Fast radio followup

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four π sky

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TKP Meeting, December 2012

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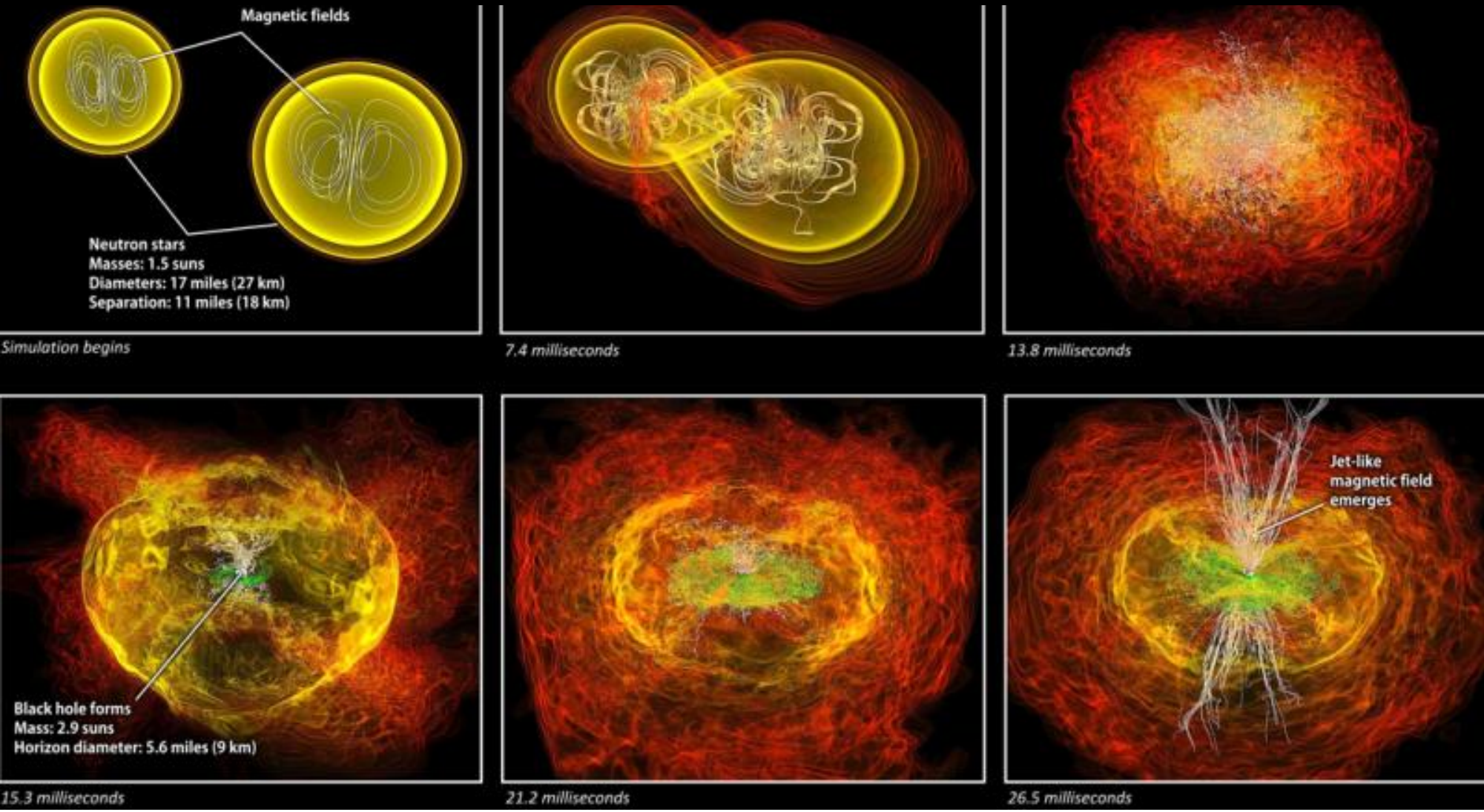
Outline

