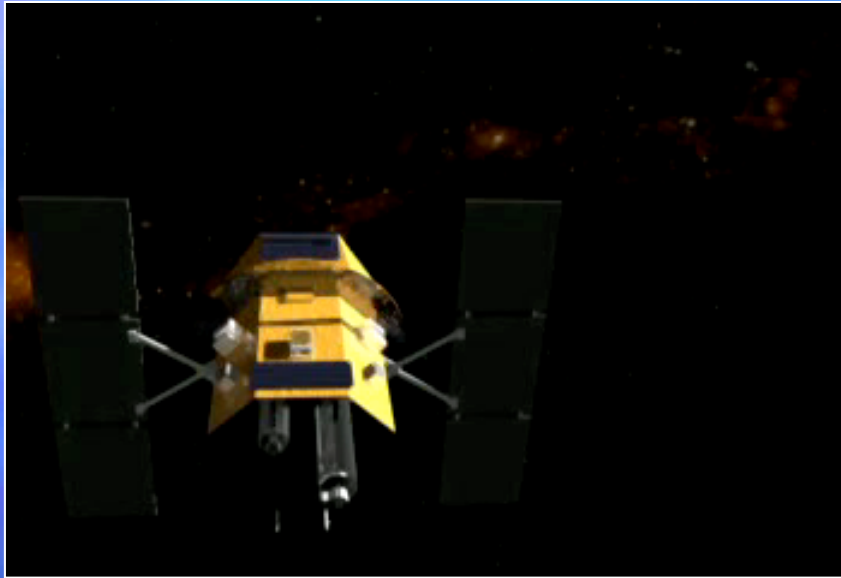
Swift as a go-to facility for BH physics

Pat Romano
INAF-IASF Palermo

Bologna, April 13, 2011



Swift Gamma-ray Burst Mission

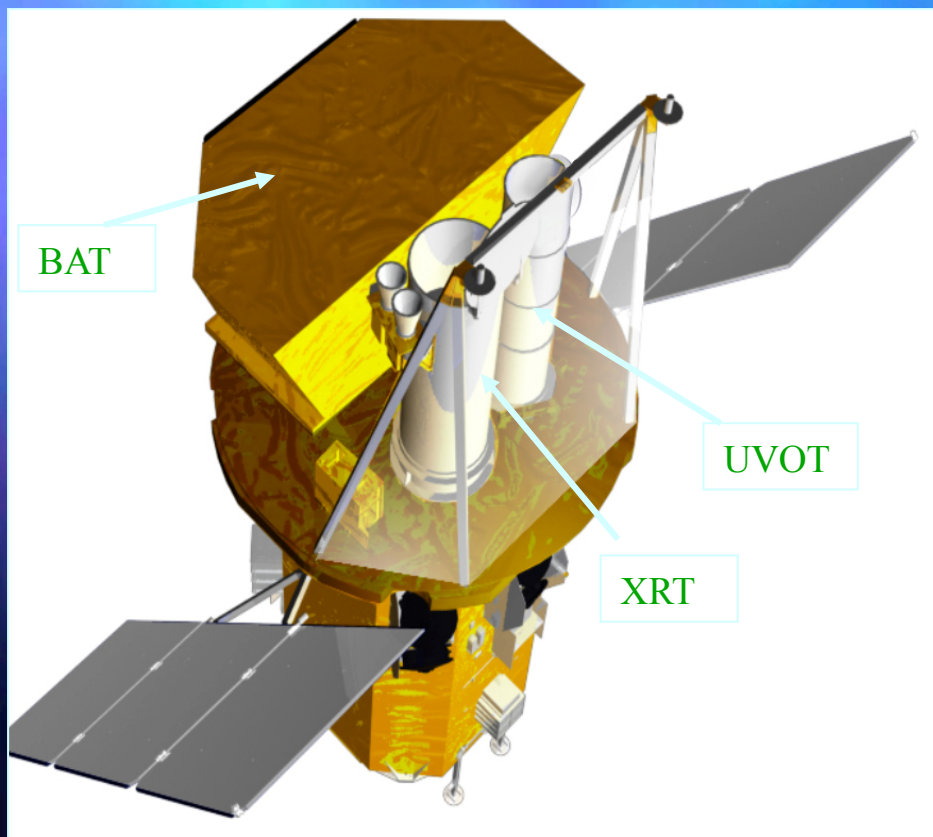


- NASA MIDEX + UK and IT
- First-of-its-kind autonomous rapid-slewing
- Pioneers the way for future rapid-reaction and multi-wavelength missions
- Nominal 2-year lifetime, extended in 2006, 2008, 2010

