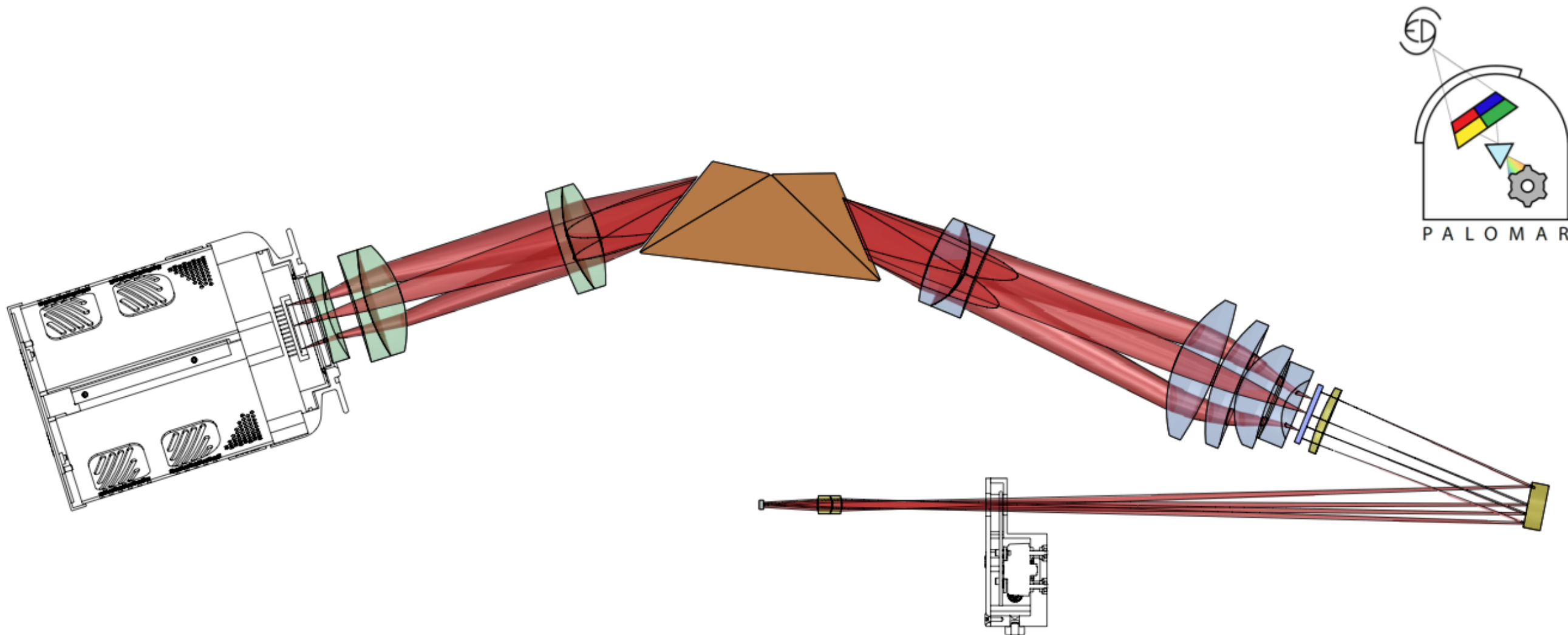


SEDM: pipelines and database



NADIA BLAGORODNOVA

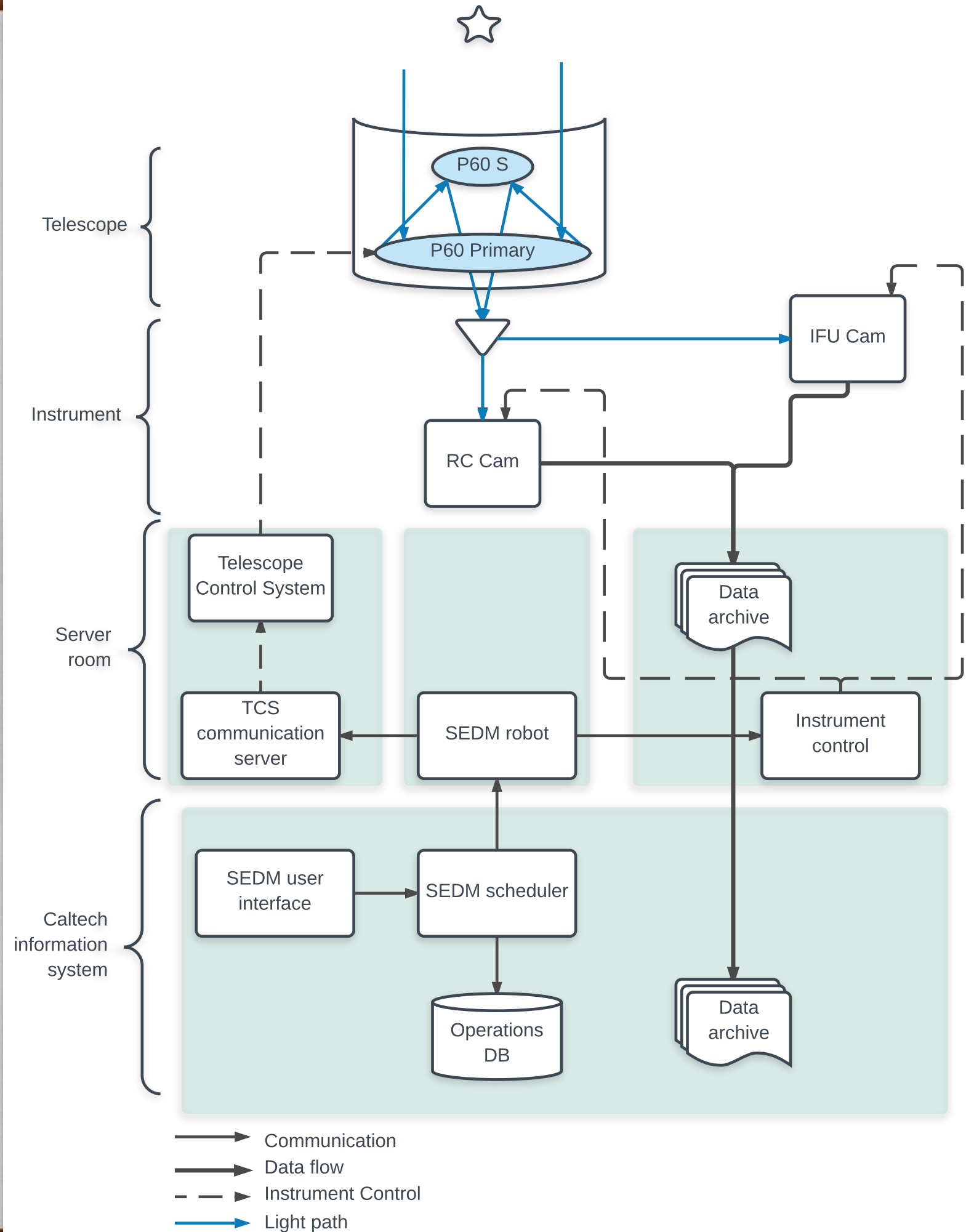
on behalf of the SEDM team

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

16hsw SN Ia 03:50:36.46 +13:54:51.4
57.661926 +13.914289

OVERVIEW PHOTOMETRY SPECTROSCOPY OBSERVABILITY FINDING CHART NERSC EXAMINE IPAC EXAMINE

NEW REF SUB SDSS

COMMENTS
 2016 Nov 27 nadia [classification]: SN Ia
 2016 Nov 26 amiller [redshift]: 0.035
 2016 Nov 26 bookkeeper [info]: SNID automatic classification. Best fit is a Ia 91T at $z=0.035 \pm 0.004$ at 15+10 days [view attachment]
 2016 Nov 25 semell [type]: Transient (KNOWN: AT2016hsw)

Add a Comment:

Attach File: Choose File No file chosen
 info Save Comment

SEND AN ALERT
☐ Soft Alert (email iptftransient)
☐ Hard Alert (email + SMS)
 Send Alert

PERSONALIZE
☒ Add to Favorites
☒ Subscribe to this Target (daily digest)
☒ Subscribe to this Target (immediate alerts)

Offset Plot

ADDITIONAL INFO
 NED TNS SNeX SIMBAD Vizier HEASARC DECam SkyView PyMP MPChecker Extinction
 CFHT IPAC DSS WISE Subaru VLT FIRST CRTS Variable Marshal (Search) ADS

CURRENT FOLLOWUP REQUEST

Requester	Start Date	End Date	Program	Priority	Filters	Cadence
naia	2016-11-25	2016-11-26	P60 Transient Vetting	4	IFU	1.0

ADD P60 FOLLOWUP

Select an observing sequence below.