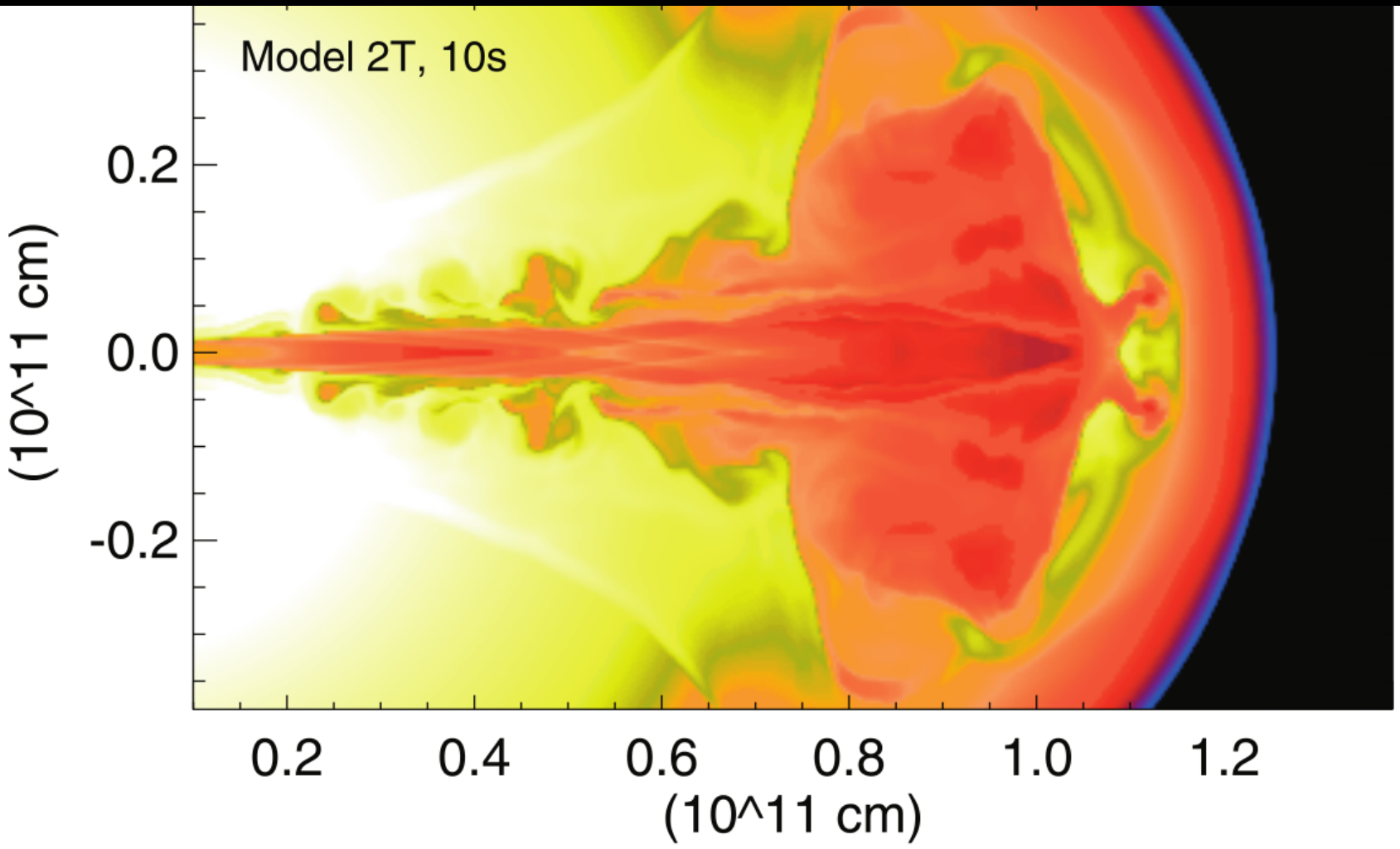
OUTLINE

GRB PROGENITORS



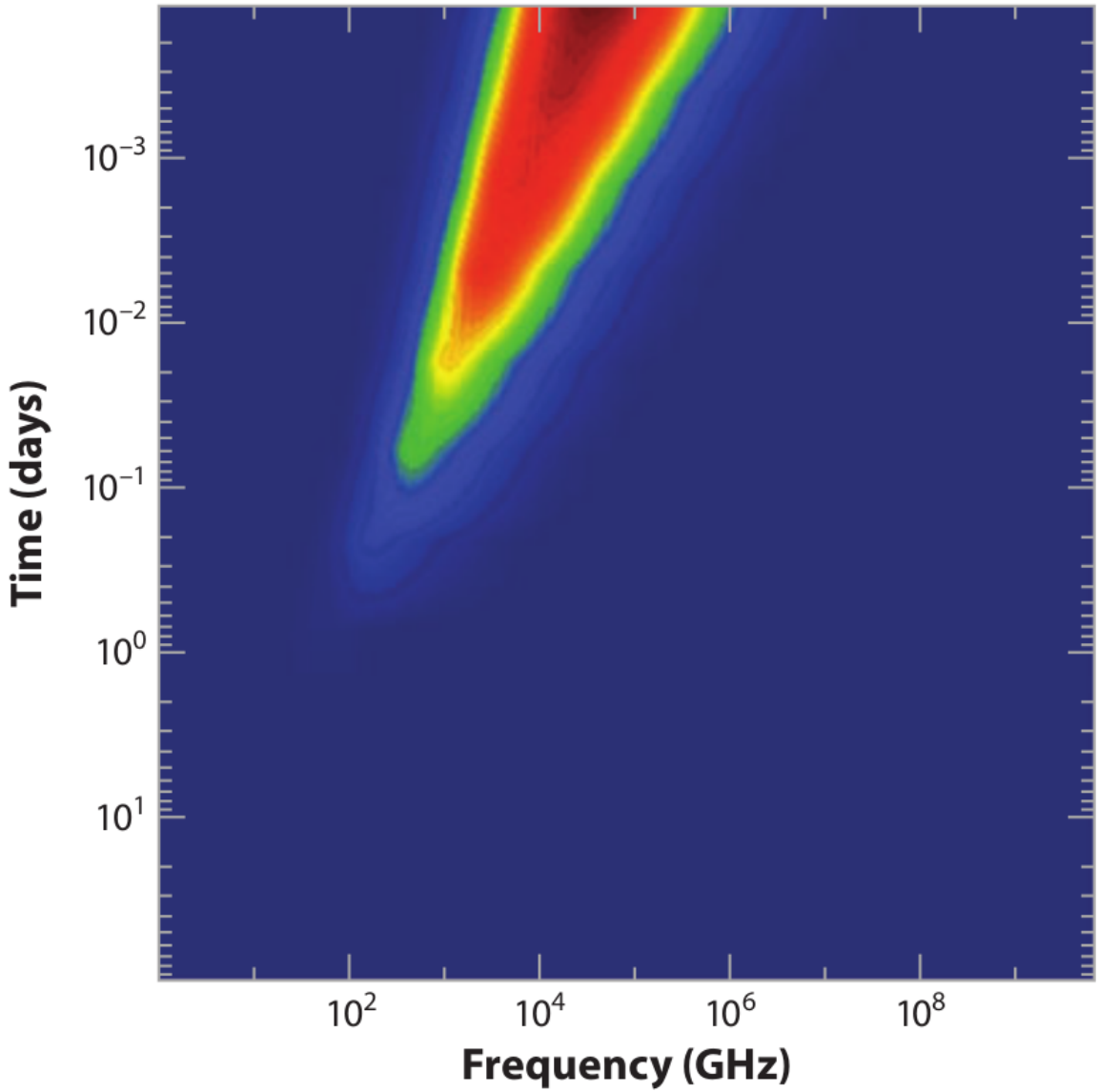
L. Rezzolla et al 2011

GRBS: RELATIVISTIC FIREBALLS



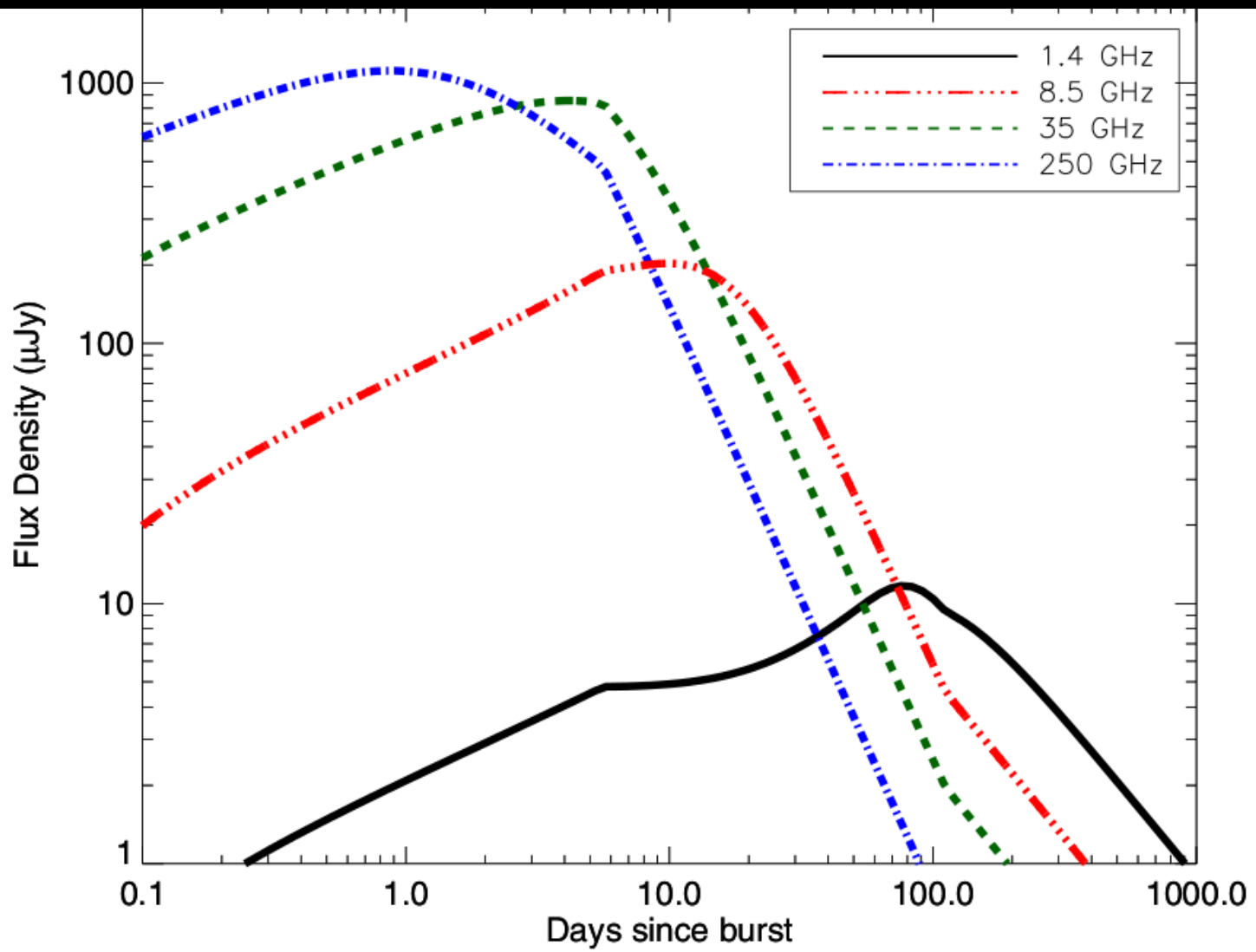
M. Rees and P. Meszaros, 1992; W. Zhang and S. Woosley, 2004.

