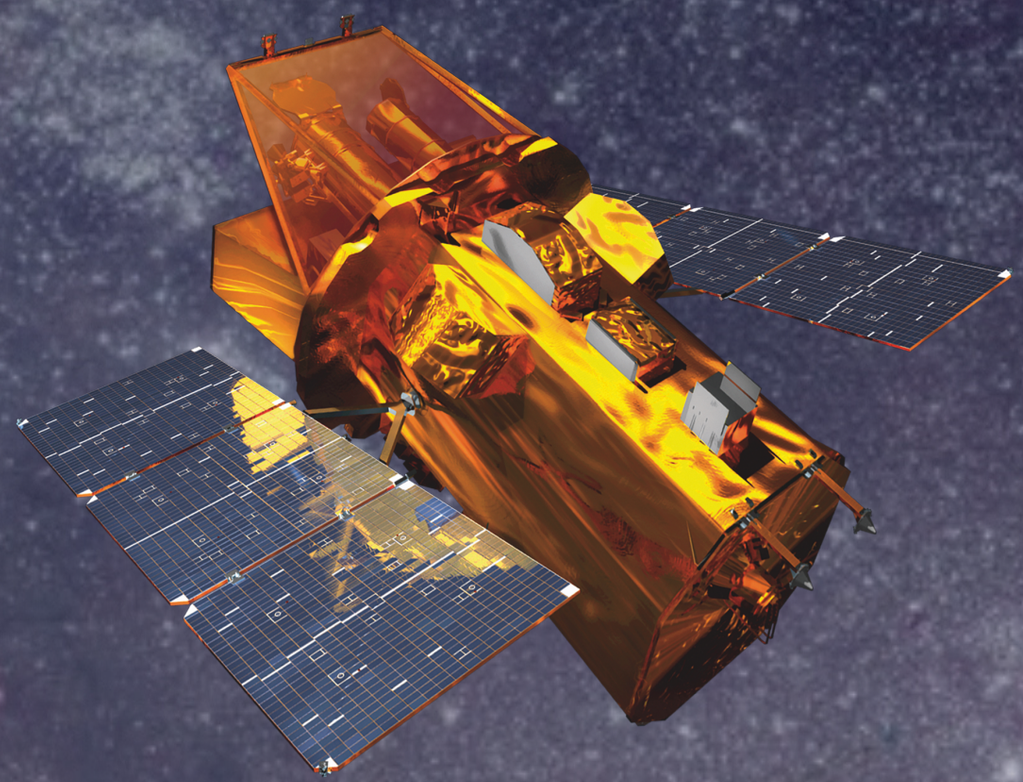
Making the Most of UVOT

Michael H. Siegel



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