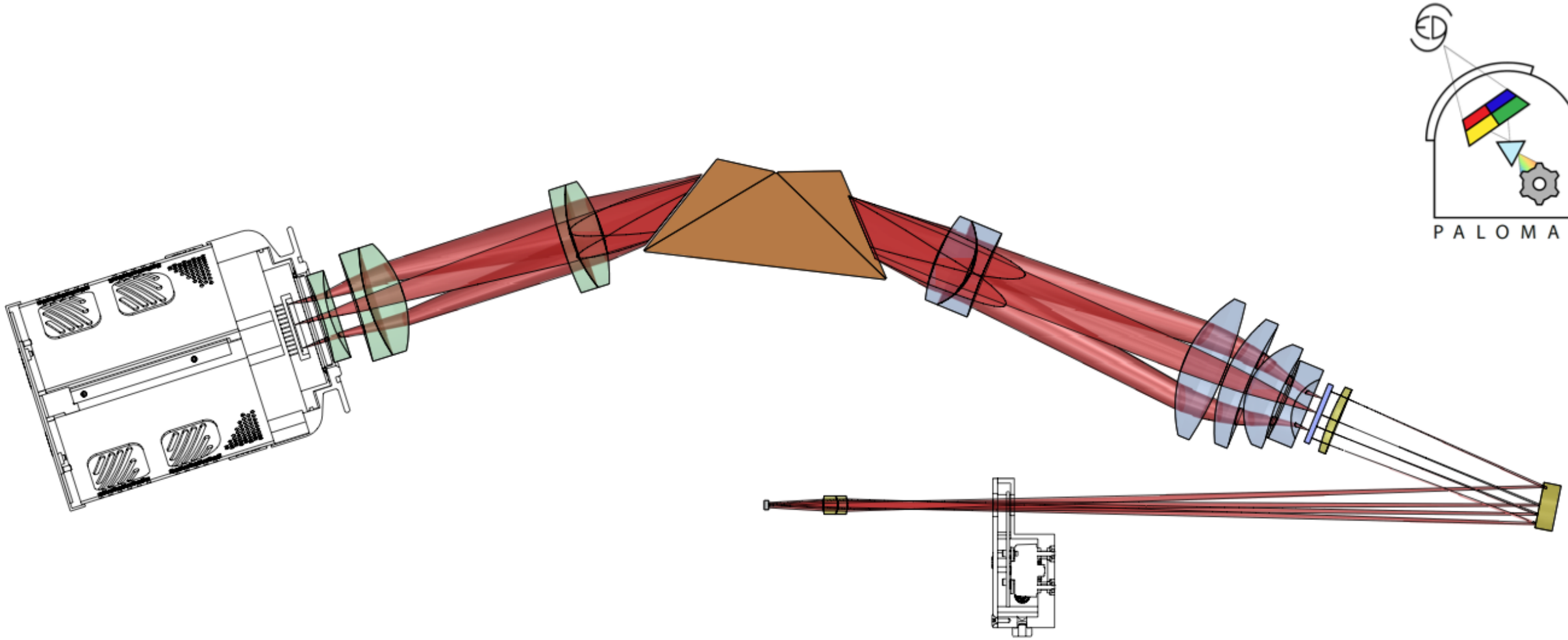
SEDM: pipelines and database

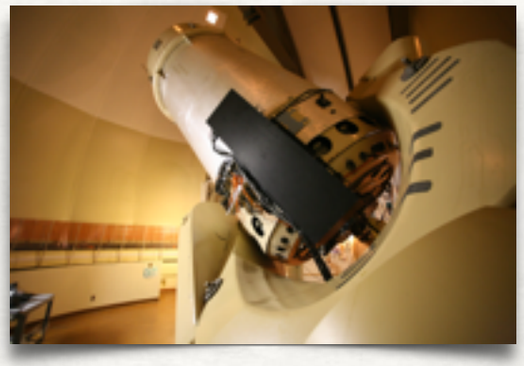


NADIA BLAGORODNOVA

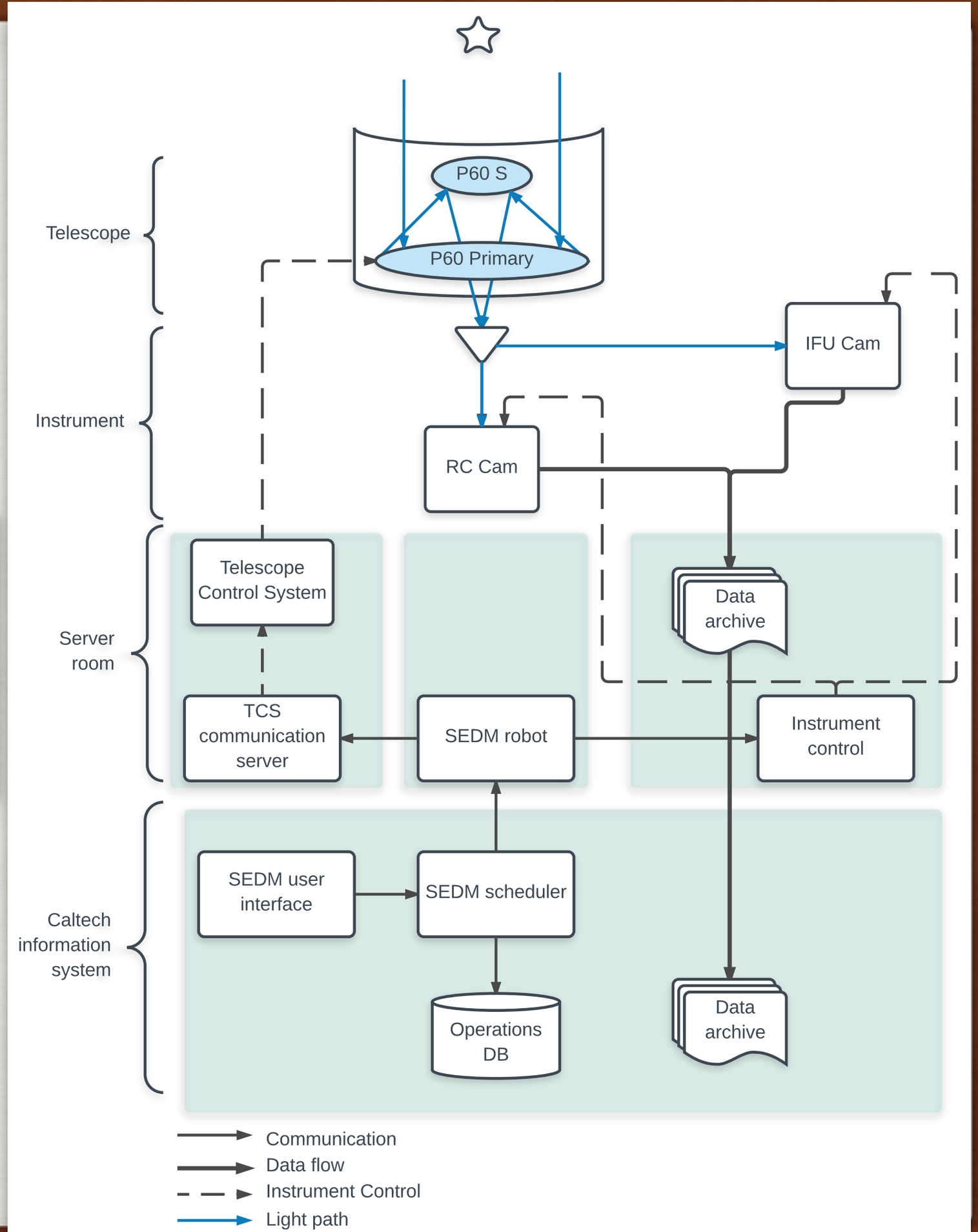
on behalf of the SEDM team

Caltech

DATA SYSTEM



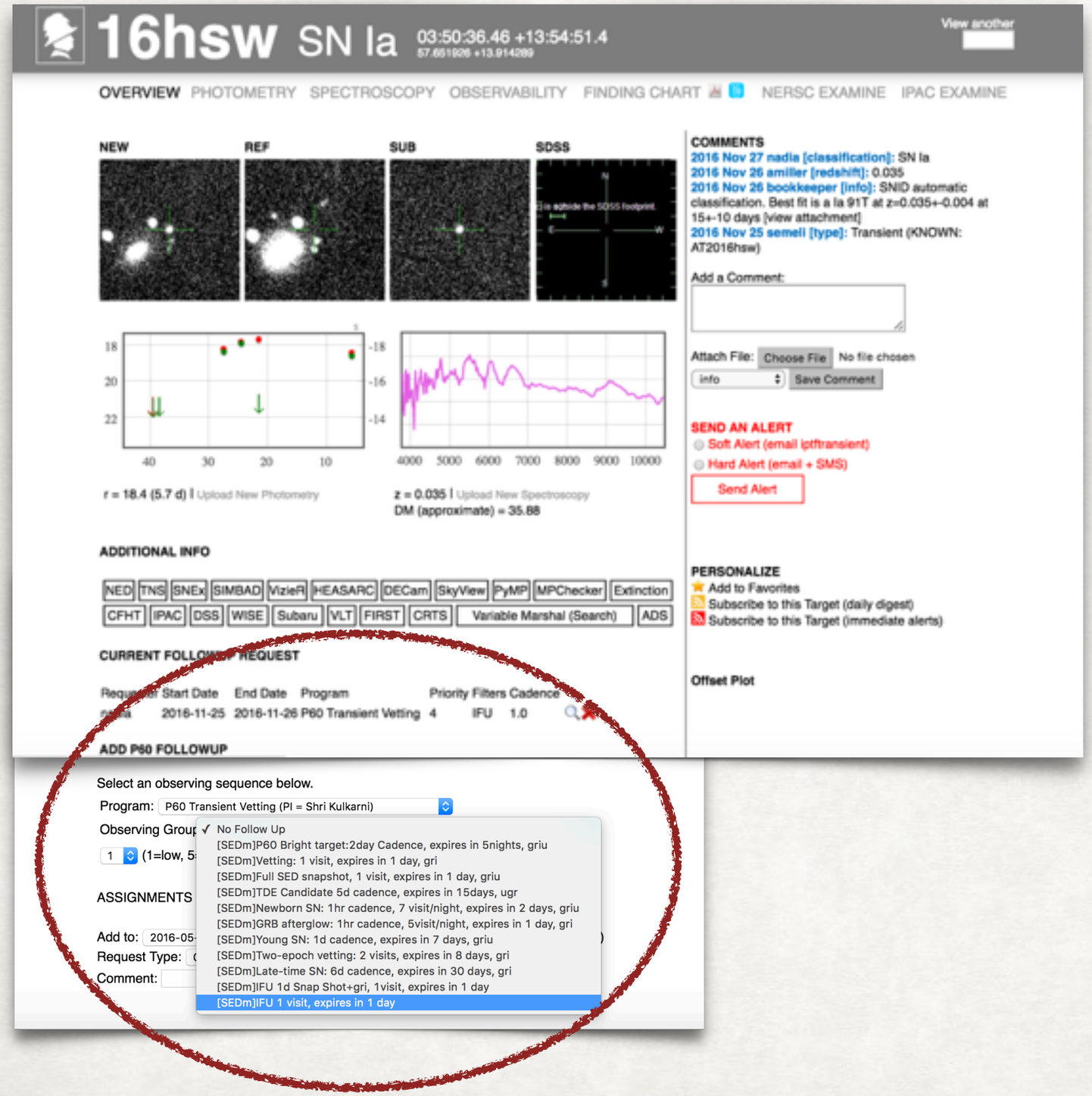
Caltech



SEDM DATA FLOW

1. Targets assignment and priorities
2. Scheduling
3. Observation
4. Data reduction and calibrations
5. Data access
6. + Quality assessment

FOLLOW-UP ASSIGNMENT



- iPTF
  - Assignment using the marshal
  - Human-based / biased
  - ~10 targets / night (iPTF usage only)
- ZTF
  - Human?
  - Automatic (mag)? Filters?