SYNCHROTRON AFTERGLOW



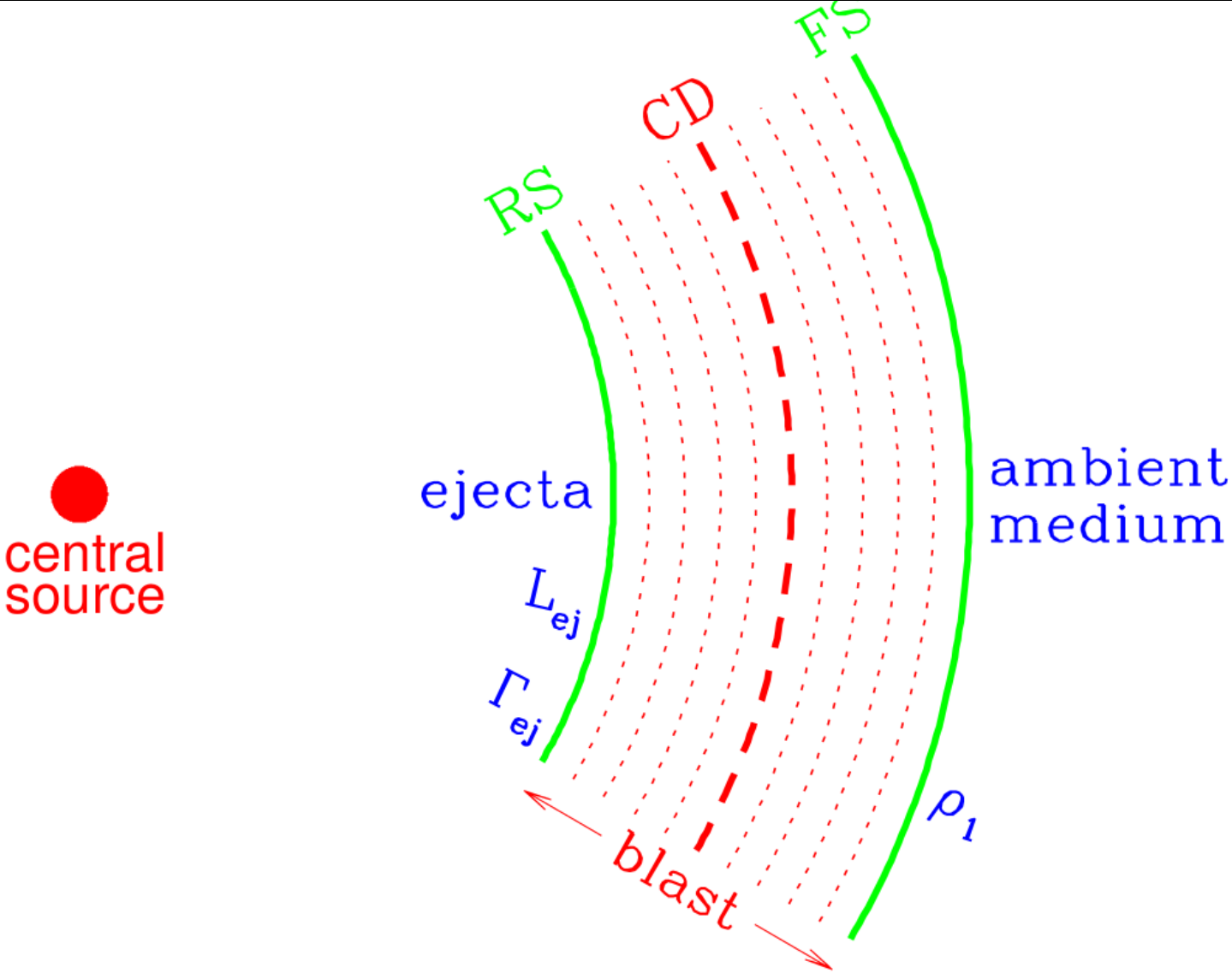
Gou, Fox & Meszaros 2007

SYNCHROTRON AFTERGLOW



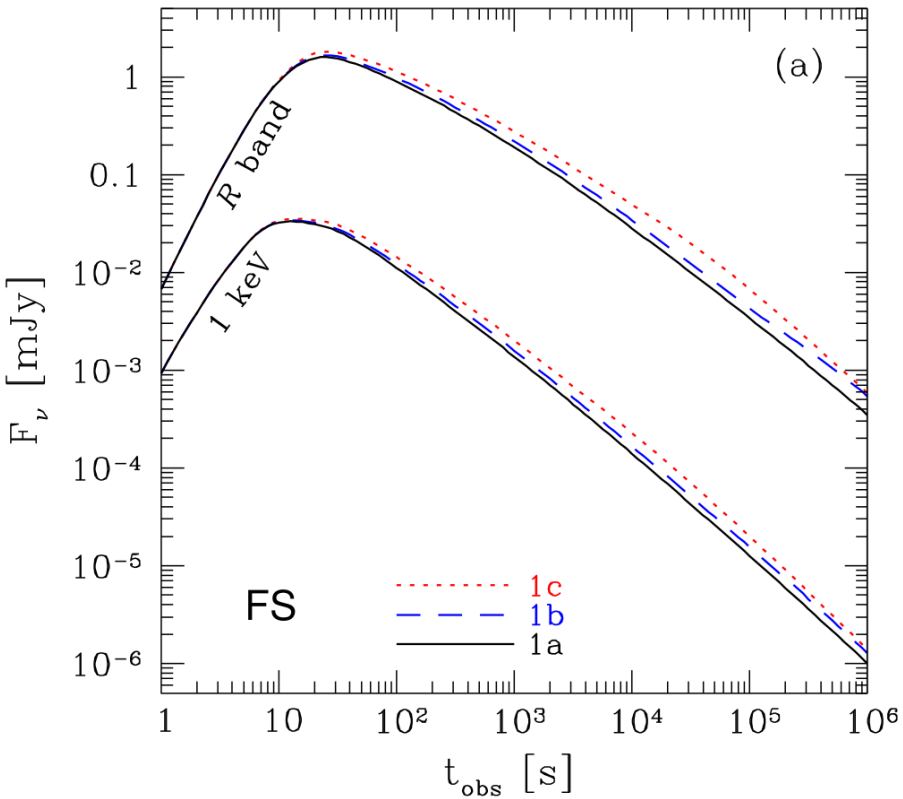
Chandra and Frail, 2012.