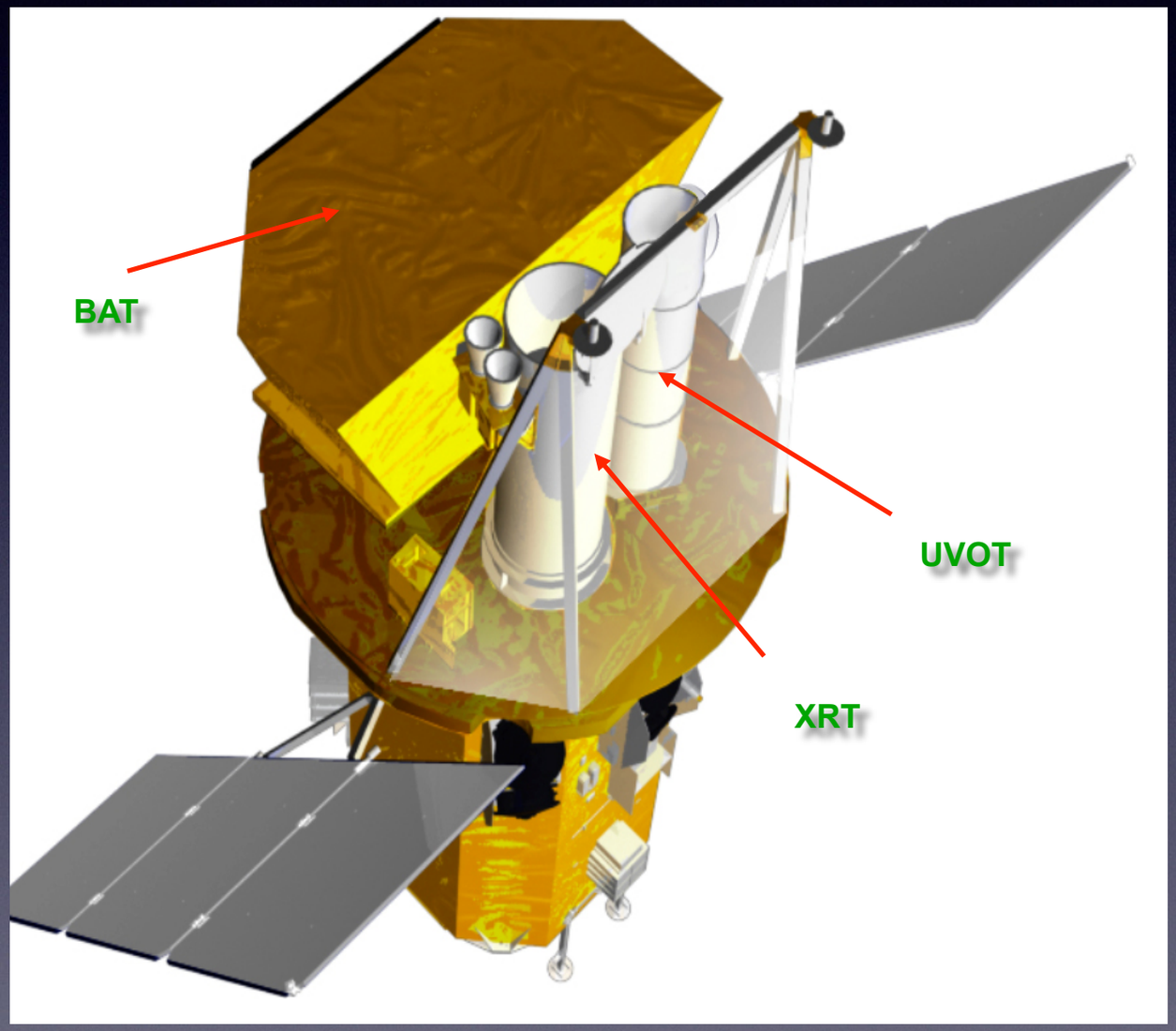
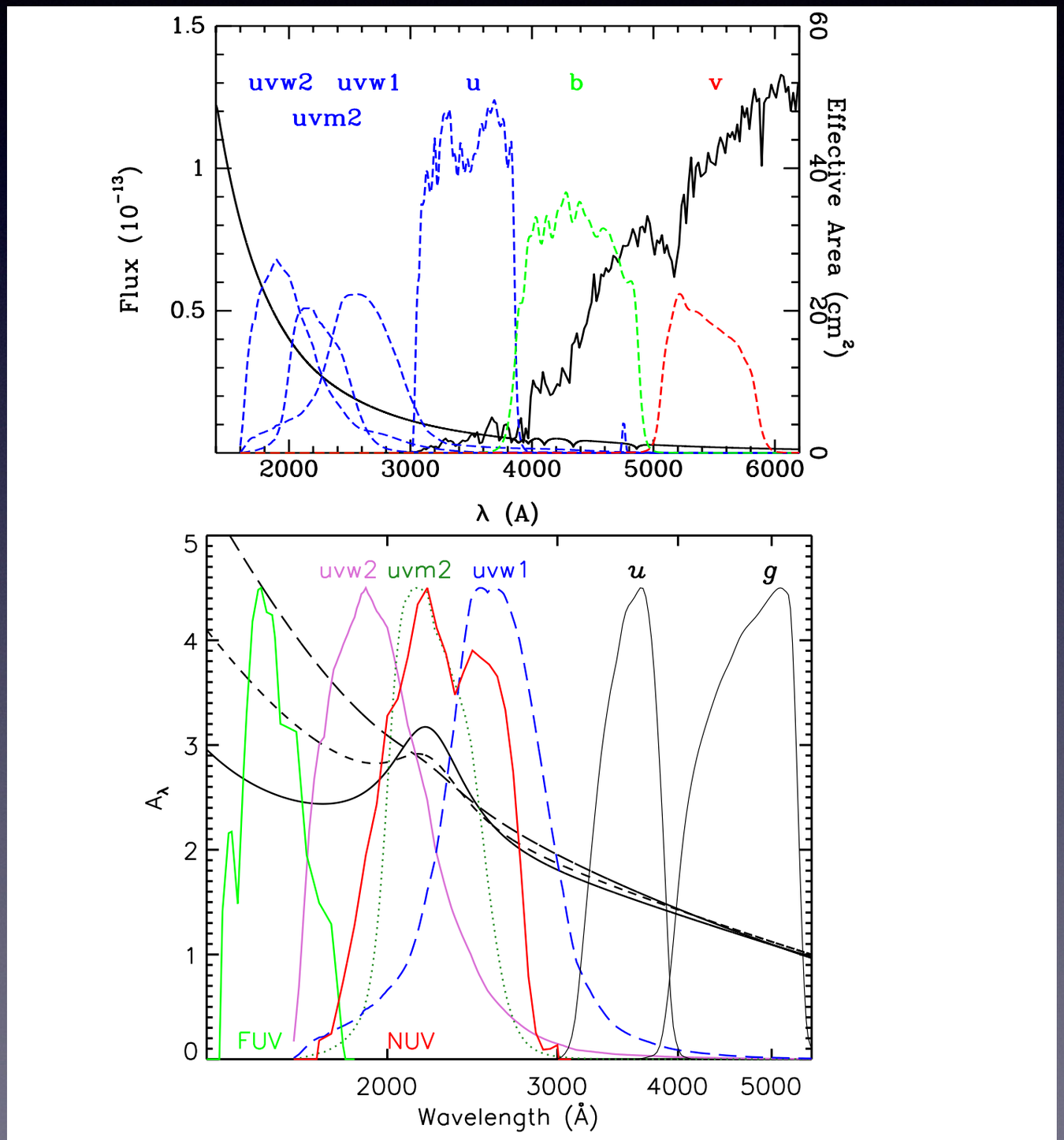
The Swift UV Optical Telescope