Swift Instruments

Spacecraft

- Autonomous re-pointing, <70 s
- Onboard and ground triggers



Burst Alert Telescope (BAT)

- Field of view: 1/6 of sky
- coded aperture mask
- Imaging: 15-150 keV
- Precision: 2-3 arcmin

X-Ray Telescope (XRT)

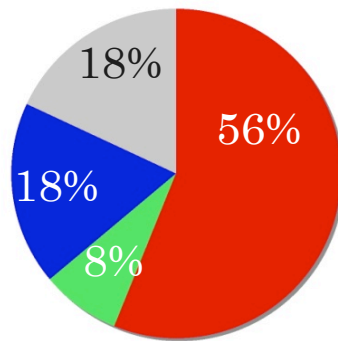
- Arcsec imaging in 0.2–10 keV, Precision: 3 arcsec
- CCD spectroscopy

UV/Optical Telescope (UVOT)

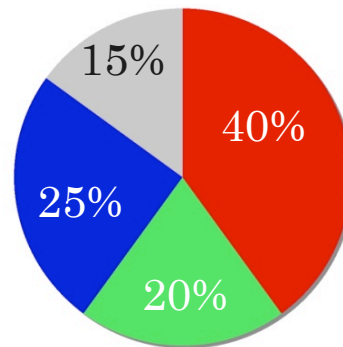
- Sub-arcsec imaging
- Precision: 0.5 arcsec, 1700 - 6500 Å
- Grism spectroscopy
- Imaging:
- Sensitivity: 24th mag sensitivity (1000 sec)

Evolving Observing Time

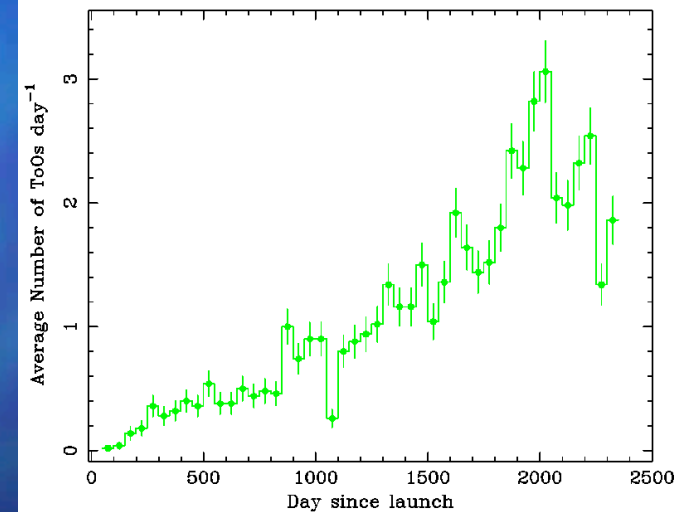
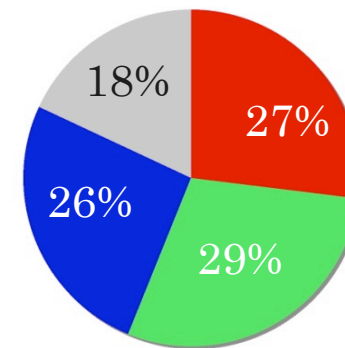
SR 2006



SR 2008



SR 2010



Courtesy of J.A Kennea

Swift as a go-to facility

- **Extreme flexibility:**
 - observing schedule (daily plans)
 - fast re-pointing: can be on target in ~2 hours
 - slews in ~ 100s



Swift as a go-to facility

■ Extreme flexibility:

- slews in ~ 100s

PPST for April 10th, 2011 (DoY 100)

April 10th 2011
PPST ☒ AFST ☐

Notes:

Click on target ID to see a summary for all segments belonging to that target ID.

Click on segment number to see information for just that segment.

PPST time is calculated from begin to end. This does not take slewing into account.

SAA Cold - Observation performed during passage through the South-Atlantic Anomaly (SAA) to aide XRT passive cooling. No data is collected during SAA passages.