Program: P60 Transient Vetting (PI = Shri Kulkarni)

Observing Group: No Follow Up

1 (1=low, 5=high)

ASSIGNMENTS

Add to: 2016-05

Request Type: C

Comment:

[SEDm]P60 Bright target: 2day Cadence, expires in 5nights, griu
 [SEDm]Vetting: 1 visit, expires in 1 day, gri
 [SEDm]Full SED snapshot, 1 visit, expires in 1 day, griu
 [SEDm]TDE Candidate 5d cadence, expires in 15days, ugr
 [SEDm]Newborn SN: 1hr cadence, 7 visit/night, expires in 2 days, griu
 [SEDm]GRB afterglow: 1hr cadence, 5visit/night, expires in 1 day, gri
 [SEDm]Young SN: 1d cadence, expires in 7 days, griu
 [SEDm]Two-epoch vetting: 2 visits, expires in 8 days, gri
 [SEDm]Late-time SN: 6d cadence, expires in 30 days, gri
 [SEDm]IFU 1d Snap Shot+gri, 1visit, expires in 1 day
 [SEDm]IFU 1 visit, expires in 1 day

- iPTF

- Assignment using the marshal
- Human-based / biased
- ~10 targets / night (iPTF usage only)

- ZTF

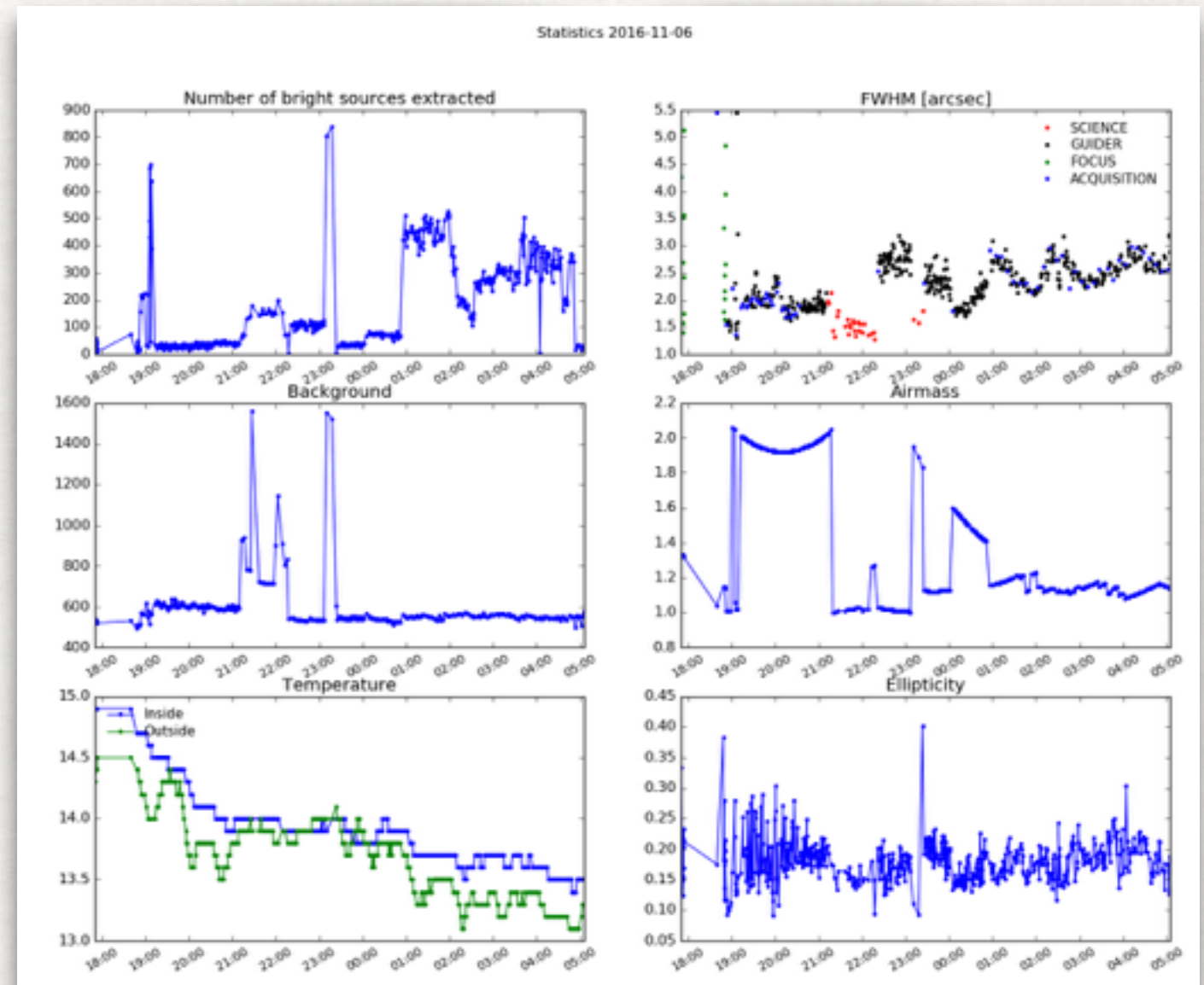
- Human?
 - Automatic (mag)? Filters?
 - Priorities?
 - By programme? (fast/slow transients, SN Ia, etc...)
- (see discussion later)

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).