UV/Optical Telescope (UVOT)

- 30 cm aperture
- 170 – 650 nm range
- 2-2.5” resolution
- 6 UV/optical broad-band filters and 2 grisms
- Wide Field (17’)
- 22nd mag sensitivity

The Swift UV Optical Telescope



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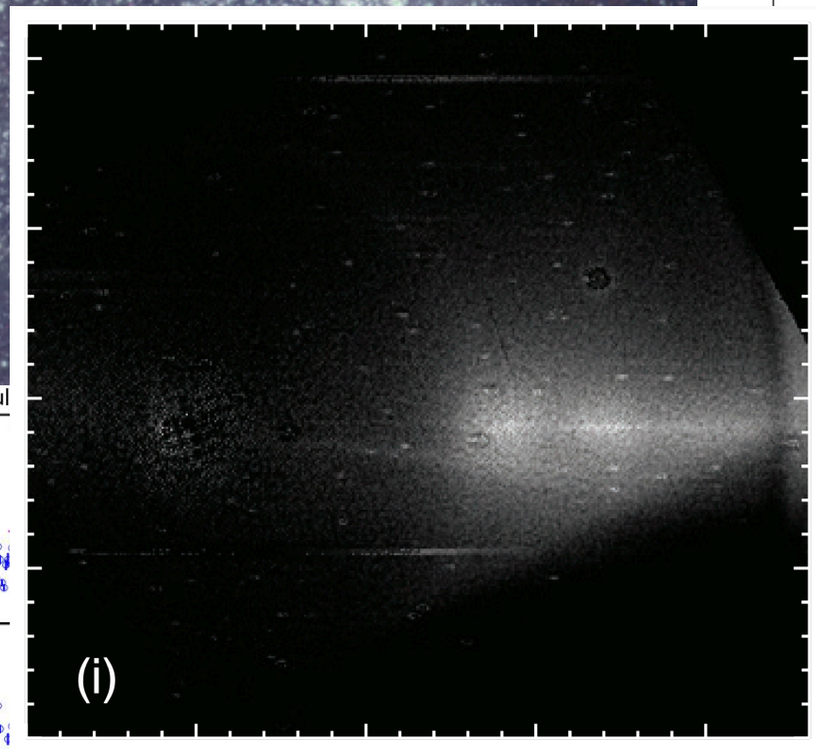
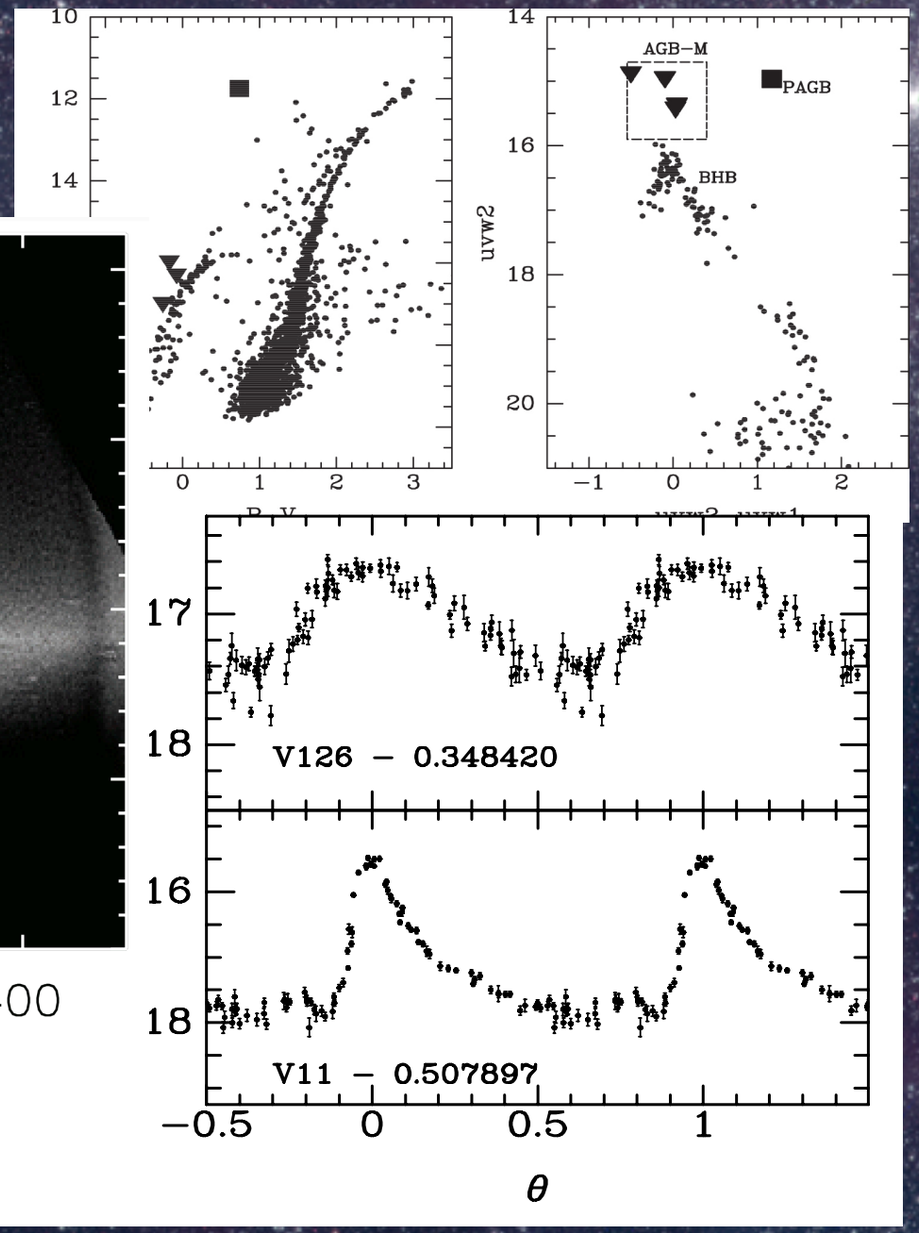
What UVOT Can Do For You





Proposing For UVOT

Approximately half of GI proposals list UVOT as the primary instrument. We do a lot of science!

UVOT has strict brightness limits. These can not be overridden. If a bright star is within 21.5” of the position, it will not observe (depending on filter).

UVOT observes in modes — sequences of filters with different weights and specifications.

To save filter wheel wear, proposals default to “filter of the day” for UVOT mode. Use of other modes must be justified. Our most common modes are on the proposal form but we have hundreds of modes!

