ROTSE-III and the ABC
Chasing Early Light From GRBs

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On behalf of a world-wide collaboration
ROTSE-III Around the World
Coonabarabran, Australia
Around the World
Khomas Highlands, Namibia

Summer 2003
Around the World
Bakırlıtepe, Turkey

Spring 2004
The Sun Never Rises on the ROTSE Array
All Systems Go!

Comet C/2001 Q4 (NEAT)
Built for Speed
Rapid GRB Response

Median response time from alert is ~6-7s

3c is ~1-2s slower due to internet link
Some bursts’ early optical light curves showed excess emission attributed to reverse shock.
AEOS Burst Camera (ABC)

- Designed by Carl Akerlof
- Fabricated by Astronomical Research Cameras & Alan Schier’s Pilot Group
- Marconi 2Kx2K CCD, cooled to –40 C
- Field of view ~ 6 arc min.
- Currently uses unfiltered light
- 10 second CCD exposures
- Limiting mag ~ 22.
ABC Response Sequence

GRB

Swift

GCN

U of M burst filter
ABC Response Sequence

GRB

Swift

GCN

U of M burst filter

Fax

DAQ

abc computer

User interface

Operator

Moves mount to target in ~60 s
After ~5 h of imaging
GRB Observations With AEOS

Faxes have been sent twice

- Aug 13, 2003, camera computer was down, no observations
- Aug 24, 2003, AEOS telescope was down, no observations

Both alerts turned out to be false alarms

Images of GRBs taken manually

- GRB030418, ~29 images taken Apr 25, 2003, too dim
- GRB030329, 2 images taken Apr 1, 2003, GRB detected

No other GRB alerts have passed the filter yet

Expect 1 out of 15 Swift alerts to be observable
GRB 030329

- Imaged 2003 April 1, 10:42 GMT
- 10 sec exposure
- Red arrow is GRB, V~17.85

~ 2 arc minutes across
Blazed Transmission Grating

- Materials are being installed right now
- Allows low resolution spectral information
- Will allow unique study of early evolution
- Distinguish between cooling and absorption
Evolution vs. Absorption?

![Graph showing time in seconds on the x-axis and magnitude on the y-axis with data points representing different instruments and bands.](image-url)
Conclusions

- ROTSE-III and ABC are ready for Swift
- Fast response and sensitivity are key
- Gratings will add modest spectral data
- Discoveries could include:
  - Fast-decaying bursts
  - Role of absorption
  - Details of reverse shock physics
  - Origin of short bursts

See also poster 18.15 on Thursday