Begin	End	Target ID	Seg.	Target Name	R.A.	Dec.	Roll	XRT Mode	UVOT Mode	FoM	Time (s)
2011-04-10 00:00:00	2011-04-10 00:05:00	91177	1	1RXSJ111333.5+301957	168.37004	30.31744	307.03686	PC	0x011e	45	300
2011-04-10 00:05:00	2011-04-10 00:25:00	31955	12	Swift J164449.3+573451	251.22572	57.56576	45.44130	Auto	0x2002	99	1200
2011-04-10 00:25:00	2011-04-10 00:46:00	31922	27	Cyg X-3	308.13267	40.95762	89.74734	WT	0x011e	74	1260
2011-04-10 00:46:00	2011-04-10 00:58:00	31287	88	ESO 243-49	17.61308	-46.09914	351.67217	PC	0x011e	64	720
2011-04-10 00:58:00	2011-04-10 01:11:00	90996	1	RX J0435.9-3636	68.95178	-36.62164	294.21331	PC	0x30ed	45	780
2011-04-10 01:11:00	2011-04-10 01:20:00	31934	13	SN 2011am	184.10401	-43.29757	189.87287	Auto	0x223f	74	540
2011-04-10 01:20:00	2011-04-10 01:46:00	74366	47	saa-cold-100-00	135.22962	-75.00000	245.68306	Auto	0x0009	100	1560
2011-04-10 01:46:00	2011-04-10 02:01:00	31955	12	Swift J164449.3+573451	251.22649	57.56658	48.02781	Auto	0x2002	99	900
2011-04-10 02:01:00	2011-04-10 02:12:00	91095	4	GALACTIC CENTER	266.42469	-28.97938	99.03663	Auto	0x011e	88	660
2011-04-10 02:12:00	2011-04-10 02:31:00	40806	2	RX J0228.2-4057	37.04886	-40.97483	324.64179	PC	0x30ed	40	1140
2011-04-10 02:31:00	2011-04-10 02:47:00	38981	2	J055046.6-175630	87.66926	-17.94394	274.88604	PC	0x011e	40	960
2011-04-10 02:47:00	2011-04-10 02:59:00	31934	13	SN 2011am	184.10247	-43.29789	193.48231	Auto	0x223f	74	720
2011-04-10 02:59:00	2011-04-10 03:27:00	74492	98	saa-cold-100-01	172.76311	-80.00000	206.45799	Auto	0x0009	100	1680

<https://www.swift.psu.edu/operations/obsSchedule.php>

Swift as a go-to facility

■ Extreme flexibility

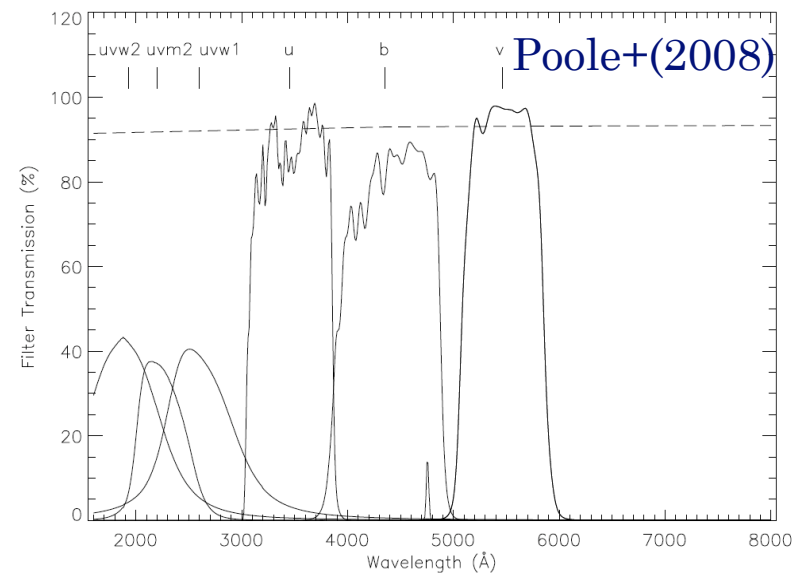
- observing
- fast re-pointing
- slews in ~ 100 s

■ Simultaneous broad-band observations

- XRT (0.2-10 keV)
- UVOT (1700 - 6500 Å)
- BAT (and BAT TM)

■ Monitoring campaigns

Filter	Central Wavelength (Å)	FWHM (Å)
v	5468	769
b	4392	975
u	3465	785
uvw1	2600	693
uvm2	2246	498
uvw2	1928	657



