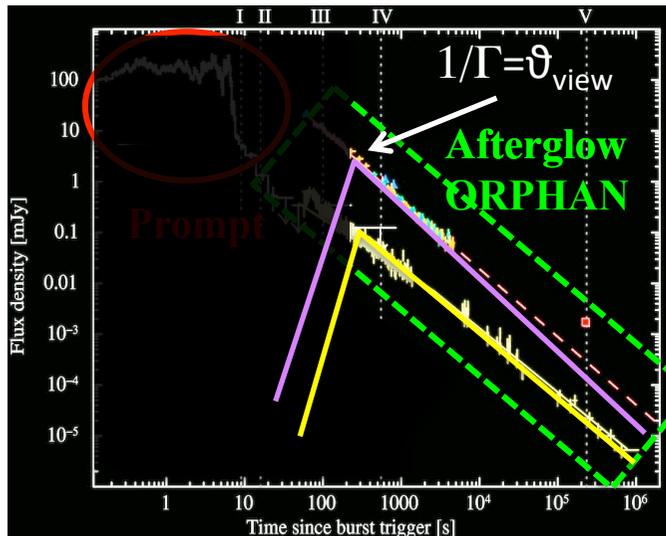
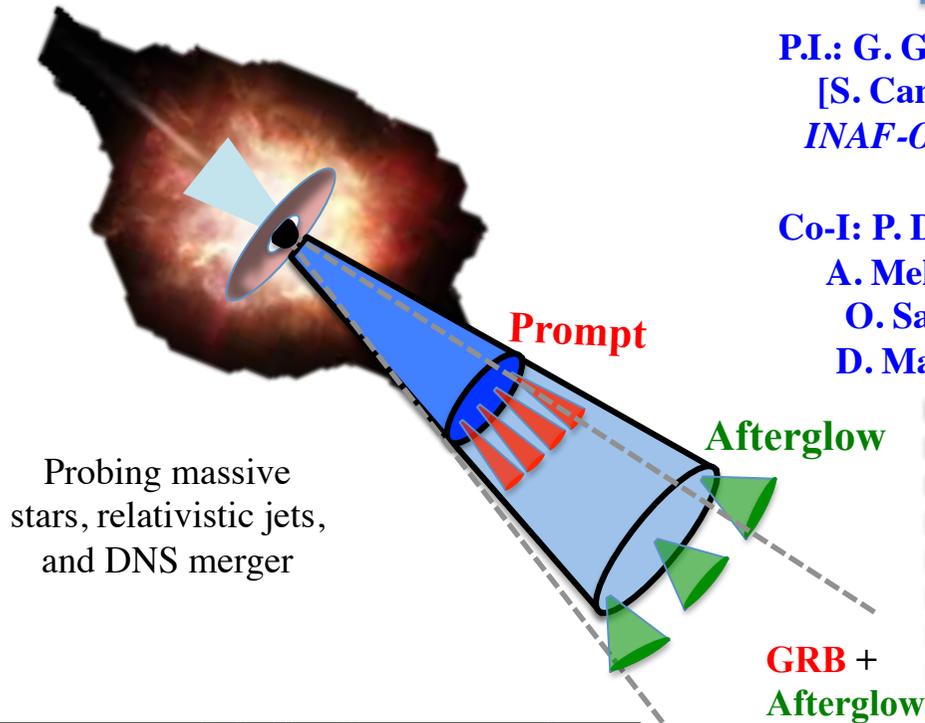


Gamma Ray Bursts AND Tidal Disruption Events

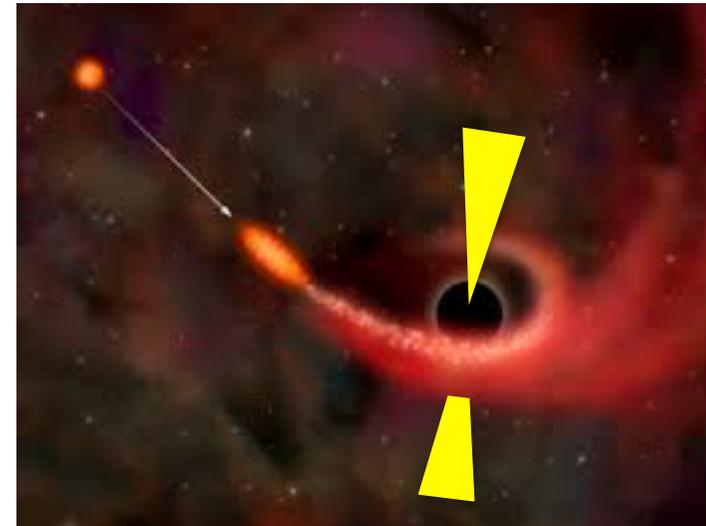
(orphans and parents)