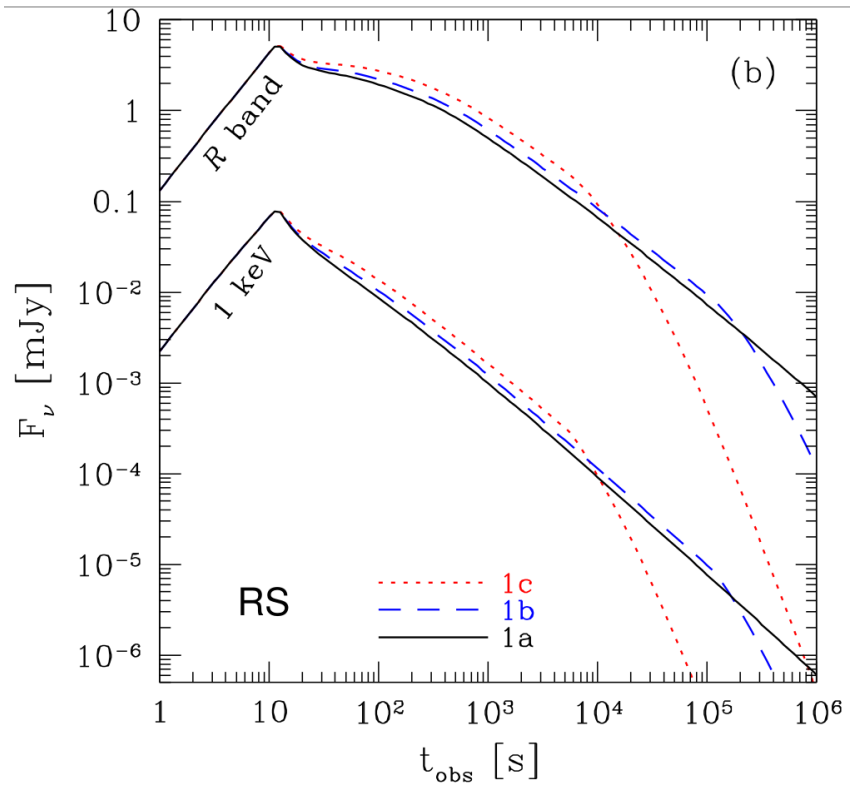
TRANSITION: REVERSE SHOCK



Z. Lucas Uhm , Bing Zhang, 2012

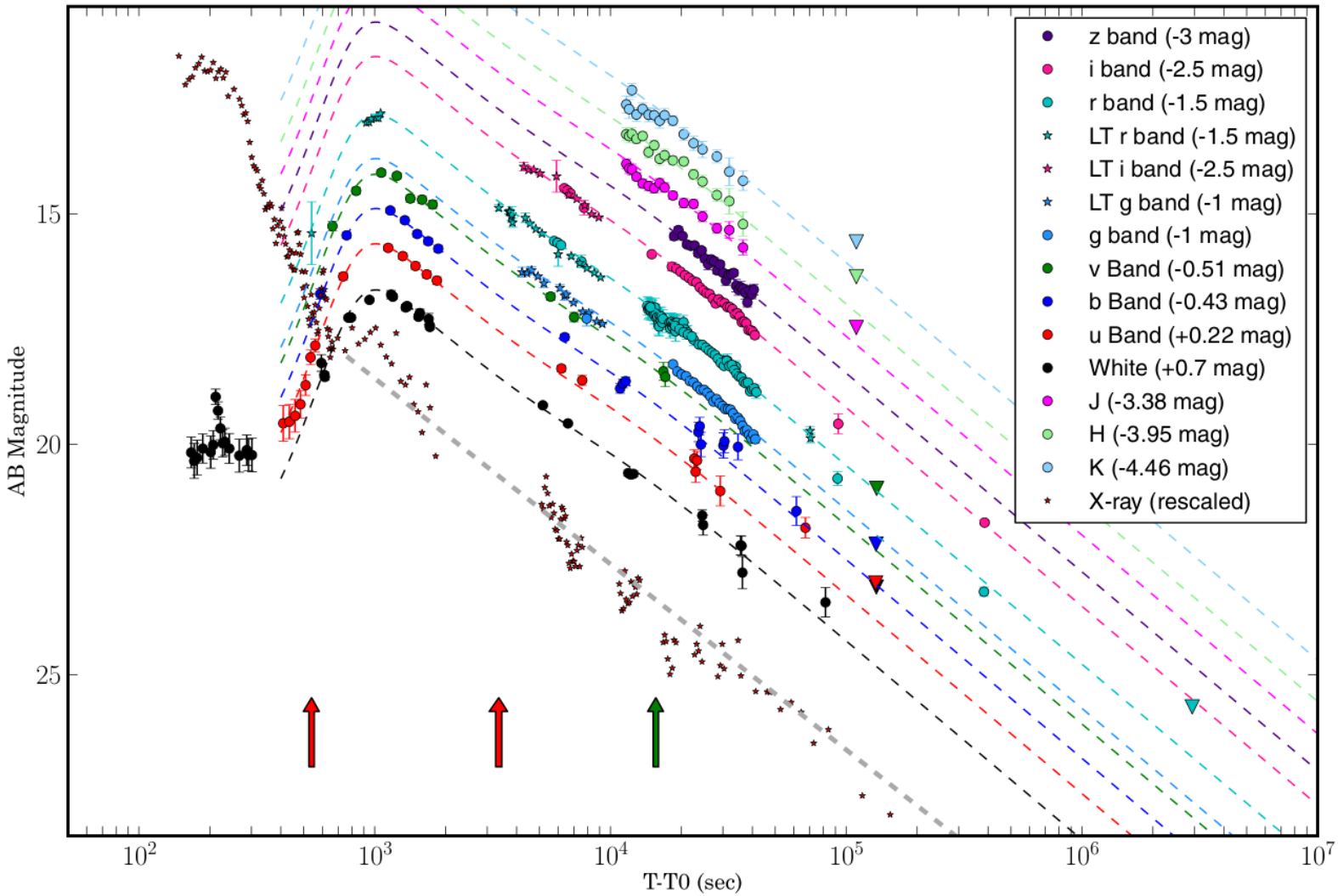
REVERSE SHOCK





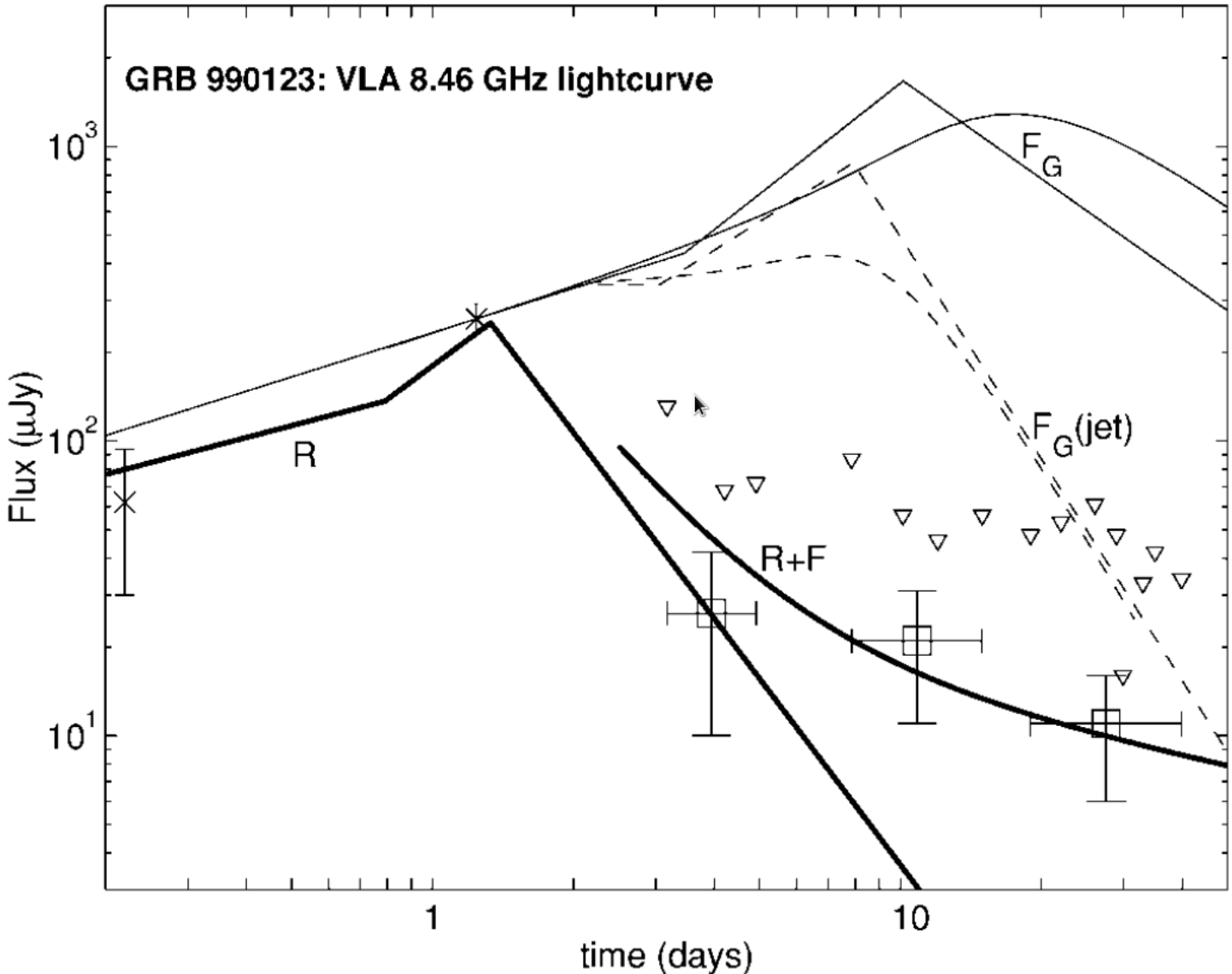
Z. Lucas Uhm , Bing Zhang, 2012

RS+FS COMBINED



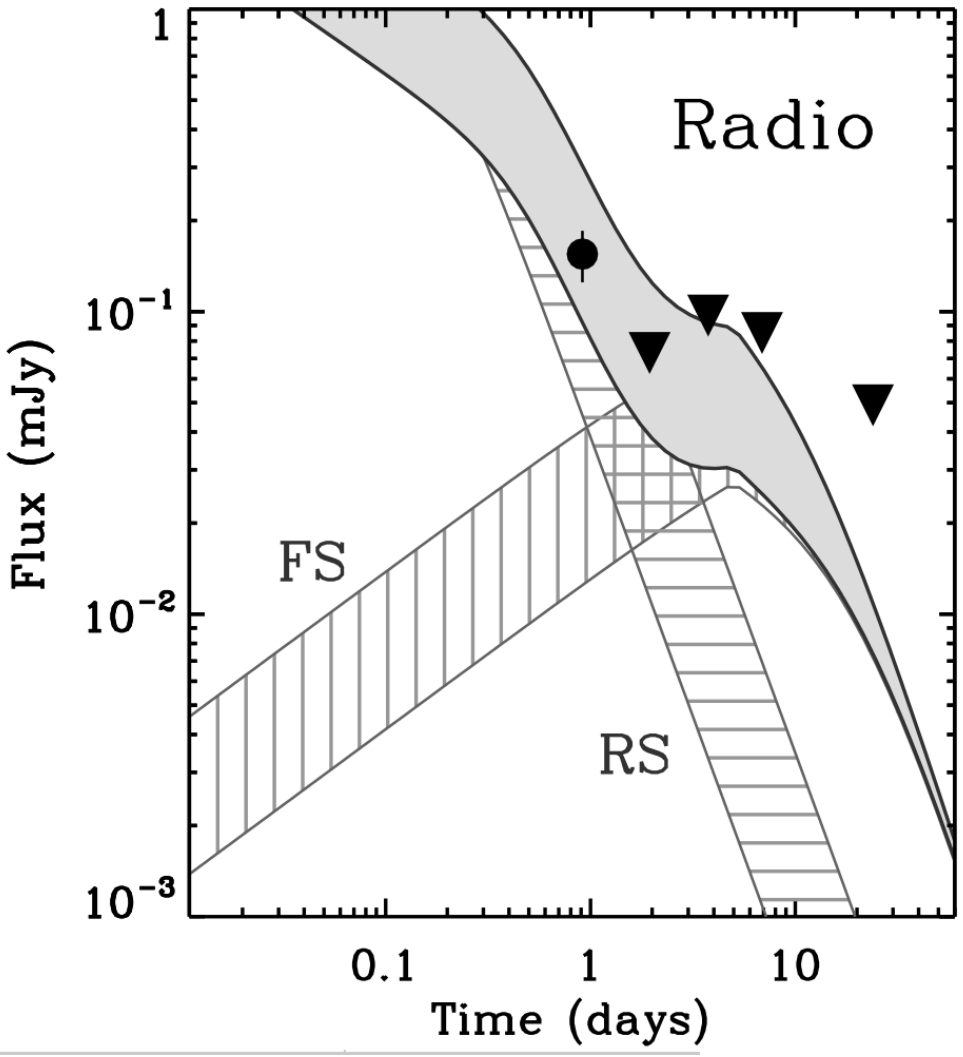
GRB110205A (Cucchiara et. al 2011)

RS IN THE RADIO ('FLARES')



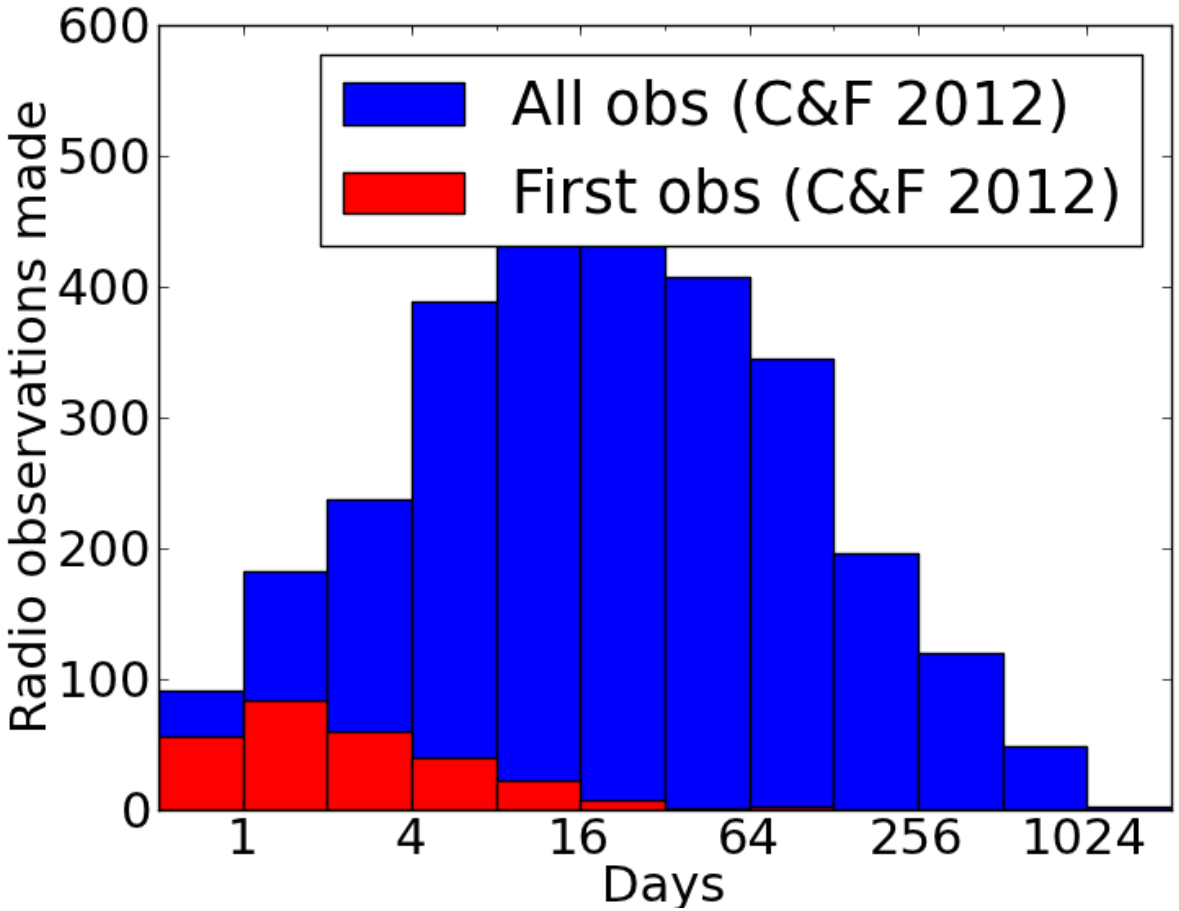
(S. Kulkarni et. al 1999)