  - Priorities?
    - By programme? (fast/slow transients, SN Ia, etc…)

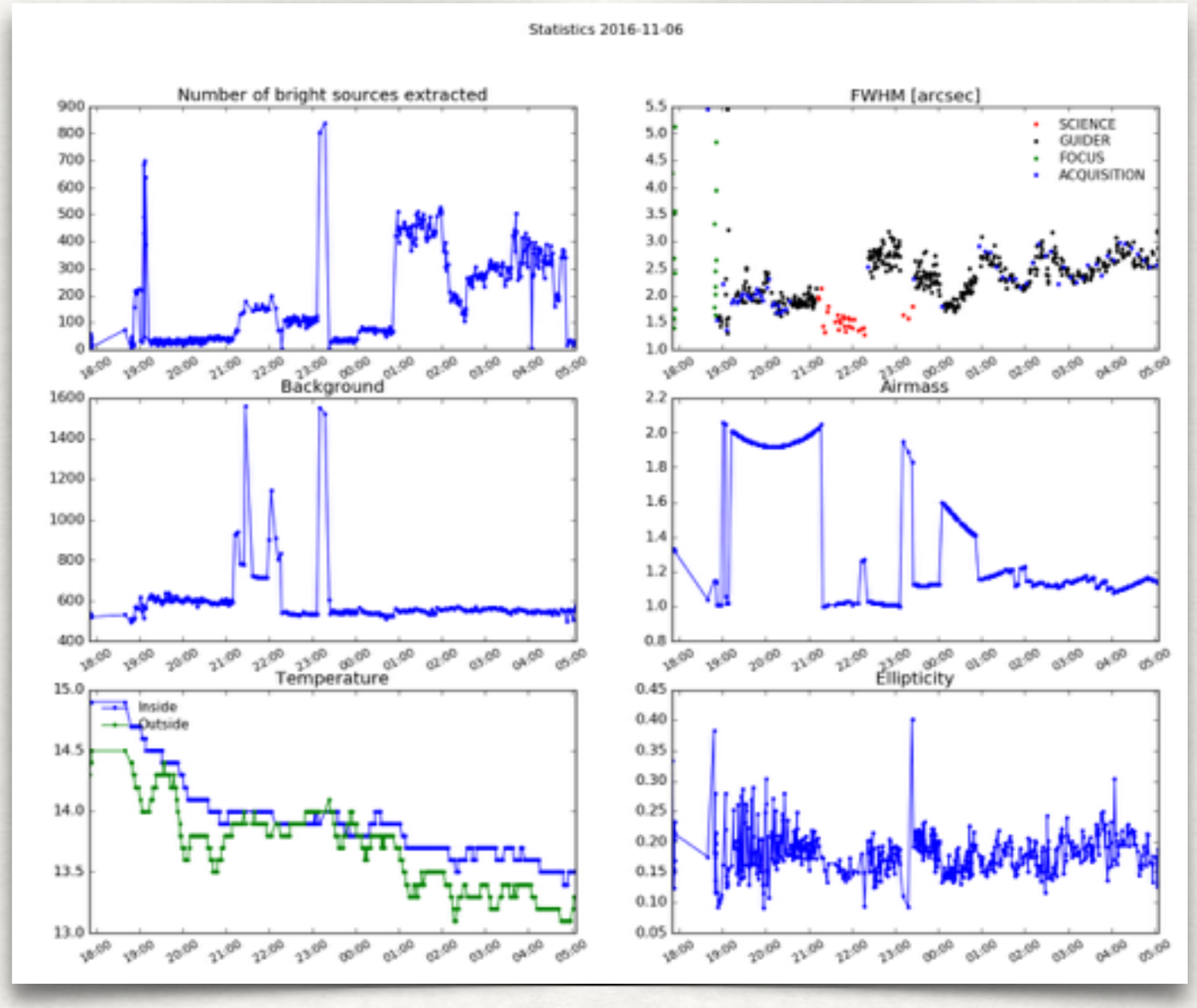
    (see discussion later)

SCHEDULING

- **iPTF**
  - Automatic scheduling of galactic, extragalactic and SSO (non-siderial)
  - Selection of targets according to priority/visibility/airmass constraints
- **ZTF**
  - Handling of light curve phase space (restart an observation in the right phase for variable stars)
  - ToO: Interruption of long exposures for GRB/fast transients
  - Track of failed observations / rescheduling
  - Allocation to programmes… (see discussion).