PI.: G. Ghirlanda,
[S. Campana]
INAF-OABrera

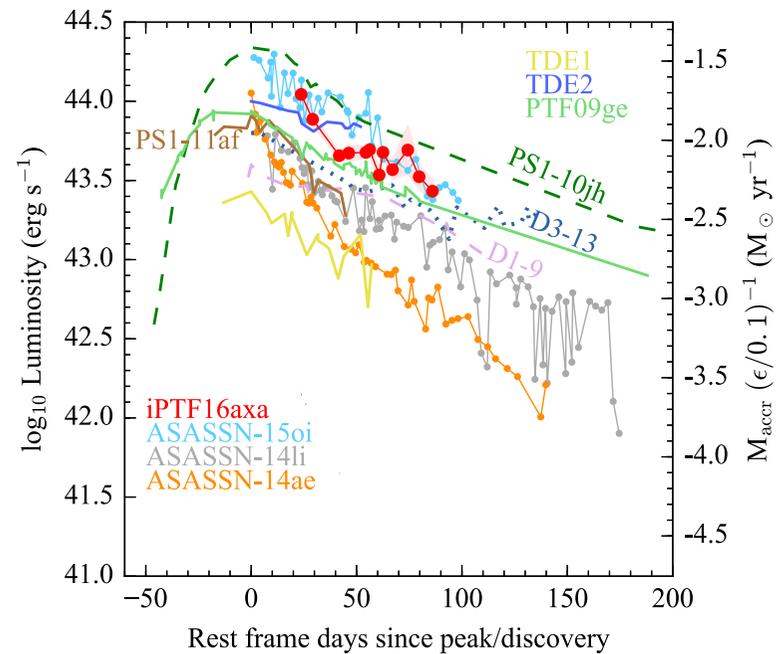
Co-I: P. D'Avanzo,
A. Melandri,
O. Salafia,
D. Mainetti



No convincing Orphan Aft. ever (@ any freq.)



Real time probes of SMBHs and accretion physics ... some jets



Scientific objectives of the project

Preparatory
(now – 2019)

Rates of GRBs and TDEs in the reach of LSST

- a) Long GRBs
 - b) Short GRBs
 - c) TDE (population + dynamics + emission regimes)
- } population + emission components

Strategies

1. Classification:

- a) Spectroscopy
- b) Light curve
- c) Diagnostic tools

2. MW follow up

JETs:

- a) Measurements of Θ_{jet} in long and short GRBs
- b) Probing the structure of jets in GRBs
- c) Constraints on jetted TDE (jet origin and accel.)

Progenitors/Engine:

- a) Long GRB-SN connection
- b) Short GRB progenitors (macronova, pre/post-merger dynamics)
- c) Fall back / accretion / debris dynamics (TDE and GRB)
- d) Dormant SMBH census from TDE
- e) TDE from NS

Hosts/Environment:

- a) Long/short GRB closest “pristine” environ (off-axis)
- b) Large host samples
- c) Circum BH environ
- d) BH (from IM to SM) mass function
- e) TDE role in AGN-BH growth