RS IN THE RADIO ('FLARES')



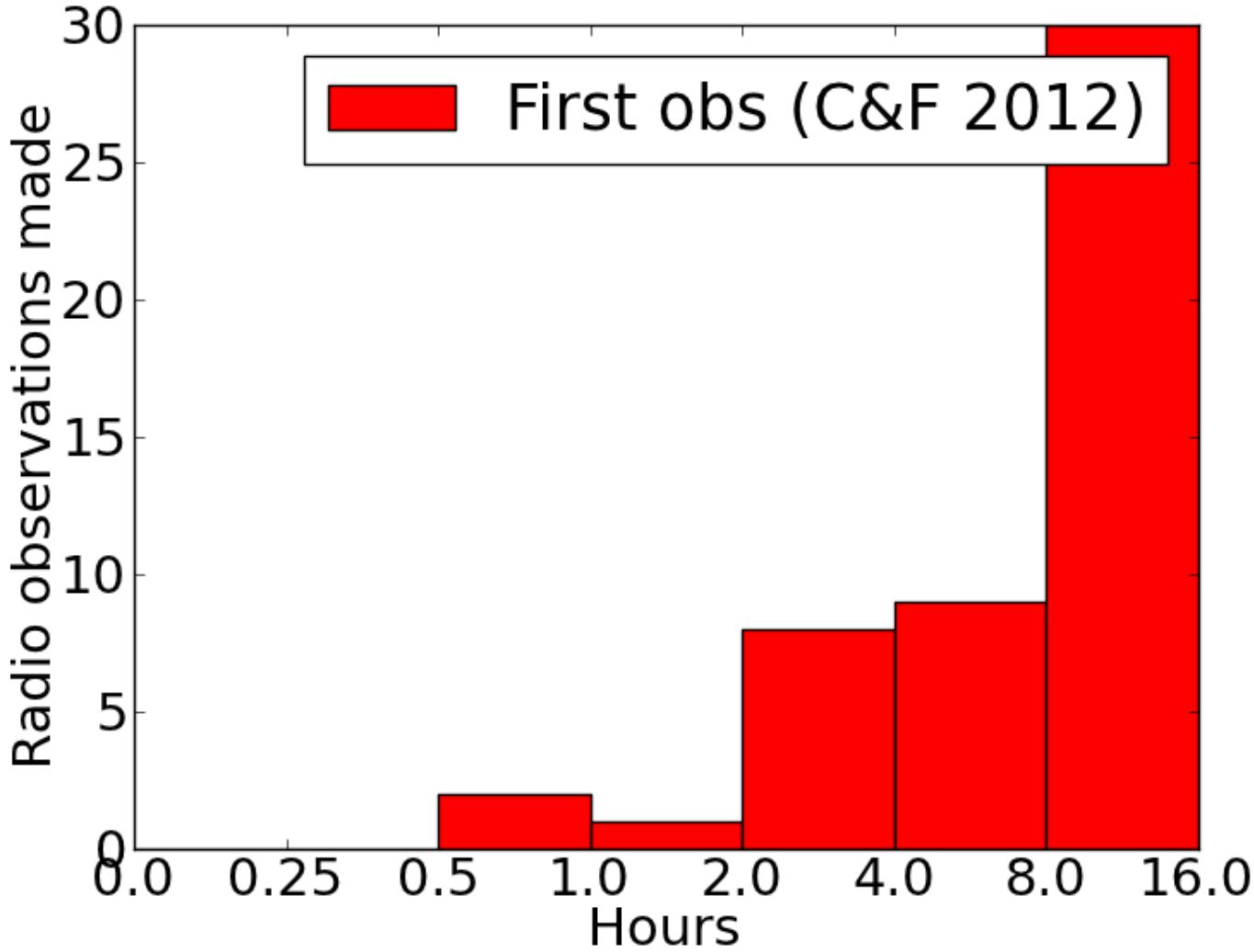
GRB051221A (Soderberg 2006)

MANUAL RADIO FOLLOW UP OF GRBS



Data from Chanda and Frail, 2012. $\sim$ 8GHz.

PRIOR RADIO OBSERVATIONS



(Excluding Dave Green et al. 1995)

WHY IS THIS INTERESTING?

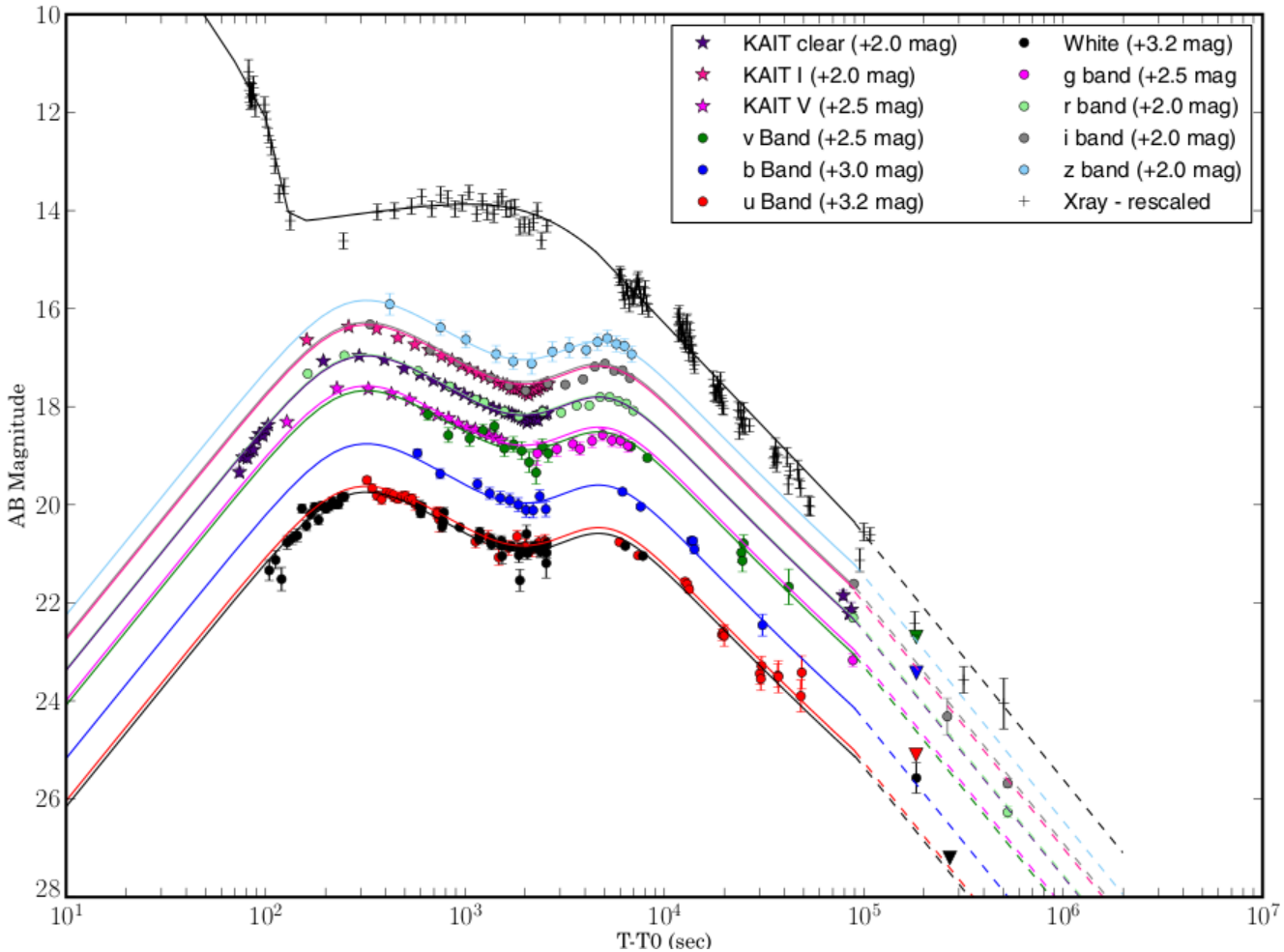
Reverse shocks and radio flares (or lack thereof) inform us on:

- Magnetization of GRB jets,
- Lorentz factor of ejecta,
- Nature of ejecta (Baryonic vs Poynting flux dominated).