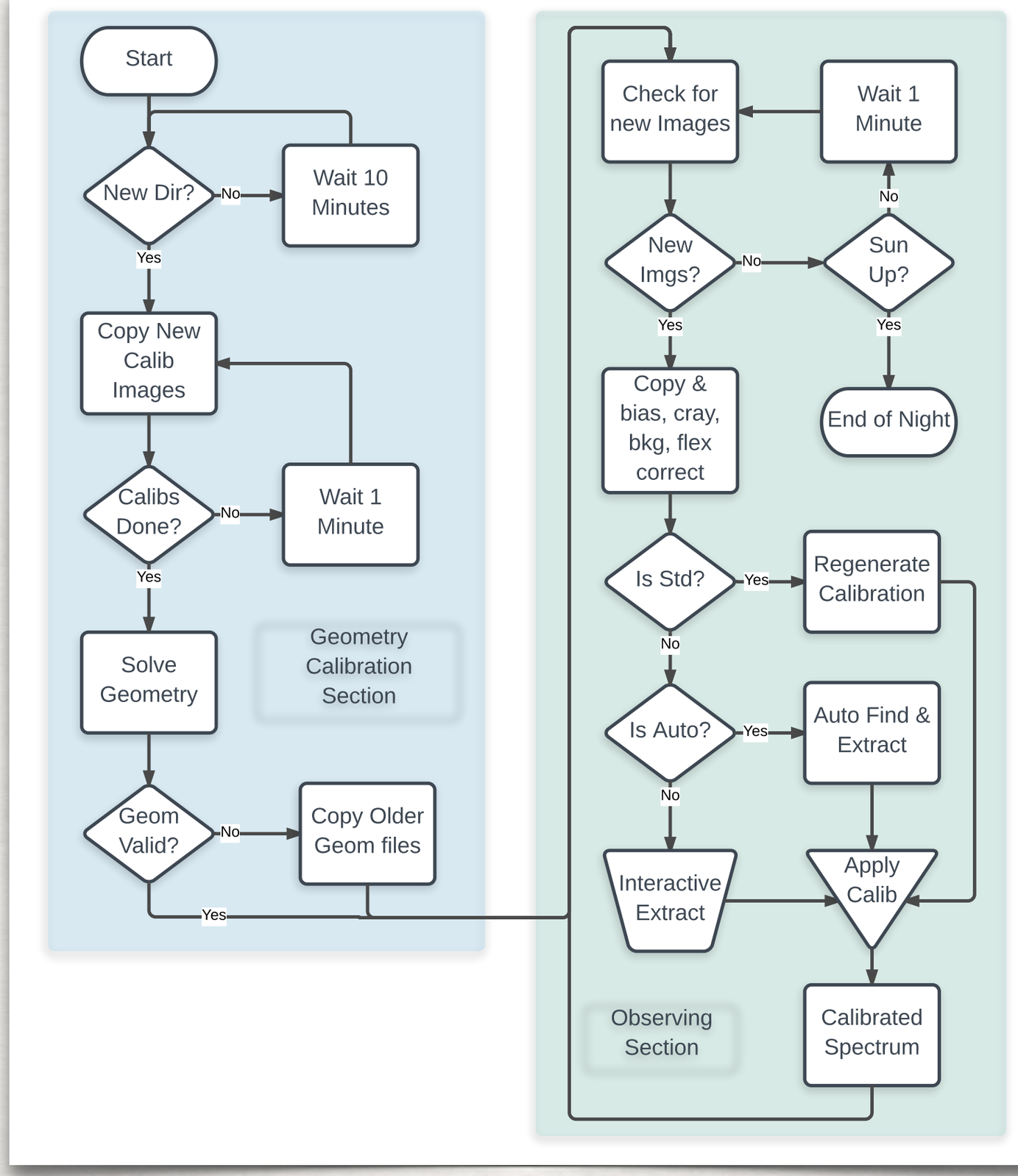
OBSERVATION - REAL-TIME STATISTICS

- **iPTF**
  - Generated every ~5 min
  - Nightly performance tracking
- **ZTF**
  - Image quality data stored along with each exposure
  - Telescope stats stored with each exposure



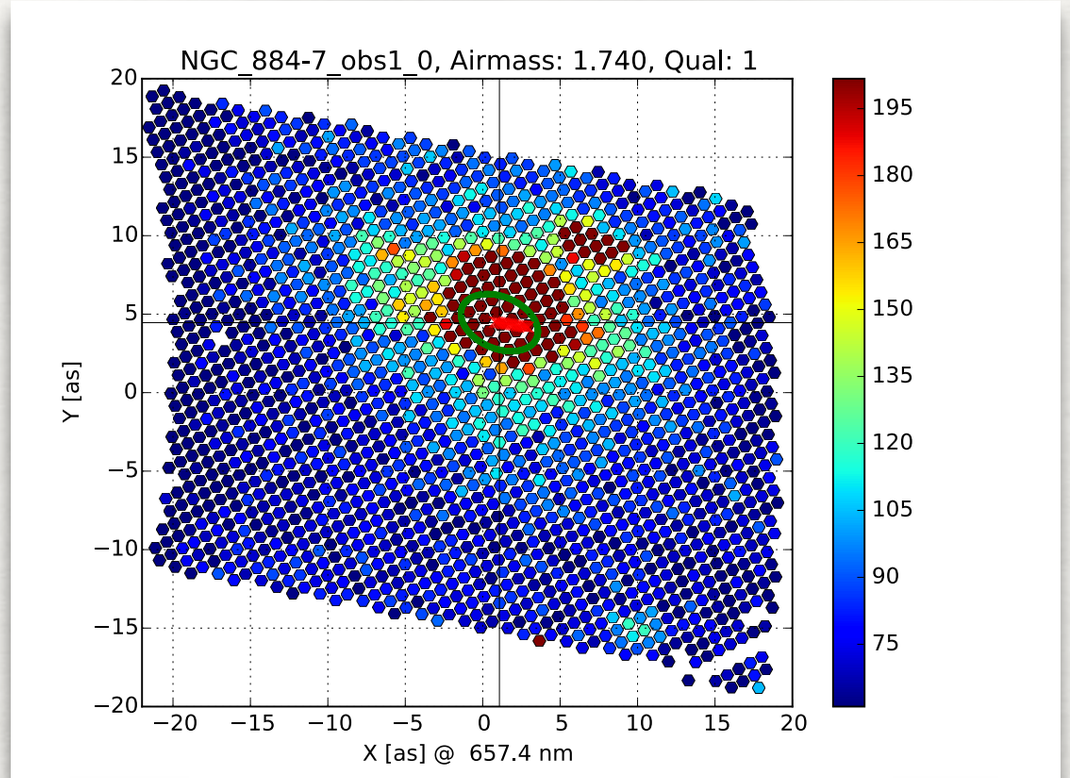
IFU DATA REDUCTION - CURRENT PIPELINE

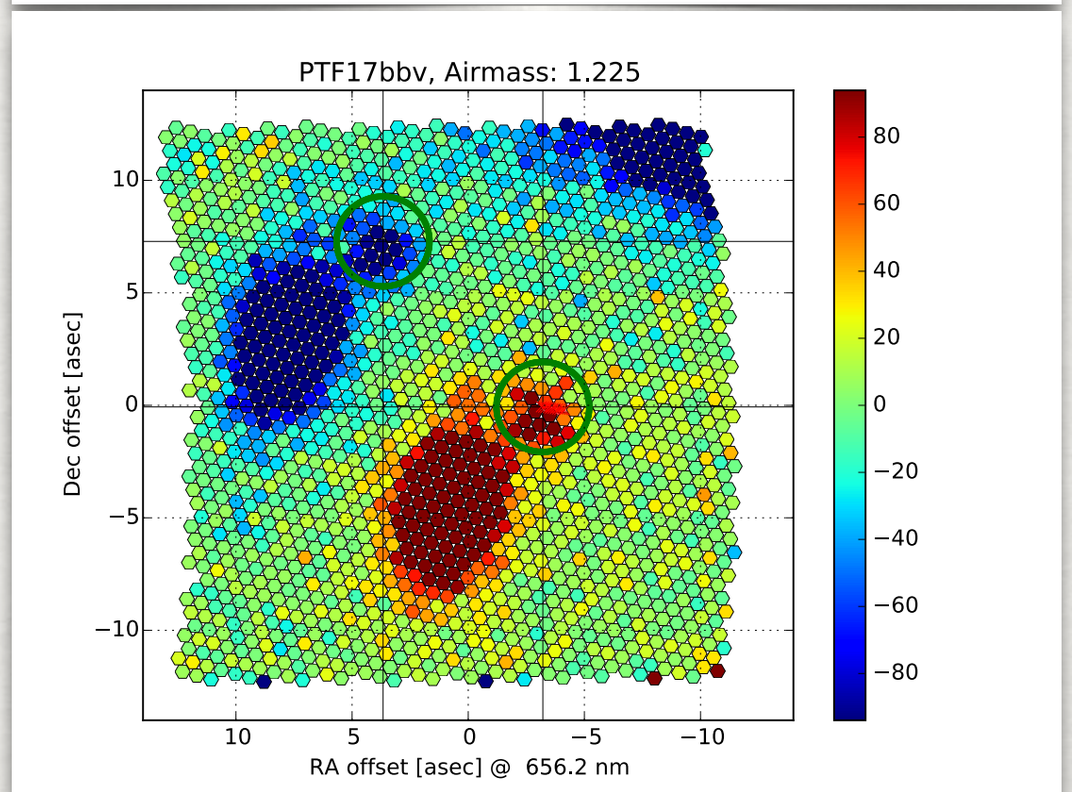
- Calibrations:
  Dome flats/Arcs
- Calculate the geometry
- Acquire science images
- Reduce
- Flux calibration
- Classification