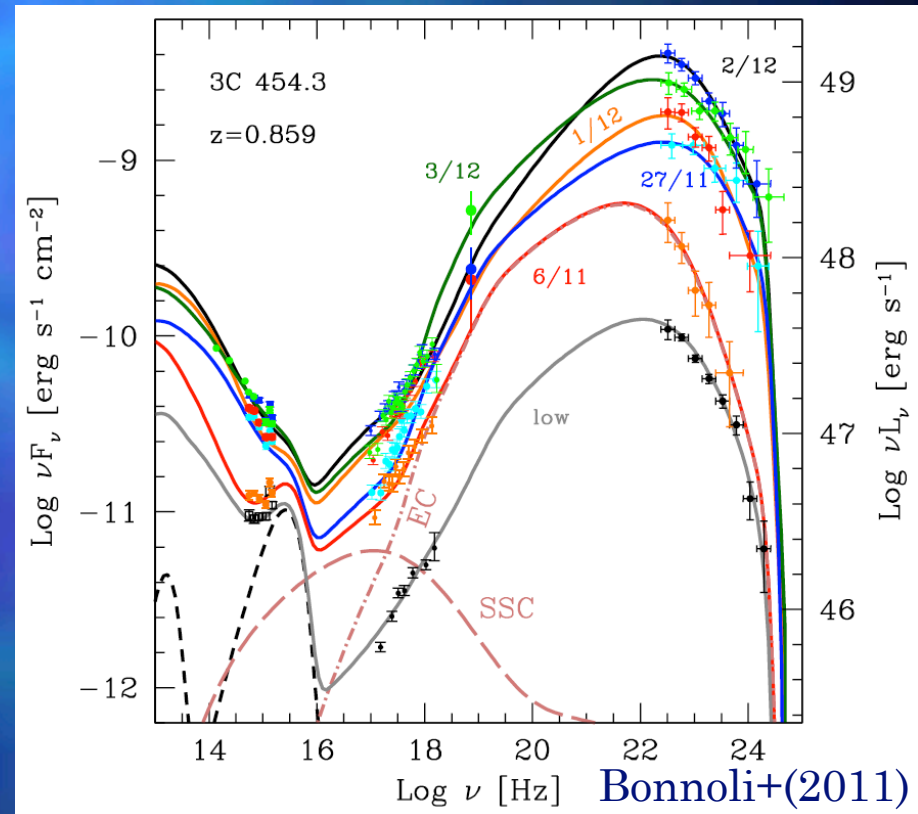
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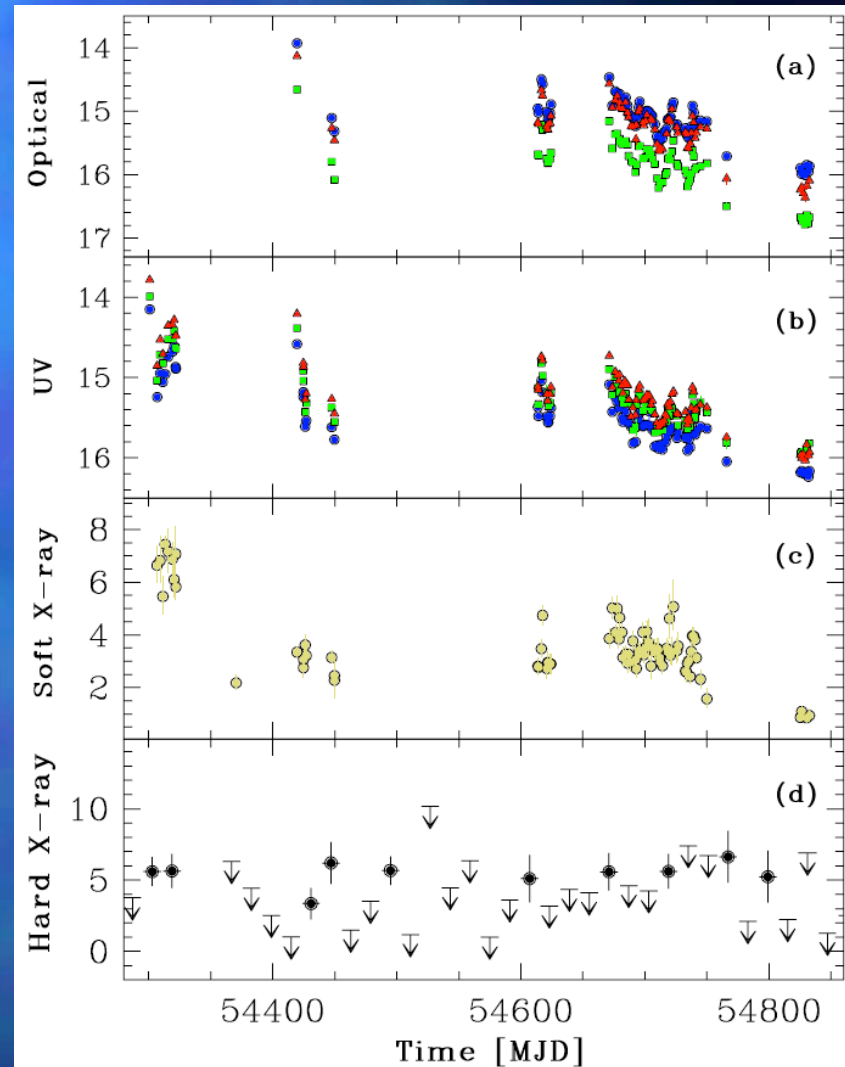
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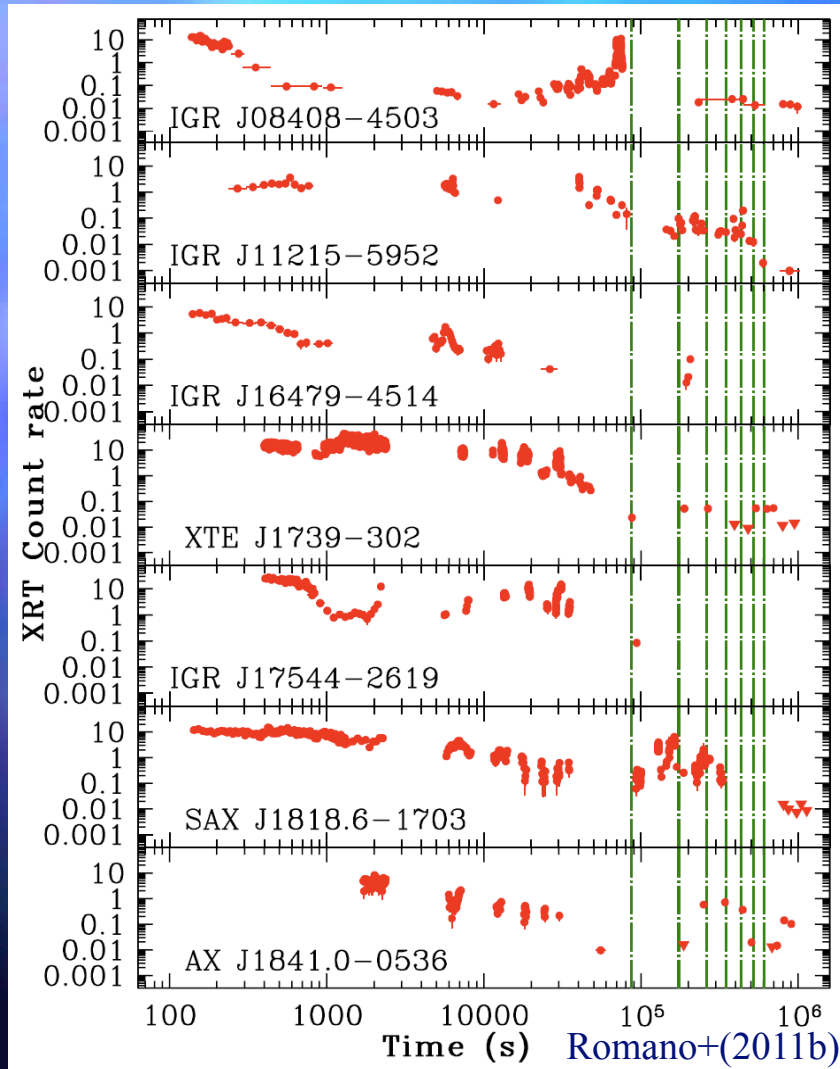
■ Monitoring campaigns