Observing Modes

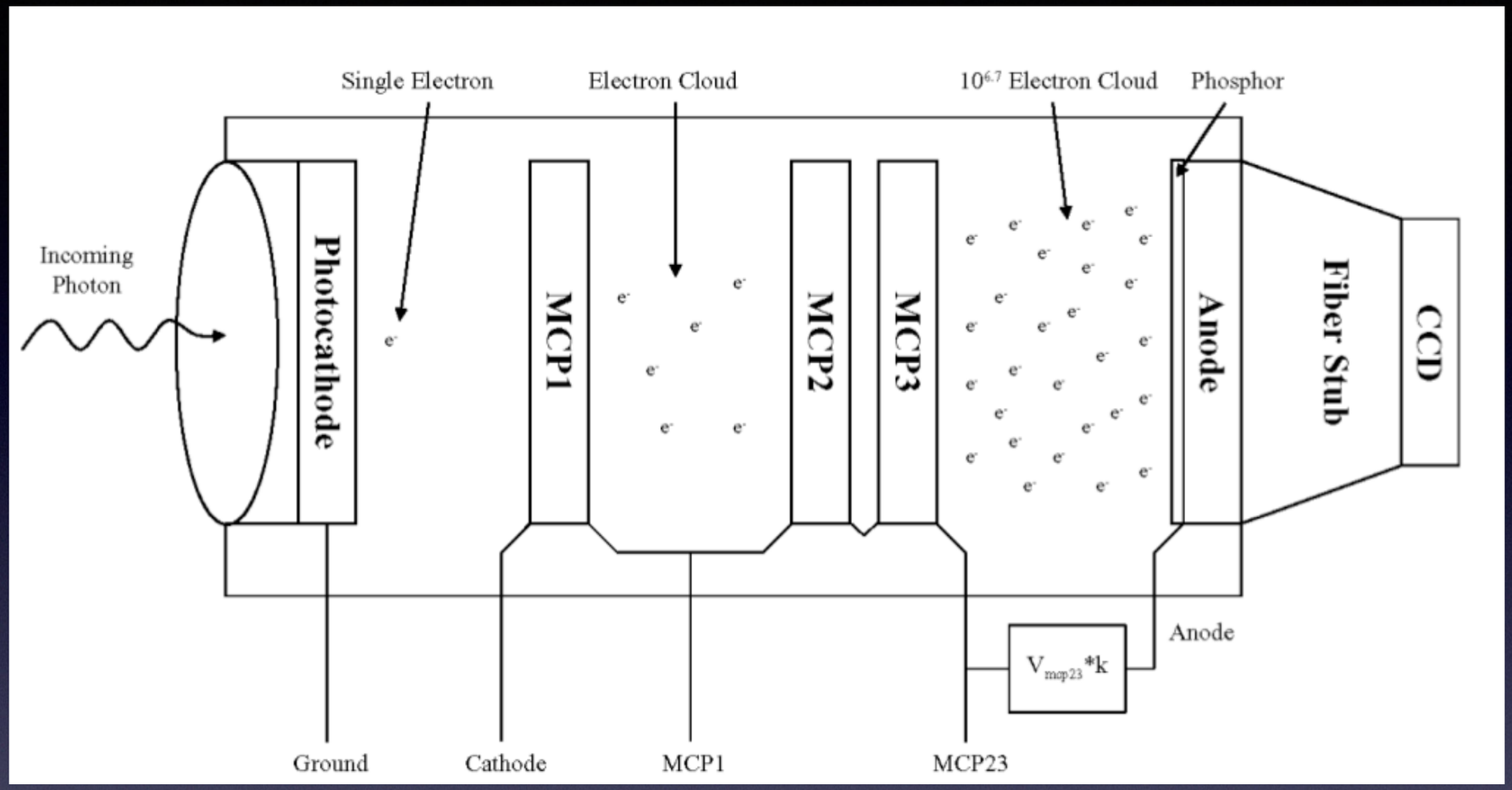
Most of our data is taken in full-frame imaging mode.

For particularly bright targets, a windowed mode (5x5 or 8x8) can cut coincidence loss

Event mode can track individual photons. However, it is very telemetry-intensive for everything but the uvm2 filter!