>> 2019

Working Groups and Activities

	Topics	Coordinator	Participants	Activities
Preparatory (< 2019)	Rates	G. Ghirlanda	<i>O. Salafia, D. Mainetti</i> R. Salvaterra, G. Lodato, M. Colpi, E. Rossi, G. Ghisellini, A. Franchini, A. Pescalli, L. Nava, M. Colpi, M. G. Bernardini, T. Sbarrato	Populations
				Long
				Short
Strategy	Classific.	S. Campana	<i>D. Mainetti, O. Salafia</i> S. Covino, M. C. Baglio, G. Oganeyan, V. D'Elia, I. Donnarumma	Spectroscopy (different phases) + photometry, definition of diagnostic tools
	Follow up	P. D'Avanzo A. Melandri	<i>S. Campana, G. Tagliaferri, S. Covino, G. Oganeyan</i>	MW follow up strategy with other facilities
Observations	LSST	S. Campana G. Ghirlanda	<i>A. Melandri, P. D'Avanzo, D. Mainetti, O. Salafia, S. Covino, V. D'Elia, G. Tagliaferri, R. Salvaterra</i>	Data analysis (shortest cadence) + follow up (early spectroscopy + MW follow up)
Jets	Structure Distribution Jet formation	O. Salafia	<i>G. Ghirlanda, G. Ghisellini, L. Nava, E. Rossi</i>	Light curve modelling (short!) Population rates (on-off axis)
Progenitors/ Engine	GRB-SN Mergers/mass eject. Fall back/accretion IMBH-SMBH	A. Melandri	<i>D. Mainetti, O. Salafia, M. G. Bernardini, M. Colpi, G. Lodato, S. Covino</i>	Light curve modelling Spectroscopy BH dynamics
Hosts/ Environments	Pristine medium Host demography BH-TDE connection	P. D'Avanzo	<i>S. Campana, R. Salvaterra, S. Covino, G. Tagliaferri</i>	Spectroscopy

Observations from other facilities

	Coordinator	Participants	Other Facilities
High Energy to Very High Energy	G. Ghirlanda	<i>O. Salafia, S. Campana, M. G. Bernardini, A. Pescalli, L. Nava, S. Covino, F. Tavecchio</i>	Fermi, Swift_BAT, Magic, AGILE, Integral CTA, SVOM
X-ray	P. D'Avanzo	<i>A. Melandri, S. Campana, M. G. Bernardini, F. Coti Zelati, G. Tagliaferri</i>	Swift-XRT, XMM-Newton, Chandra IXPE eROSITA, Athena
Optical	S. Campana	<i>A. Melandri, D. Mainetti, S. Covino, V. D'Elia, R. Salvaterra, M. C. Baglio</i>	Swift-UVOT, ESO-NTT, TNG, VST, REM, VLT X-Shooter, NOT-NTE, LBT SOXS (P.I. Campana) JWST, e-ELT
mm to Radio	A. Melandri	G. Ghirlanda, S. Covino I. Donnarumma	VLA, EVN, VLBI(A), SRT, ALMA Pre-SKA, SKA