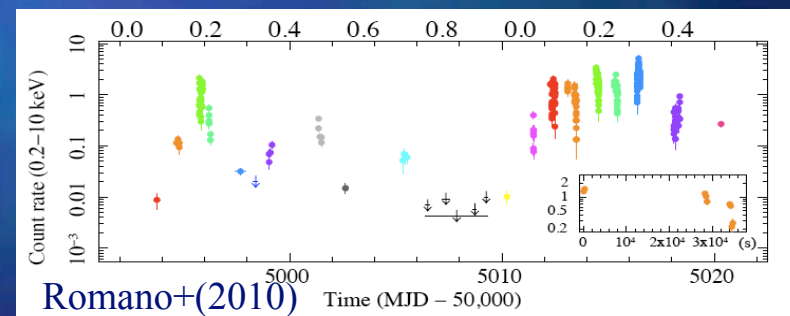
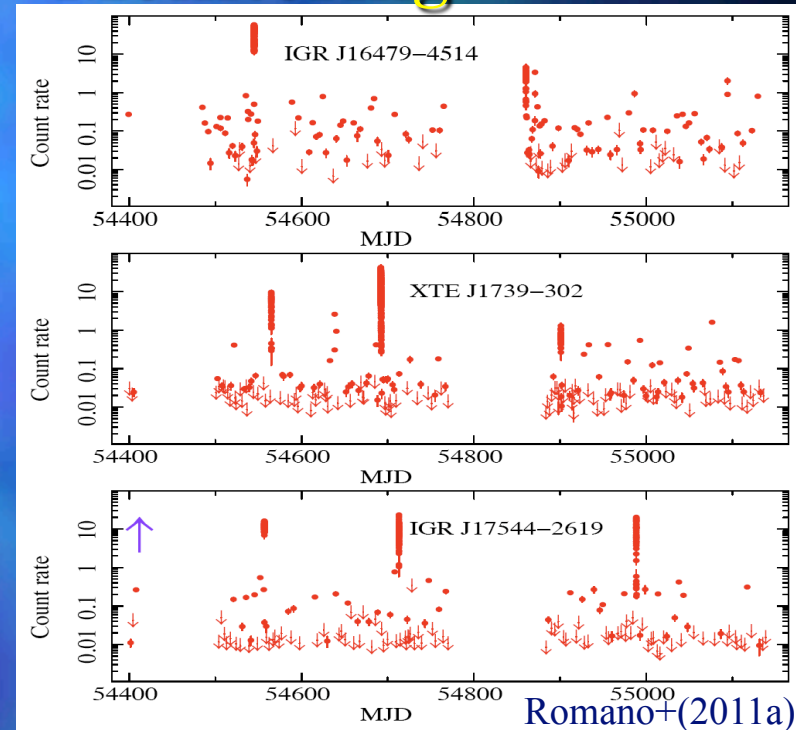
Vercellone+(2010) 3C454.3 2007-2009