For coarser time resolution, there are 200s snapshot modes

Coincidence Loss



UVOT is a photon-counting instrument, doing on-board centroiding of photon splashes. This minimizes cosmic rays and dark count but creates coincidence loss (pileup) which makes counts non-linear and limits us to ~13th magnitude.*

Reduction and Calibration

The standard pipeline will produce sky images, exposures maps, large scale sensitivity and basic data products. UVOTSOURCE and UVOTMAGHIST are the basic photometry packages.

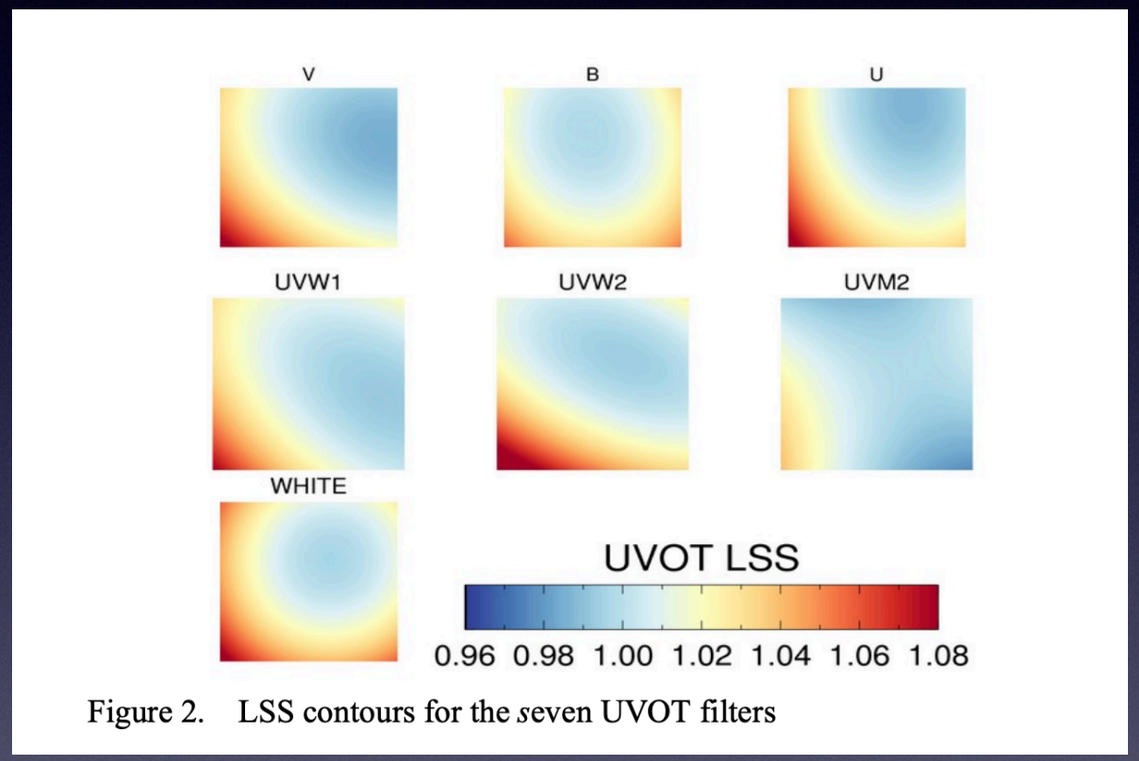


Figure 2. LSS contours for the *s*even UVOT filters

There are codes out there that can improve upon this (Dresscode, UVOT_DEEP). The Swift team can not provide support for these.