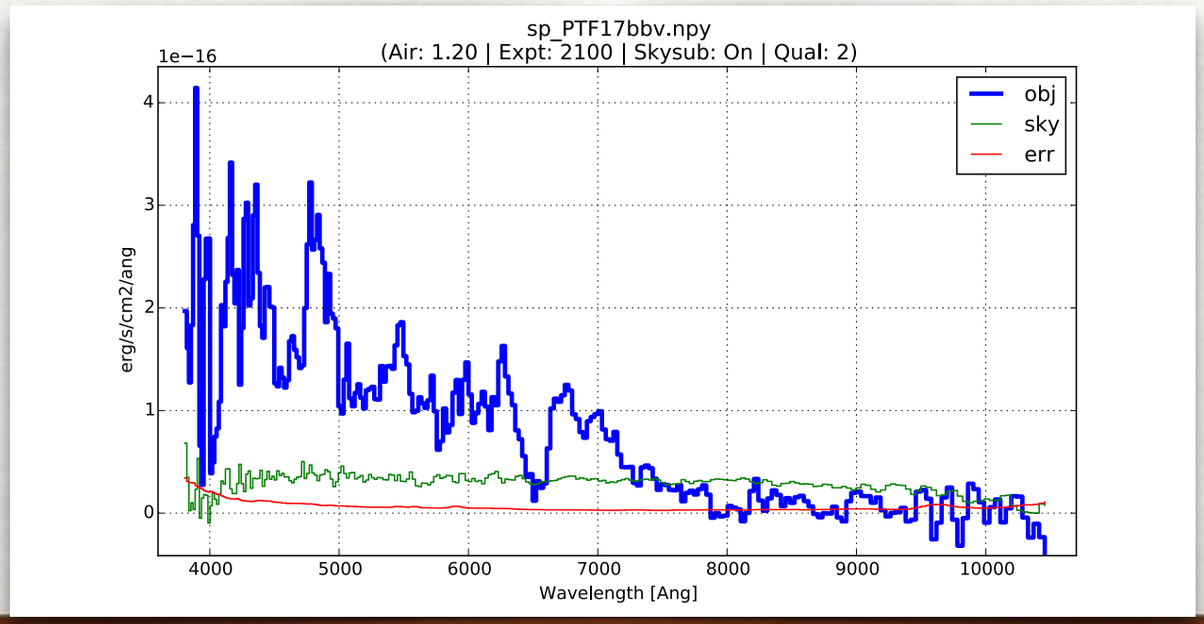


IFU DATA REDUCTION

- iPTF
  - Automatic for bright objects.
  - Requires A/B pairs to remove background + scattered light for faint (<16.5 mag) objects
- ZTF
  - Improvements ongoing: pysedm
  - (see talk by M. Rigault/J. Nordin)