Supergiant fast X-ray Transients (XRT)

Outbursts



Monitoring



Requesting *Swift* ToOs



Home | Mission | Observatory | Operations | Additional Info |

Target of Opportunity - Request Form

Required information is indicated by an asterisk *.

Note: This form can only be used to submit a TOO request for one(1) target. If you require observations of more than one target, you will need to submit multiple TOO requests.

Requester's Information

*Username: [create an account](#)

*Password:

*Urgency

☐ Highest Urgency (observation needed within 4 hours, **wakes up PI**)

☐ High Urgency (observation needed within 24 hours)

☐ Medium Urgency (days to a week)

☐ Low Urgency (weeks to a month)

☐ Observing Campaign (provide dates/times at end of page)

Source Identification

ToO Request
New User Form
Summary of Requests
Admin



https://www.swift.psu.edu/secure/toop/too_request.htm

P. Romano COST 0905 3rd WG Meeting, Bologna, 2011 April 12-13

Requesting *Swift* ToOs

Requested Observation

*Observation Type: ☐ Single Observation
[What is this?](#) ☒ Monitoring Observations

*# of Requested Visits:

*Exposure Time Per Visit: seconds

*Time Between Each Visit: ☐ hour(s)
☐ day(s)
☐ week(s)
☐ other
(also select if irregular monitoring or exact times/dates are required)

*Total Exposure Time: seconds

*Exposure Time Justification:

*XRT Mode: ☐ Windowed Timing (WT)
For count rates > 1 count/s.
☐ Photon Counting (PC)
For count rates < 1 count/s.
☐ Auto
XRT will pick the mode based on source brightness.

UVOT Filters:

[More information about UVOT filter wheel rotations.](#)

https://www.swift.psu.edu/secure/toop/too_request.htm

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Summary

- *Swift* is a GRB mission which has evolved into a multi-purpose observatory
- Multi- λ capacity and flexible observing schedule (flares and monitoring) make it ideal for AGN studies
- Support for other current and future observatories (AGILE, Fermi, MAGIC, Veritas, H.E.S.S., CTA, WEBT-GASP etc.)

Contact us!

romano@ifc.inaf.it



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Thanks!

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