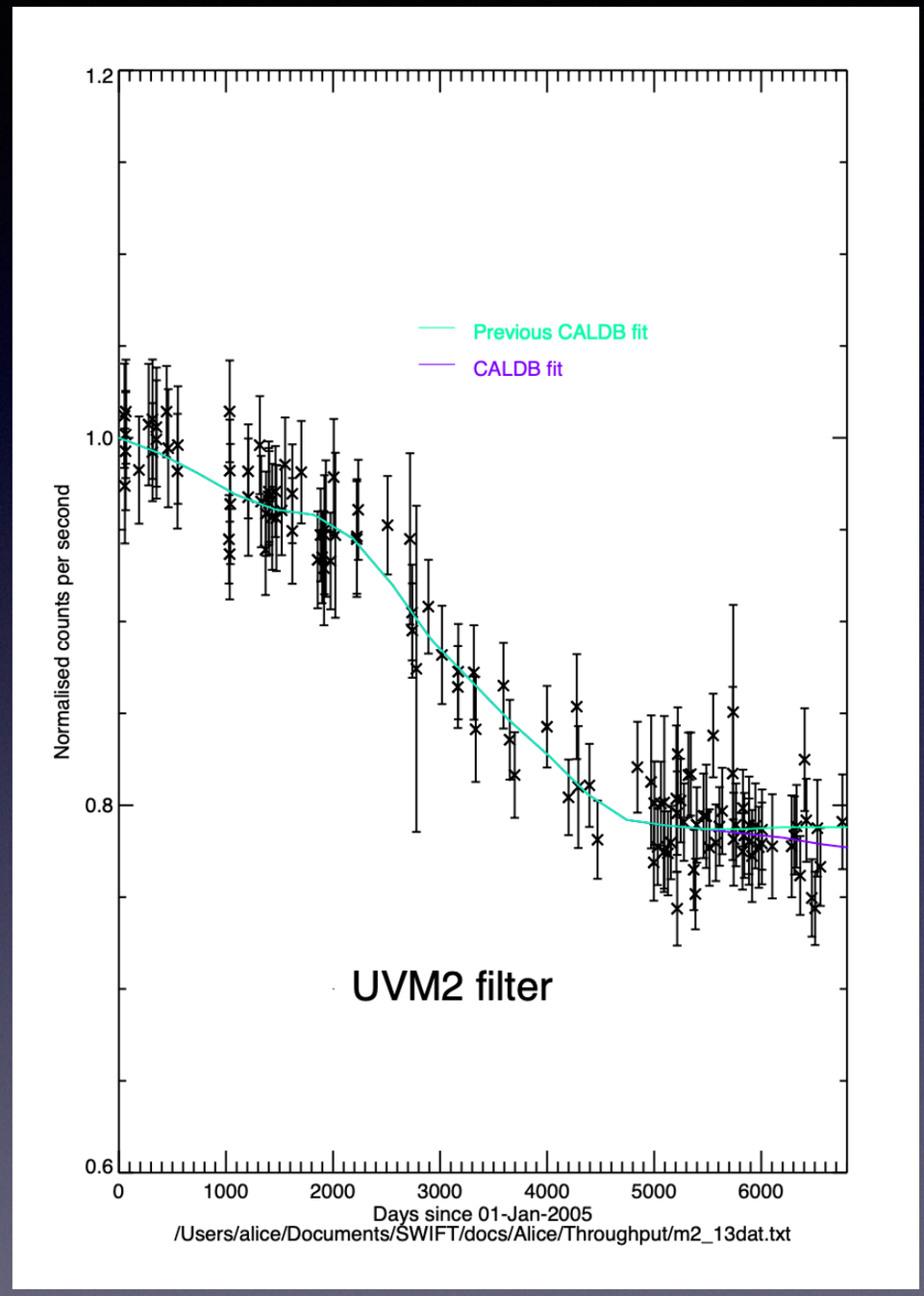
The most common complaint is aspect correction failure. This can be corrected through using UVOTSKYCOR or UVOTUNICORR

Reduction and Calibration

The most up-to-date calibration data include sensitivity loss, large scale sensitivity, etc. These are available on the CALDB website and will be updated periodically.

Photometric zero points and details of the calibration are available in the UVOT digest.

All of these corrections are included in the standard UVOT data tools.



Useful Links and E-mails

UVOT exposure time calculator: https://www.mssl.ucl.ac.uk/www_astro/uvot/uvot_observing/uvot_tool.html

UVOT brightness check: https://swift.gsfc.nasa.gov/proposals/bright_stars/bright_star_checker.html

UVOT reduction threads: https://www.swift.ac.uk/analysis/uvot/

UVOT digest: https://swift.gsfc.nasa.gov/analysis/uvot_digest/

UVOT mode table: https://www.swift.psu.edu/operations/mode_lookup.php

Grism pages: https://mssl.ucl.ac.uk/~npmk/Grism/

All inquiries should go through the Swift helpdesk!