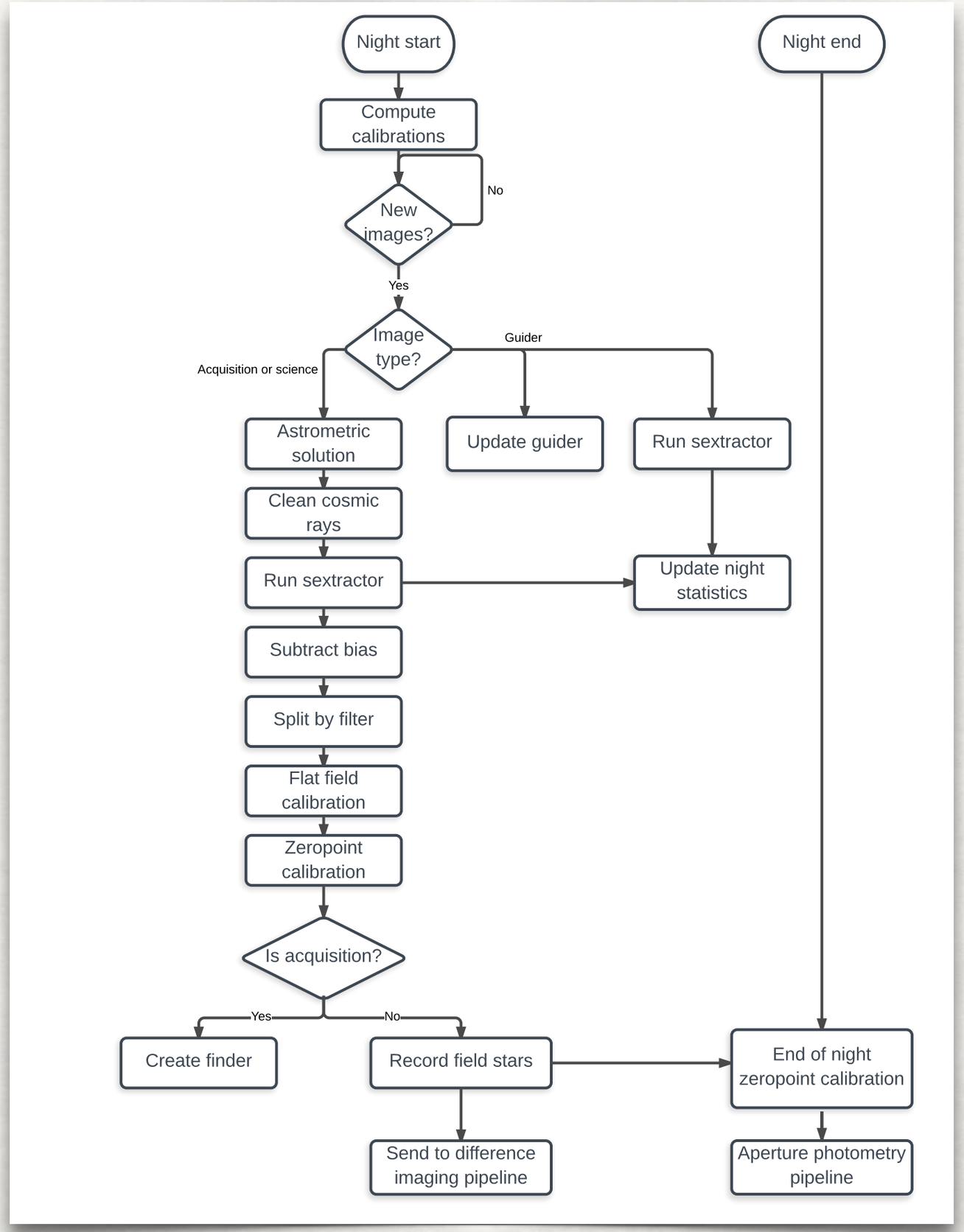




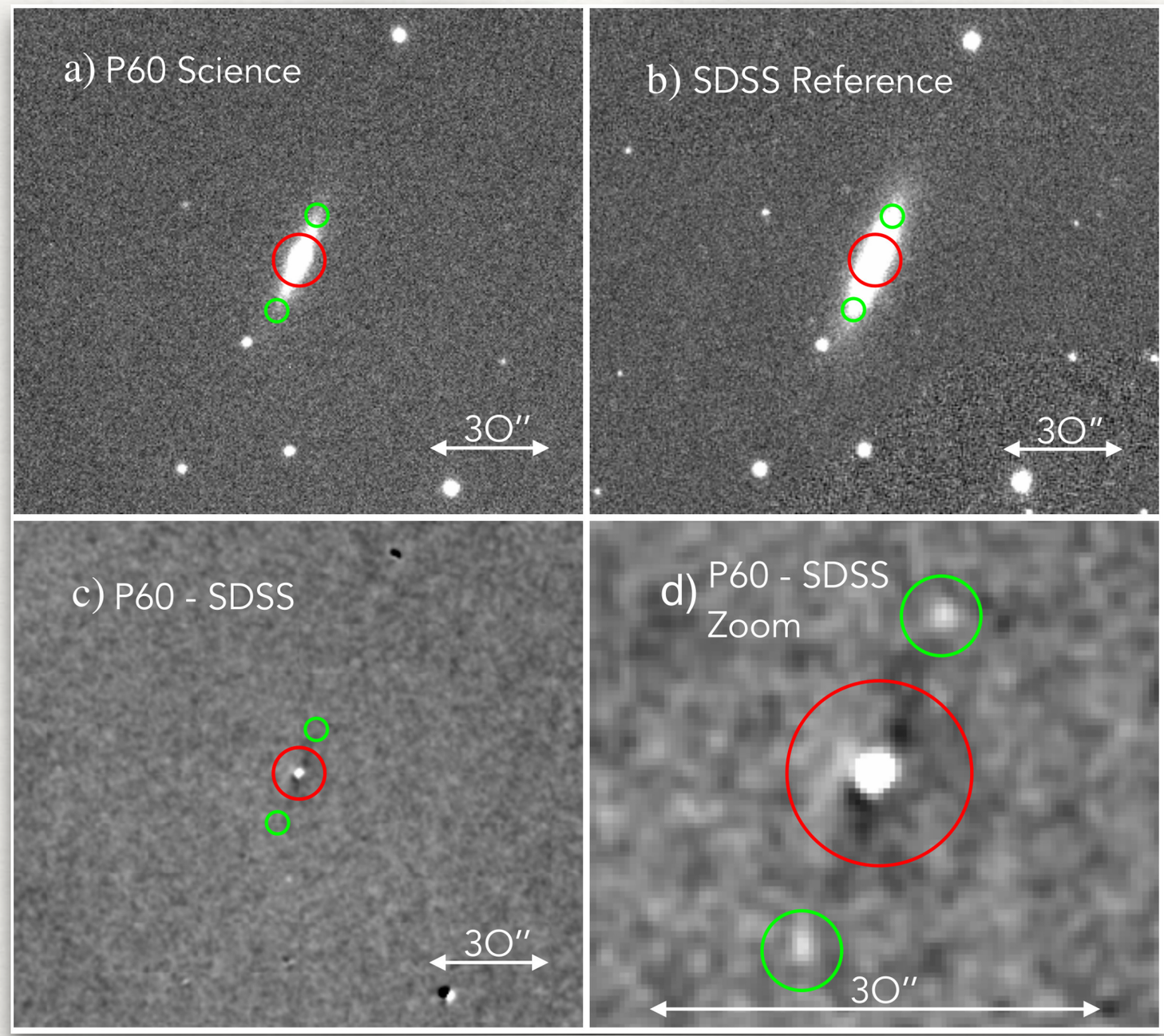


PHOT DATA REDUCTION

- Calibrations
- Astrometry
- Cosmic cleaning
- Image reduction
- Zero point calibration (PS1 + SDSS)
- Magnitude determination
- (aperture + PSF diff image)