MEANWHILE...

- 'Dark' GRBs (Rol 2005; Zauderer 2012).
- Re-injection events (Soderberg 2006; Cucchiara 2011)
- Unknown phenomena (Bannister 2012).

REBRIGHTENING



GRB110213A (Cucchiara 2011)

OUTLINE

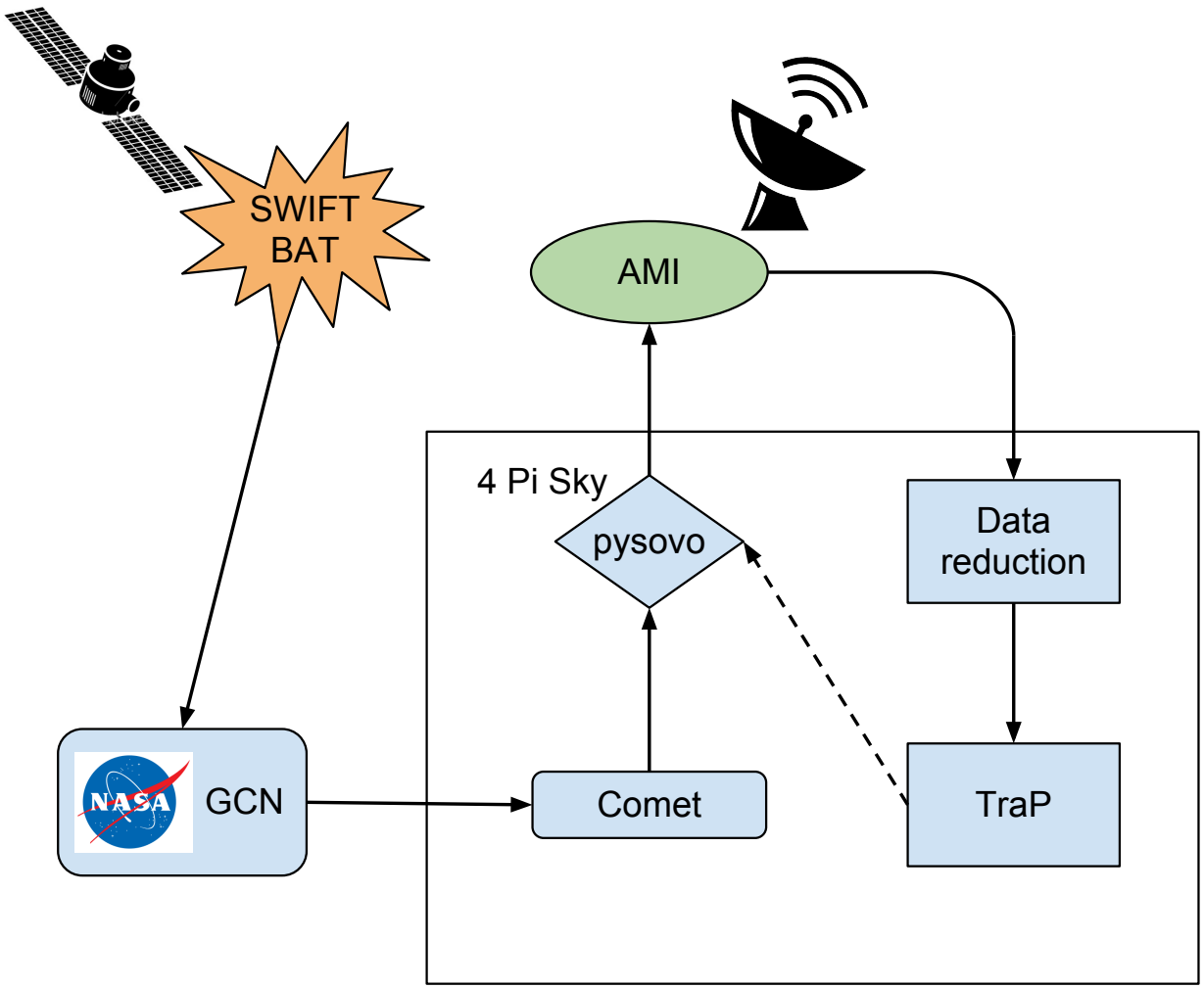
AMI-LA (UK)

AMI-LA (UK)

Arcminute Microkelvin Imager — Large Array

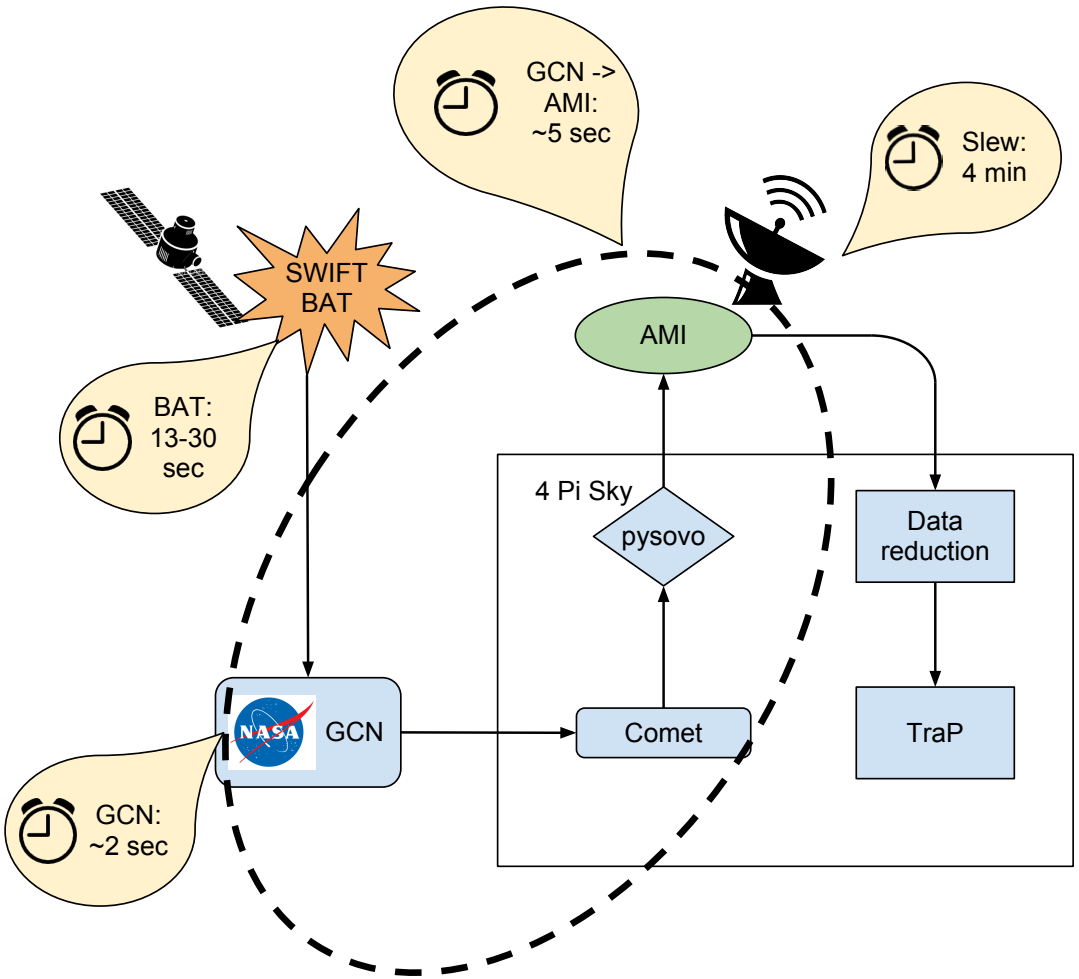
- 15 GHz central frequency, 4.5 GHz bandwidth
- 5.5 arcmin primary beam (FoV)
- 30 arcsec synthesised beam (PSF FWHM)
- $\approx$ 0.1mJy noise level, 1 hr image