Future Facilities

SOXS = Son Of X-Shooter (P.I. Campana). Expected 2019-2020

0.35-1.75 μm

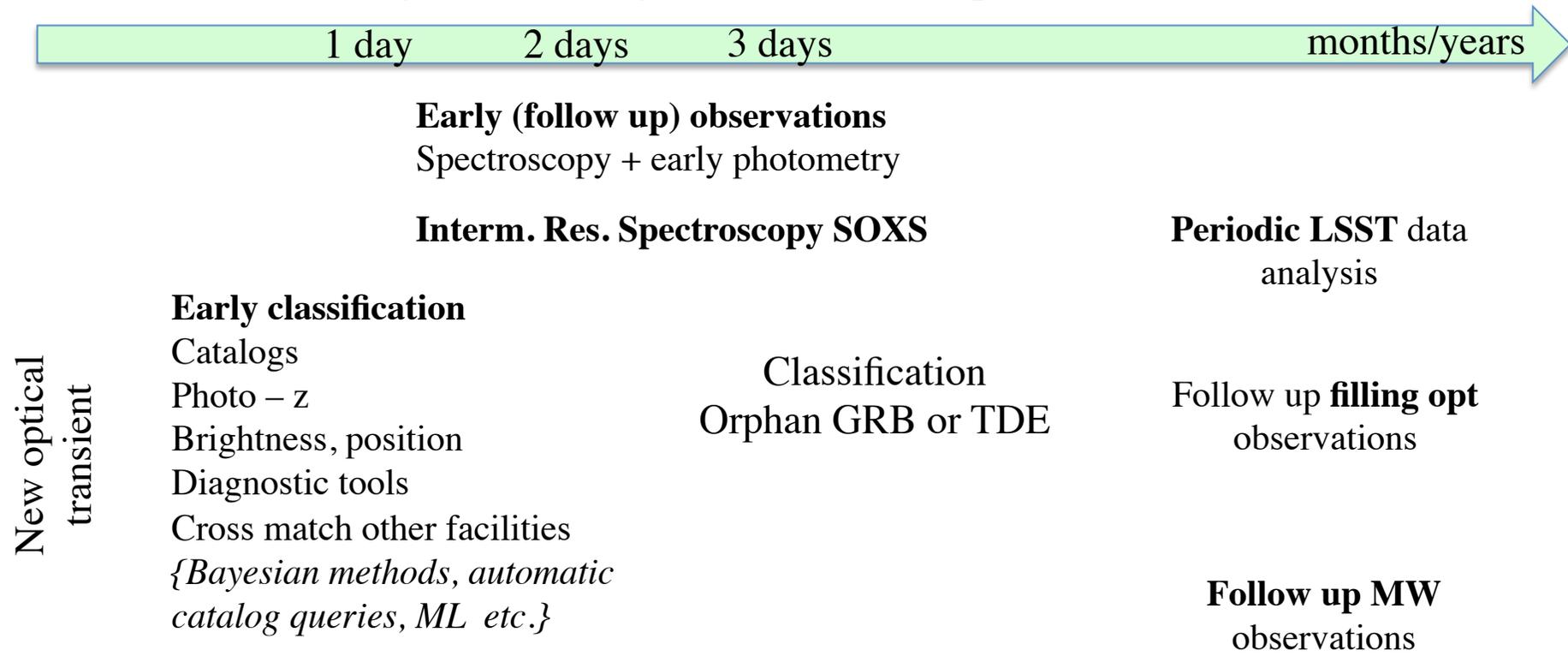
R~4500

@NTT

Goal: cont spect R=20.5 @ 10σ (1h)

SOXS \rightarrow > 180 night per year for transients

Data analysis necessary/foreseen, development and cadence



The **core team** consists of 4 units.
Expected needs for the project

Phase	Activity	Needs	HW
Early (< 2019)	Rates + Strategies	2 Positions YR full time	Workstation & upgrade
> 2019	LSST data analysis	2+2 Positions YR full time	

GRB: 50 yr⁻¹ orphan Long + 25 orphan Short GRBs
100-6000 yr⁻¹ TDE
25 yr⁻¹ Long GRBs + 5 yr⁻¹ Short GRBs with HE
10 – 600 yr⁻¹ jetted TDEs

DEVELOPMENT Scientific objectives of the project

Preparatory
(now – 2019)

Rates of GRBs and TDEs in the reach of LSST

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 - b) Short GRBs
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- } population + emission components

Strategies

1. Classification:

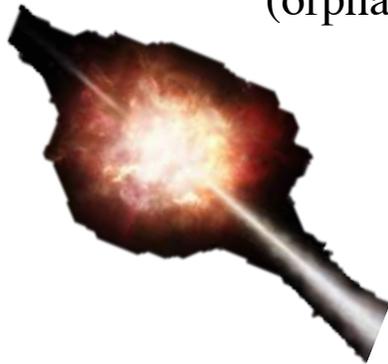
- a) Spectroscopy
- b) Light curve
- c) Diagnostic tools

2. MW follow up

Long GRB population synthesis code with afterglow dynamics and emission (accounting for geometry and beaming) from the early to the NR phase.	Mostly done (GG+2010, 2014)	Simulation for early spectroscopy and follow up strategy	To do
Short GRB population synthesis code with afterglow dynamics and emission (accounting for geometry and beaming) from the early to the NR phase + Macronova component.	80% done	Light curve templates and filling follow up (optical and MW)	20% done
Short and long GRB low Bulk velocity jets	To do		
TDE population synthesis code with full dynamics of debris and evolution, including corona and stream stream shock interaction and cosmological parent AGN.	20% done	Optical and MW studies of existing populations in search of classification tools	To do
Alternative channels (DBH and NS TDE events).	To do		

Affiliations

Gamma Ray Bursts and **Tidal Disruption Events**
(orphans and parents)



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Co-I: P. D'Avanzo, A. Melandri
O. Salafia, D. Mainetti



■ *LSST Science Collaboration*
■ *Sub-groups*