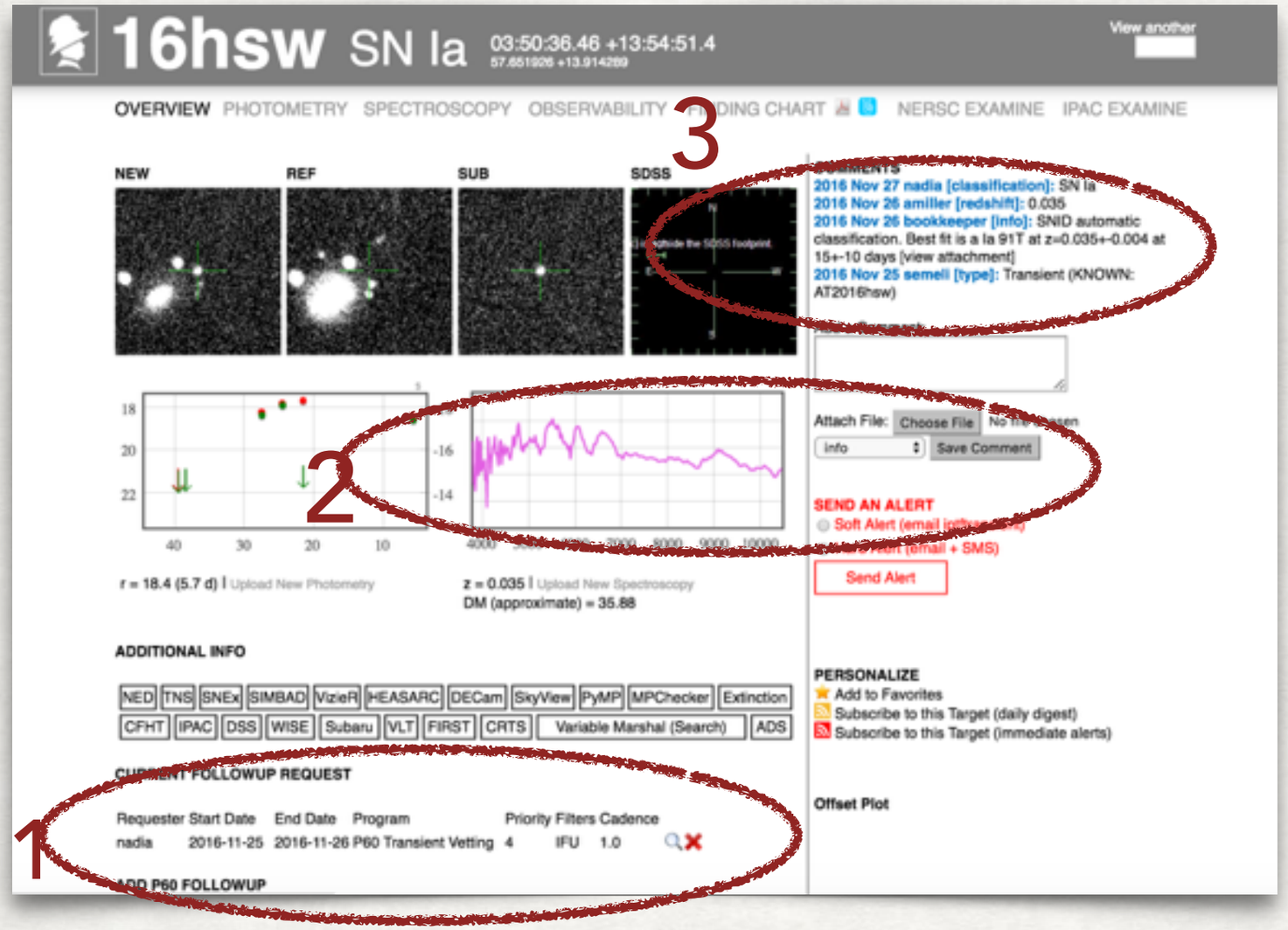


DIFF IMAGING PHOTOMETRIC PIPELINE



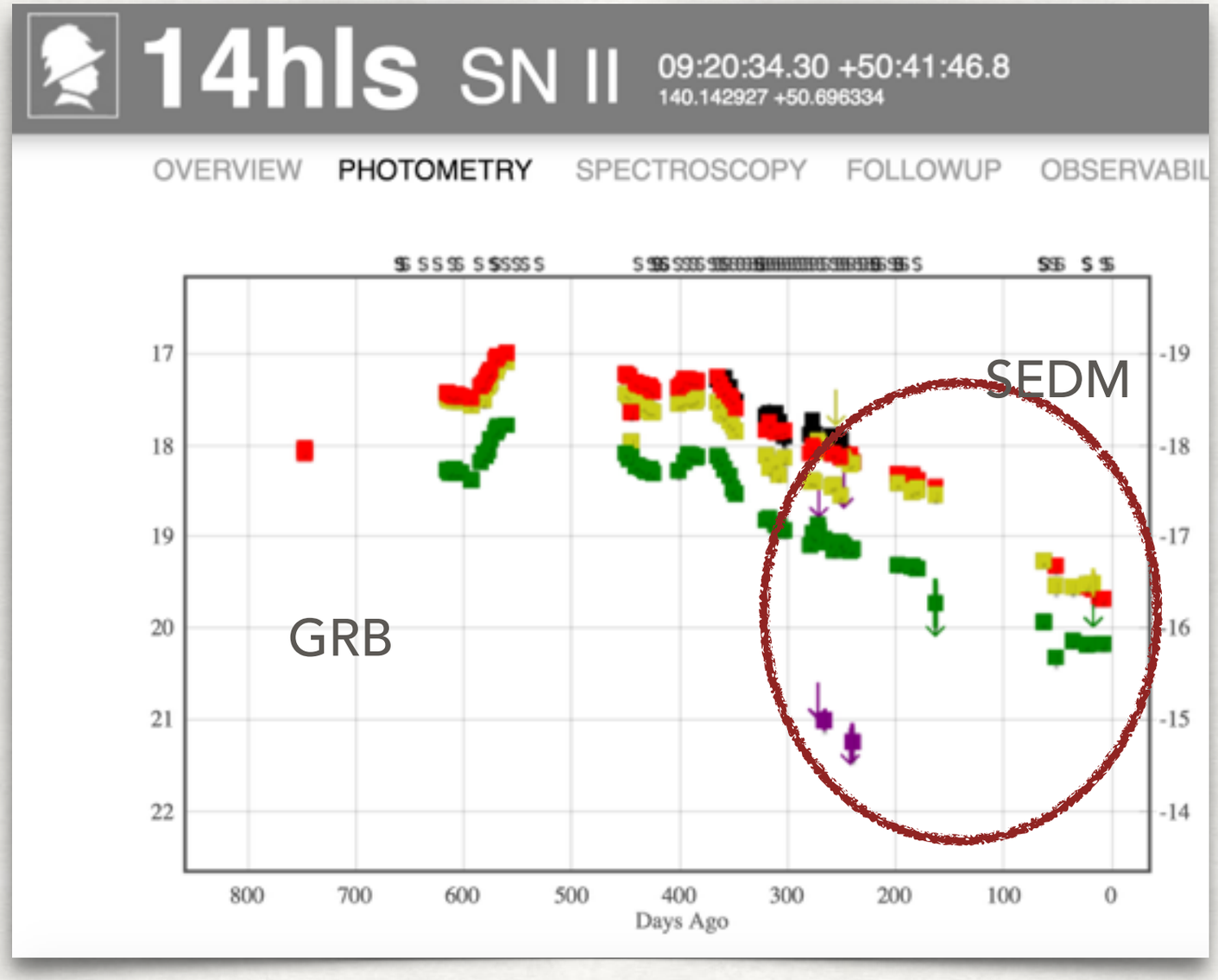
- FPipe - available for GRB Cam and SEDM in SDSS footprint
- Based on Common PSF Method (Gal-Yam +2008)
- Current plans to extend the pipeline to include PS1 catalogs *(gri)*

SPECTRA DISTRIBUTION TO THE COLLABORATION



- iPTF
  - Uploaded to the marshal.
  - Automatically classified
- ZTF
  - Uploaded to SEDM DB and… A specific marshal? / Central repository?
  - User notification
  - Use different classifiers (SNID, SuperFIT…).
  - Classification shall be shared with all groups?
  - Spectra shall be shared with all groups?

PHOTOMETRY DISTRIBUTION TO THE COLLABORATION



- iPTF
  - Photometry uploaded to the marshal.
- ZTF
  - Photometry stored in local SEDM database
  - Extragalactic marshal(s) DB?
  - Complement Galactic / Asteroid light curves?

SEDM DATABASE

- **iPTF**
  - Integrated with the marshal
  - Scheduling and daily operations
- **ZTF**
  - Integrated with (many?) marshals
- Closer control on time allocation and scheduling priorities
- QA
  - Tracking of scheduling, observation status, and image quality.
  - Anomaly triggers and alerts.
- Permissions and data access rights
- User notification

DB CONTENT

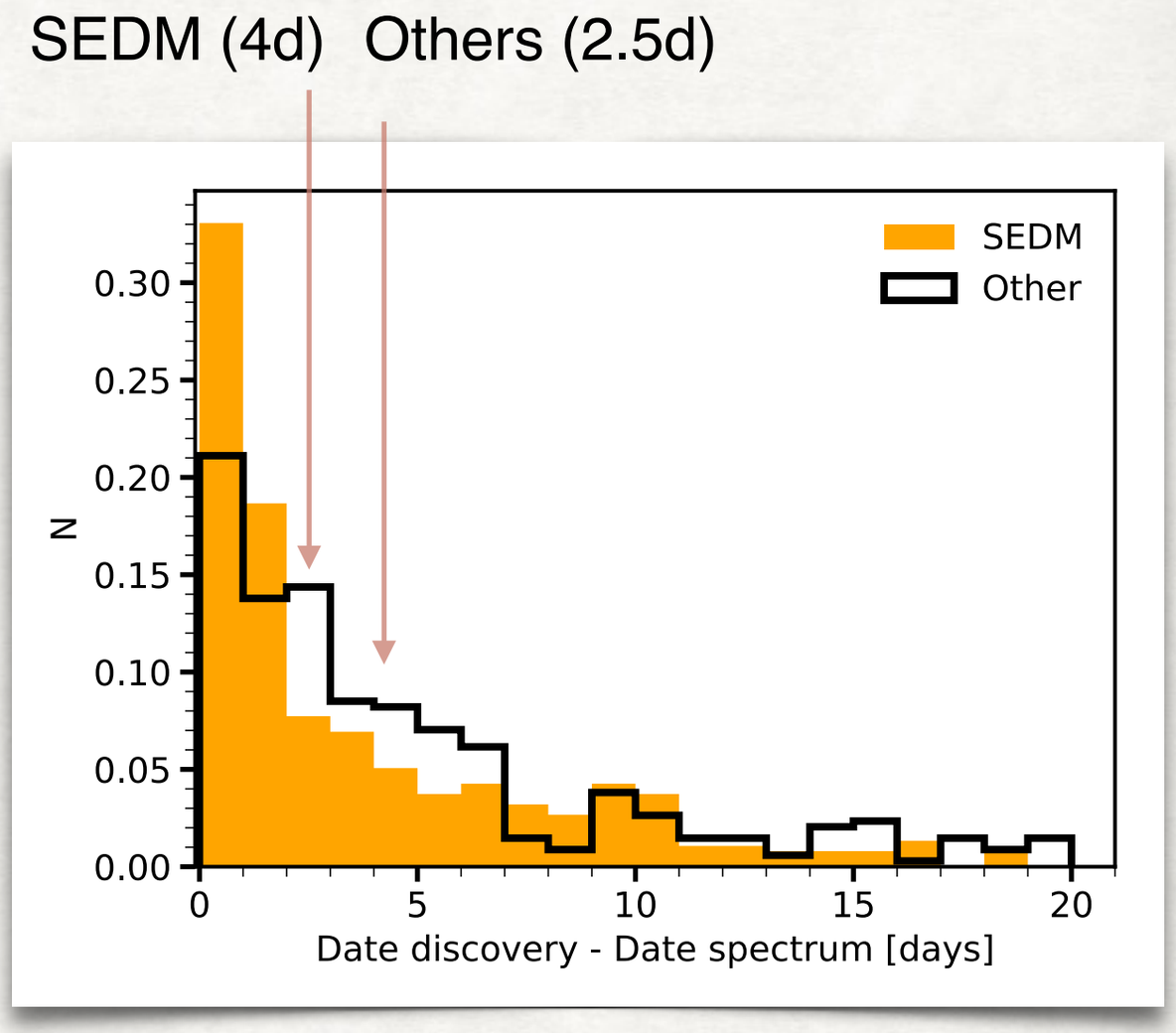
- **Users**
  - users
  - groups
  - usergroups
  - program
  - allocation
- **Objects**
  - object
  - elliptical_heliocentric
  - hyperbolic_heliocentric
  - parabolic_heliocentric
  - earth_satellite
  - periodic
- **Obser-vations**
  - observation
  - spec
  - phot
- **Calibra-tions**
  - spec_calib
  - phot_calib
  - ref_stars
- **Requests**
  - request
  - atomicrequest
- **QA**
  - telescope_stats
  - flexure
  - metrics_phot
  - metrics_spec
- **Metadata**
  - classification