THE SYSTEM



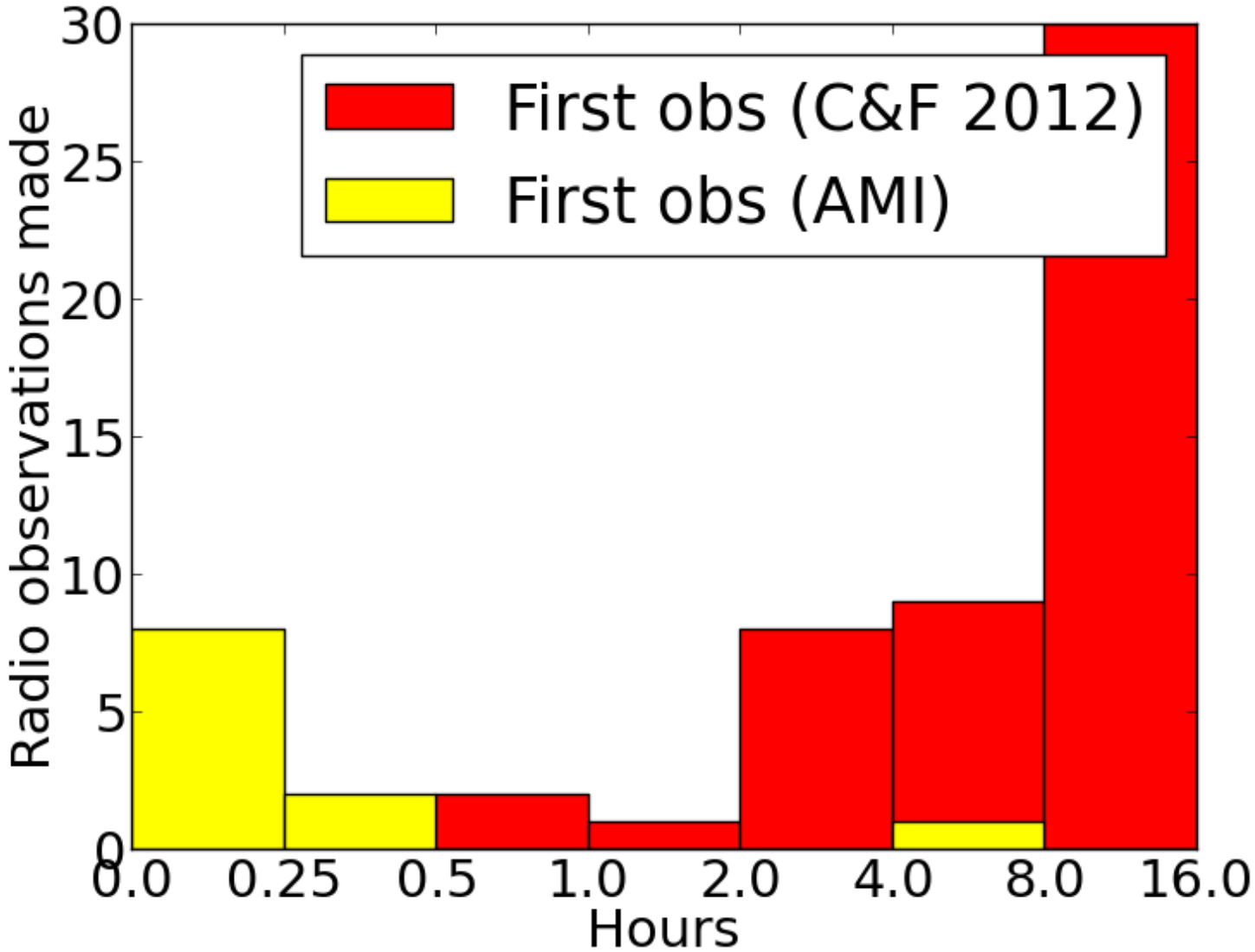
(Staley et al 2012)

THE SYSTEM

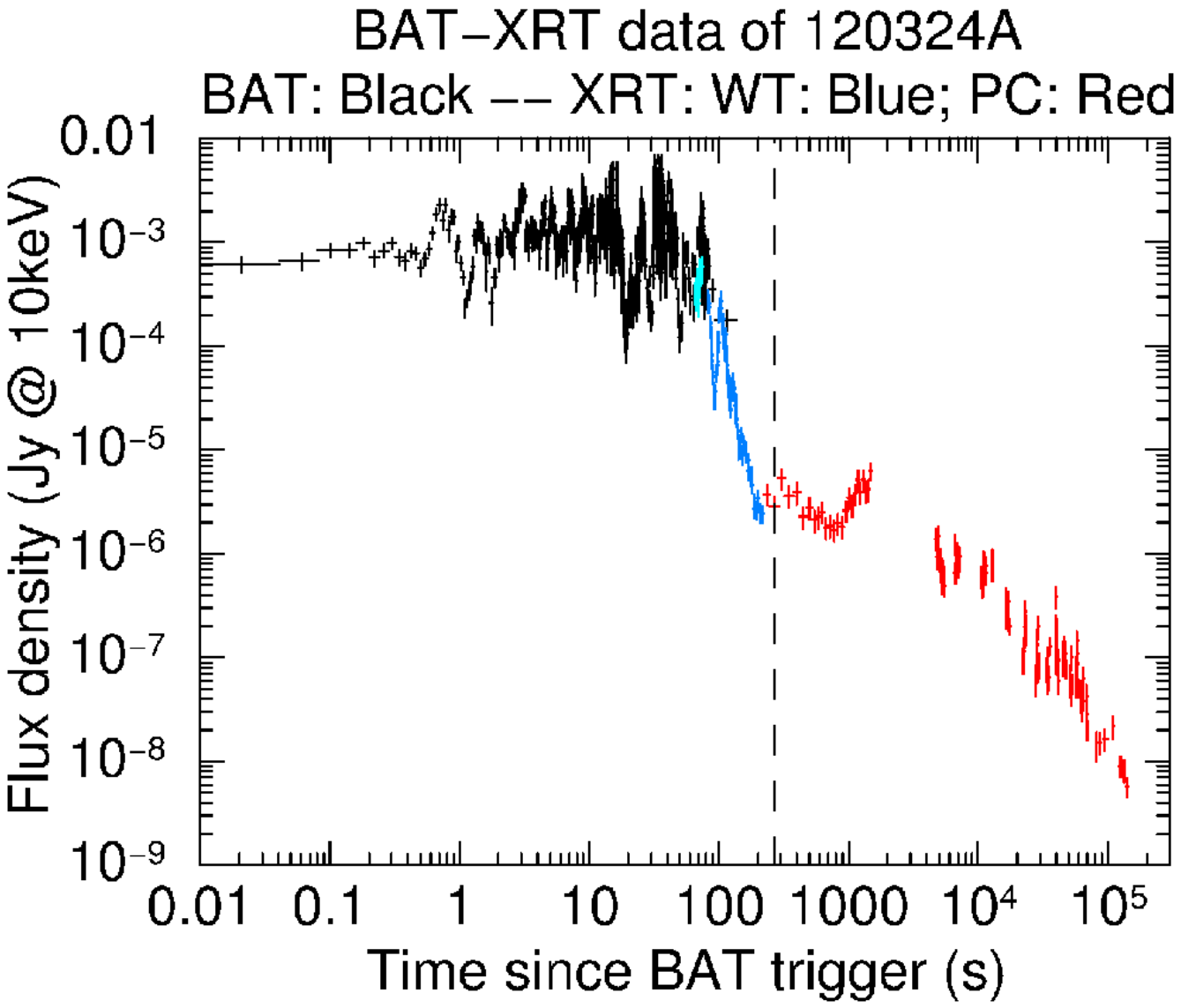


(Staley et al 2012)