DB STATUS AND FUTURE PLANS

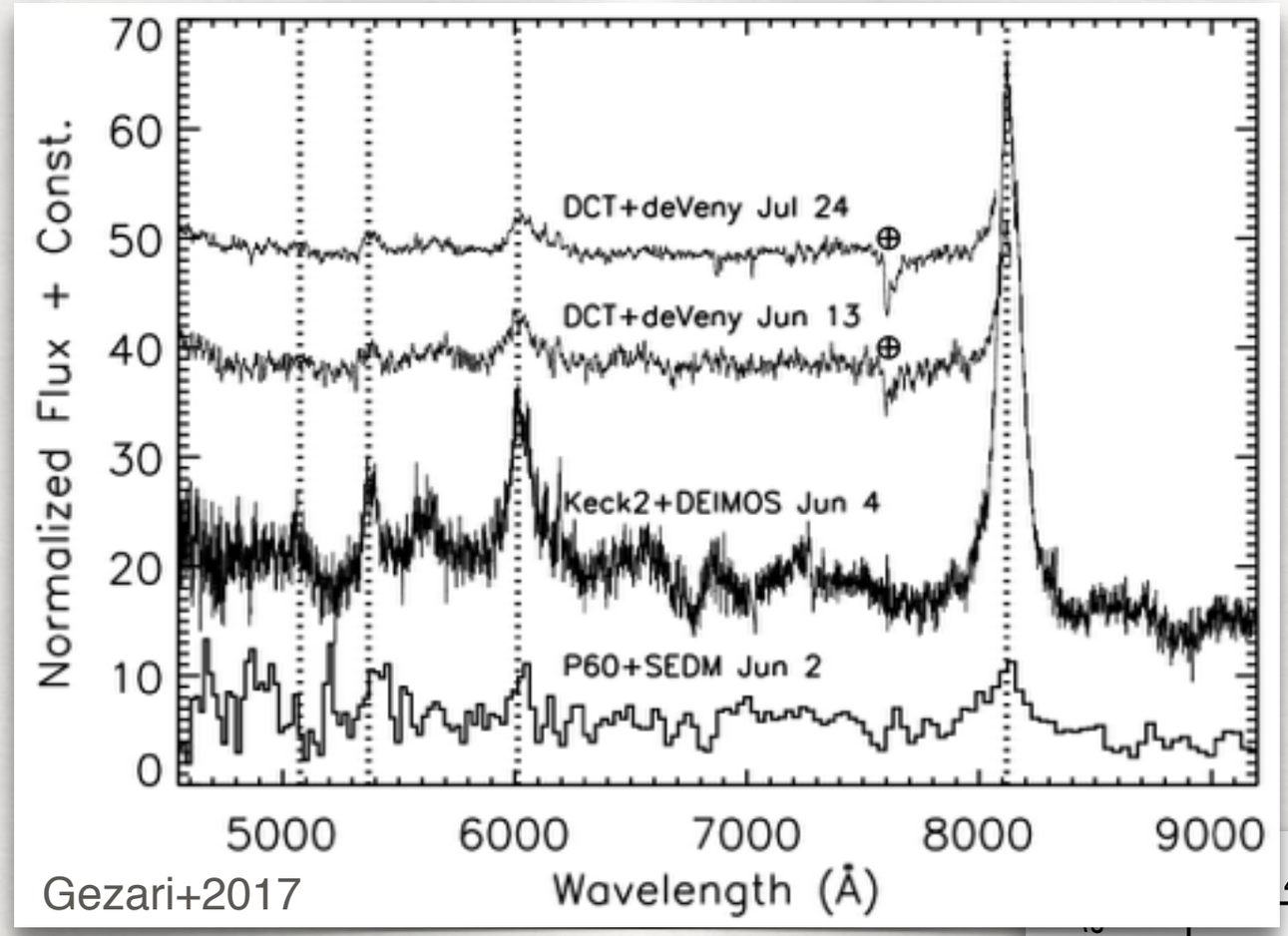
- DB implementation and interfaces are ready.
- Current effort in adapting the pipelines to:
  - Log each piece of information to the DB
  - Log existing data into the DB (different format!) for easier archival retrieval
- SEDM back online to test the interfaces.
- User web site under development.

SUMMARY OF RESULTS (IPTF)

- May 2016 - Feb 2017 (10 months)
- 1660 science spectra taken
- 486 transient object spectra (in the marshal)
- 25-40% more classifications than previous years
- 4 -> 2.5 days latency



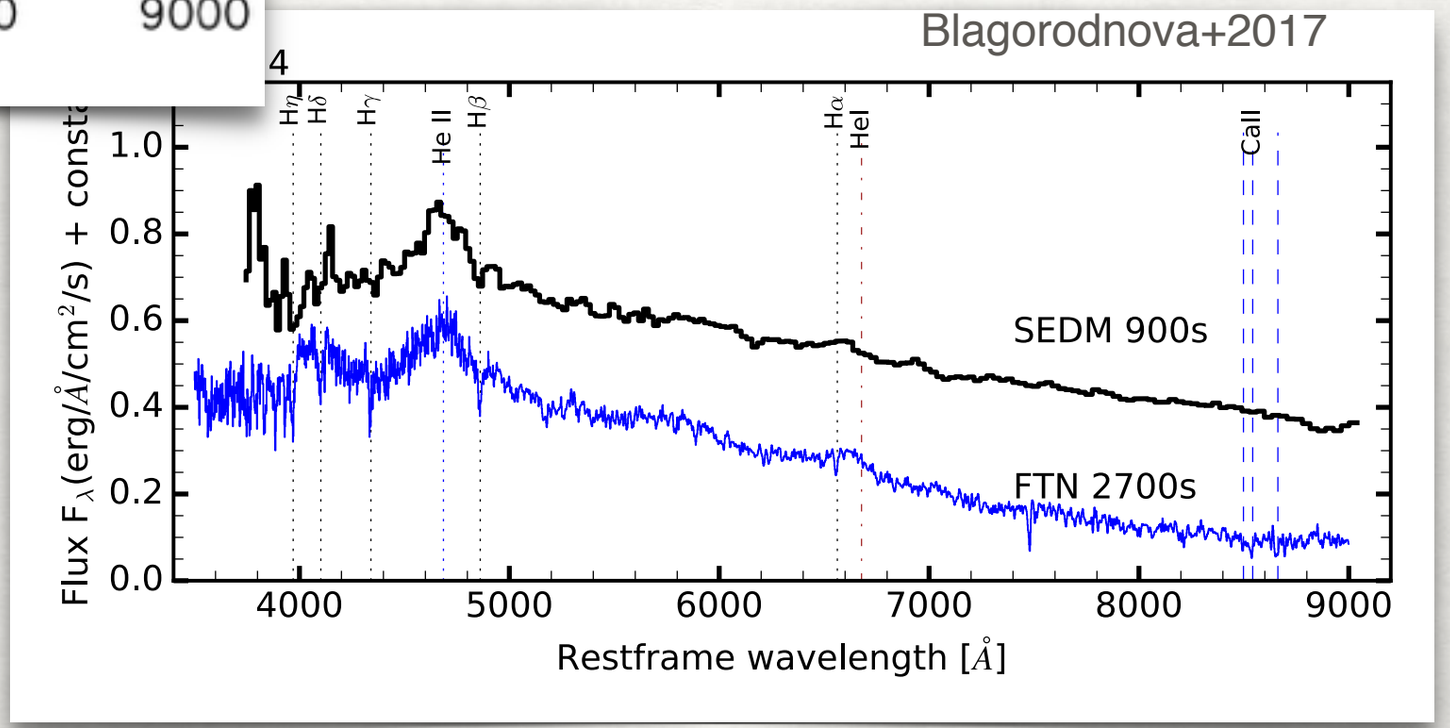
SCIENCE - TRANSIENTS



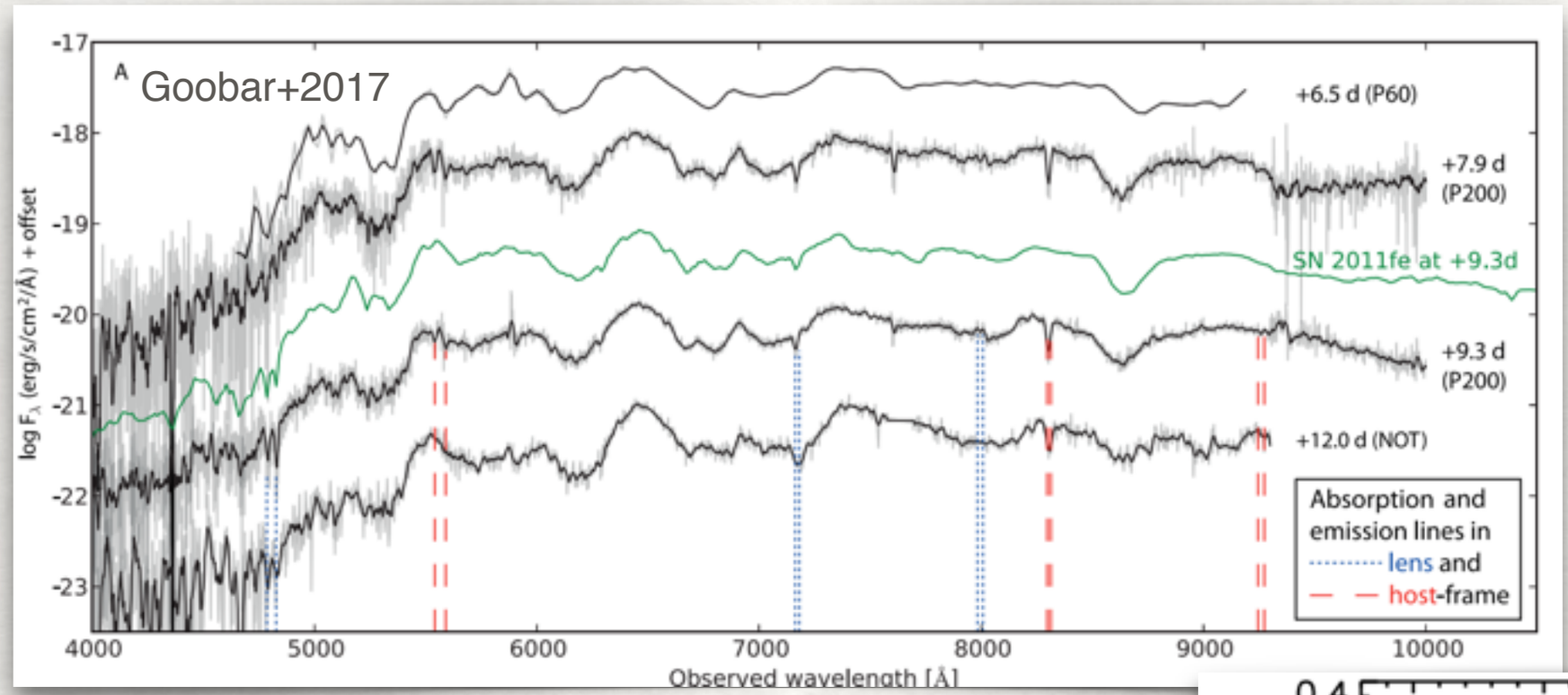
CHANGING LOOK QSO

+

TDE



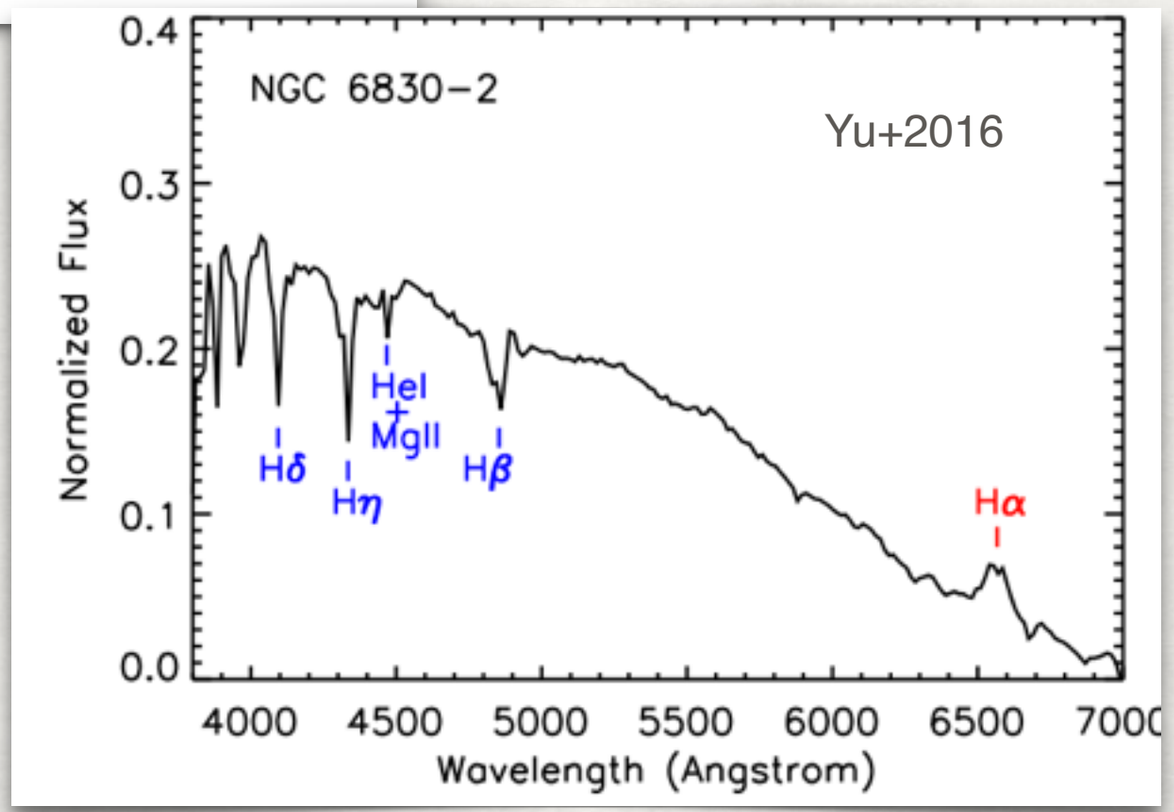
SCIENCE - TRANSIENTS + STARS



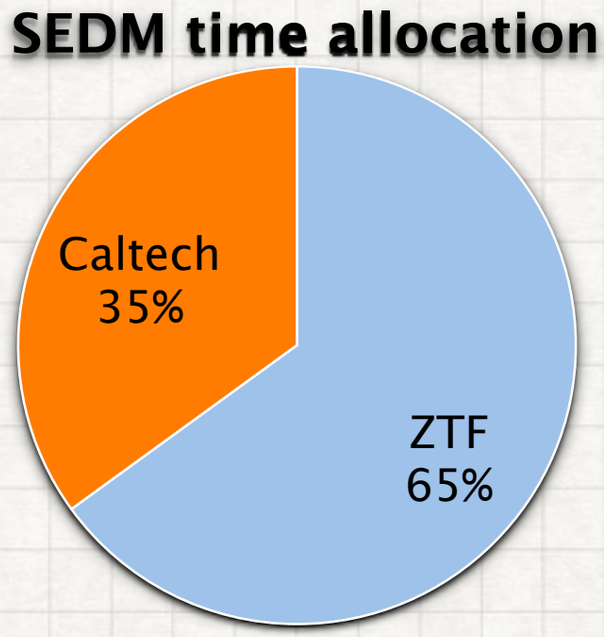
LENSED SN Ia

+

Be STARS

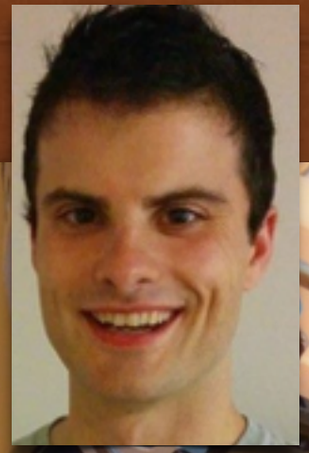


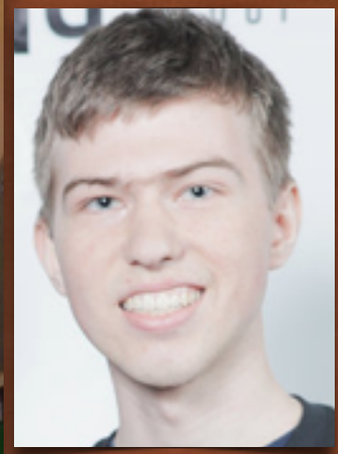
IN ZTF ERA...



What is the best way
to use this 65%???







Thank you!

Robert Quimby [PS]

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Nick Konidaris [PI]

Reston Nash [optics]

Choong Ngeow [DRP]

Sagi Ben-Ami [RC]

Nadia Blagorodnova [Ph]

Don Neill [CS]

Richard Walters [P60]

Karl Vyhmeister [DB]

Christoffer Fremling [Ph]