FASTER RESPONSE TIMES



FASTER RESPONSE TIMES

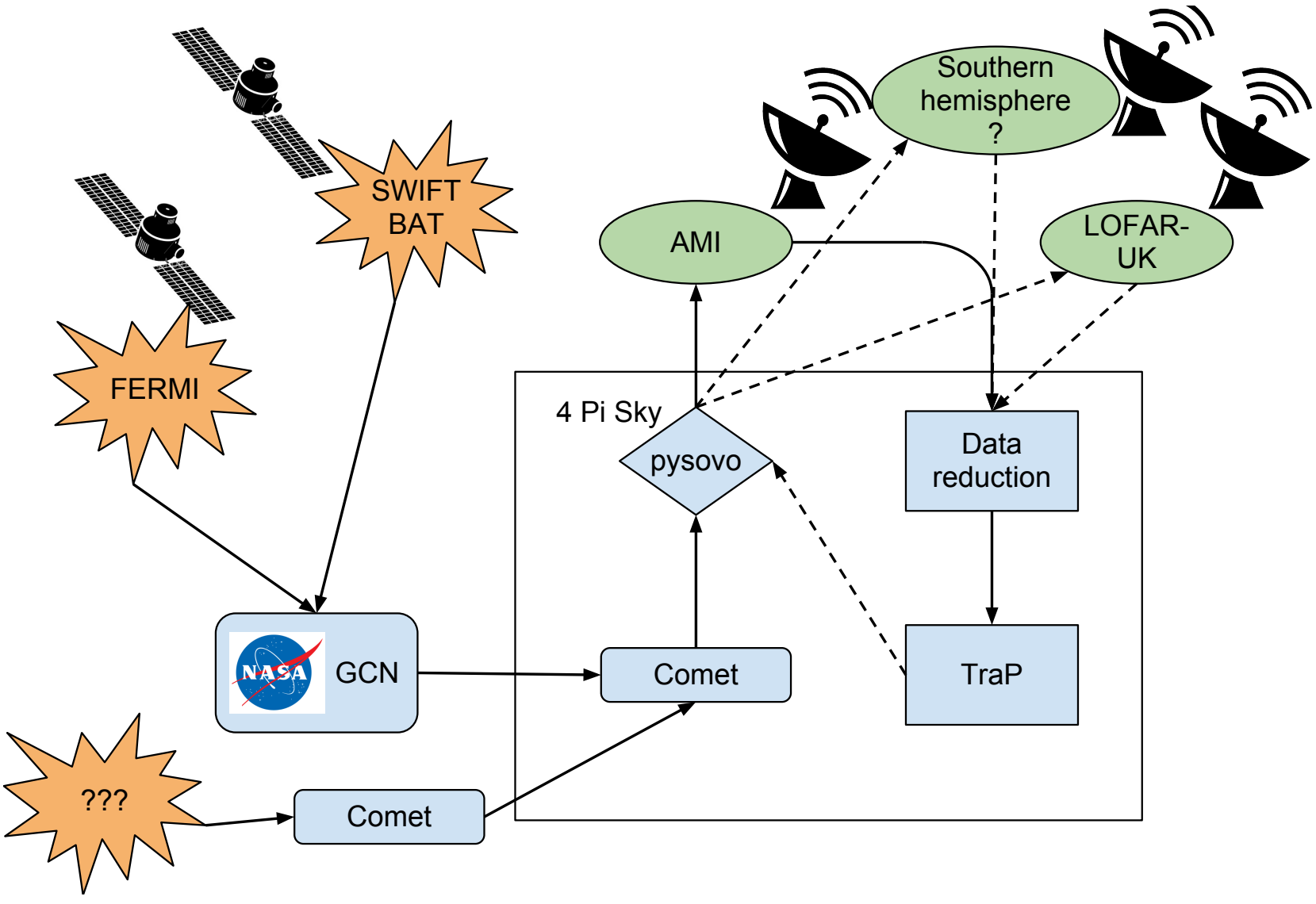


Outline

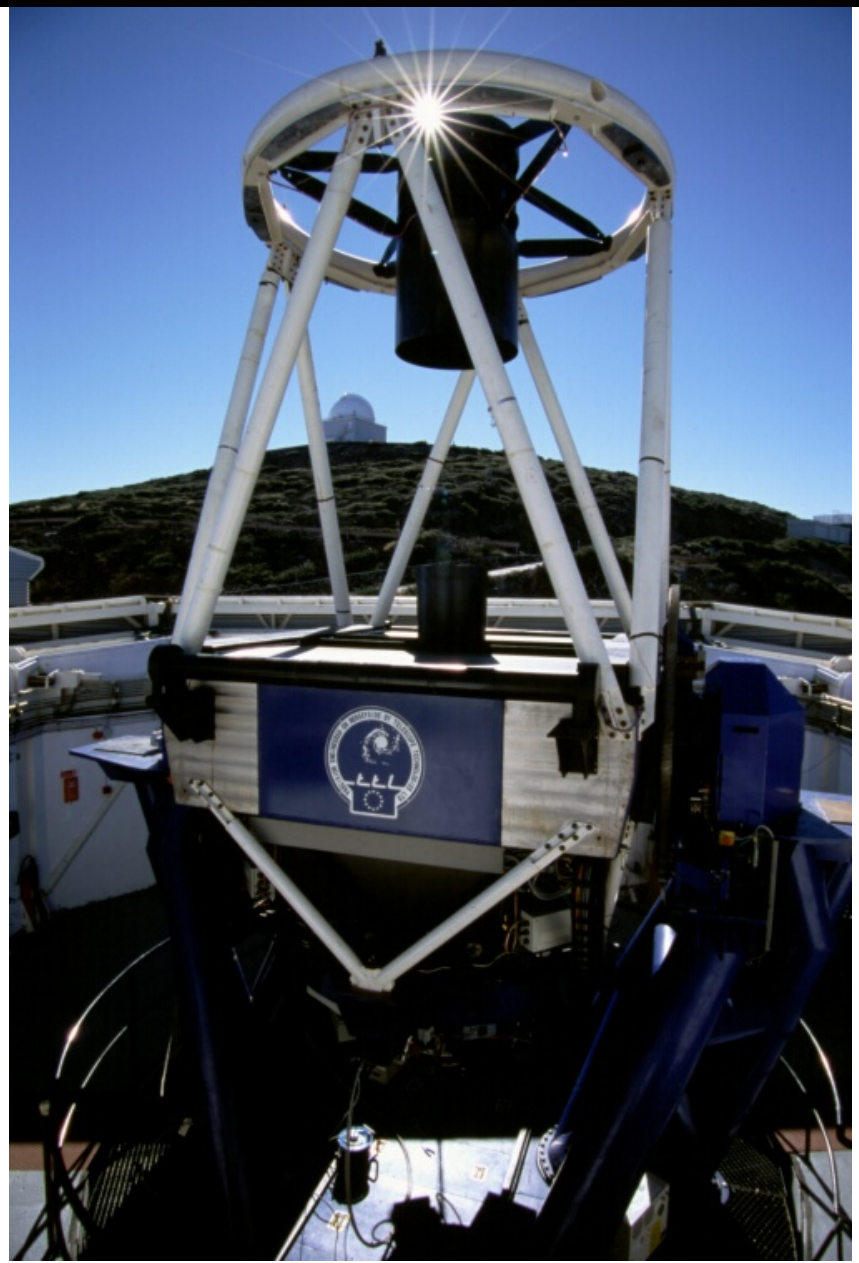
NETWORKING

[Transient] astronomy currently follows the "second grade soccer system" - everyone chases the same ball.

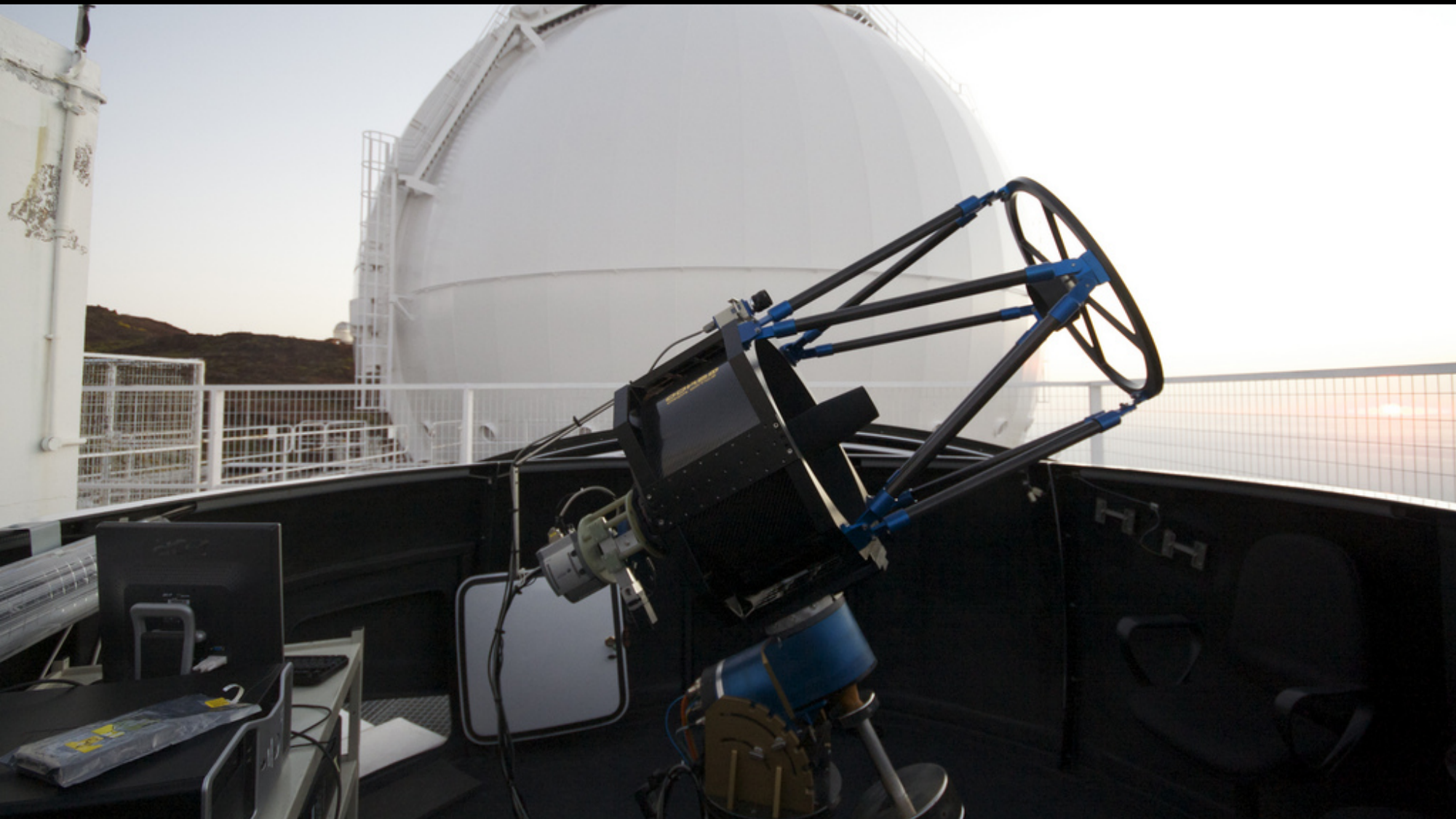
NETWORKING


SWIFT
BAT
FERMI
Southern
hemisphere
?
AMI
LOFAR-
UK
4 Pi Sky
pysovo
Data
reduction
GCN
Comet
TraP
???
Comet

Optical followup: LT and pt5m



Optical followup: LT and pt5m (La Palma)



QUESTIONS

- Classification
  - Teo, Adam, Gosia.
- Prioritization and scheduling
  - Well framed as an 'Intelligent Agents' / computer science project.
  - Collaborating with Southampton IA group (Amr Hussein).

SUMMARY

- Swift-AMI 'proof of concept' has piqued the interest from the GRB community.
- 'Plumbing' works fine.
- Reduction process continues to evolve.
- Follow-up prioritization and scheduling system now in design phase.