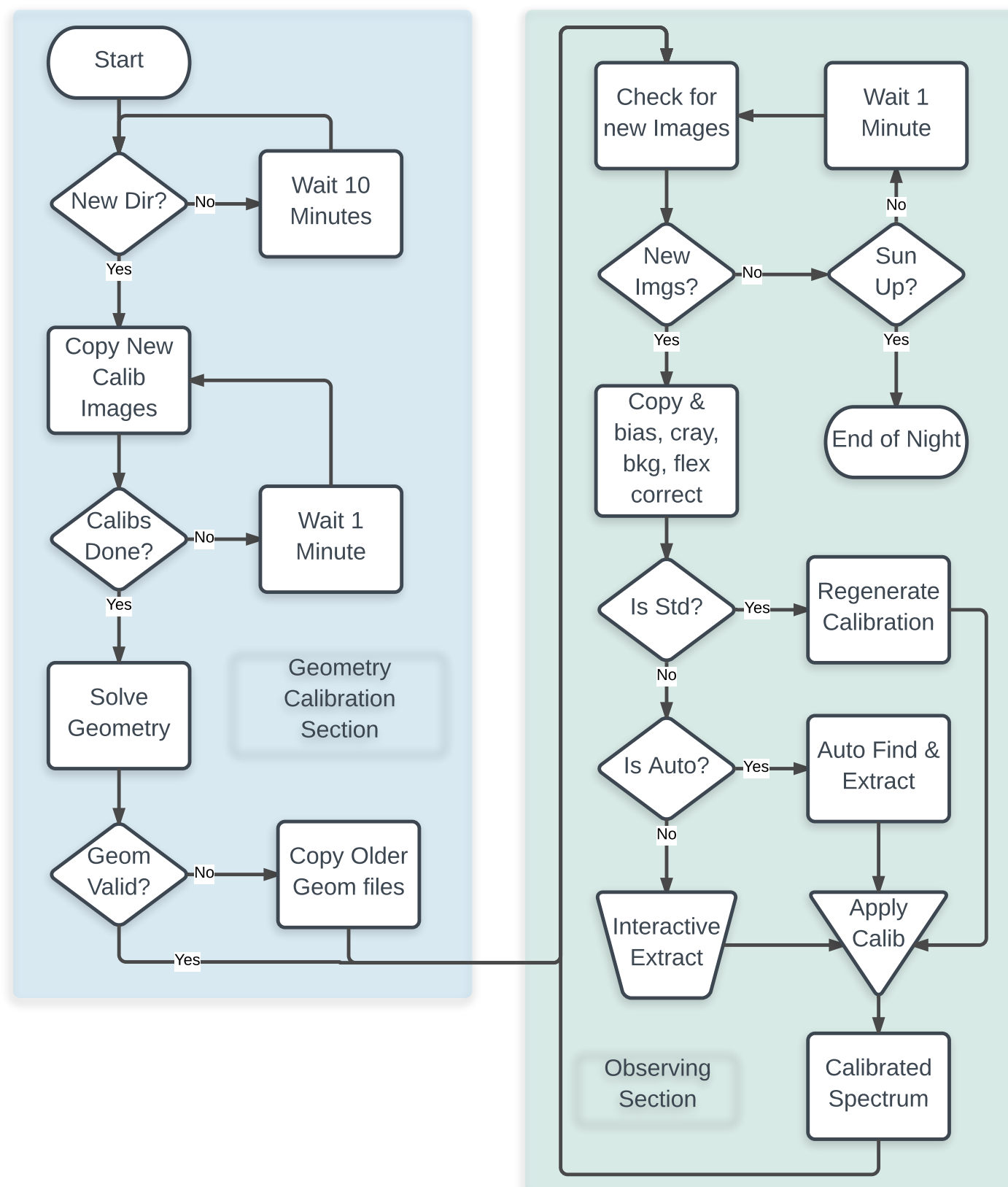
OBSERVATION - REAL-TIME STATISTICS

- 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



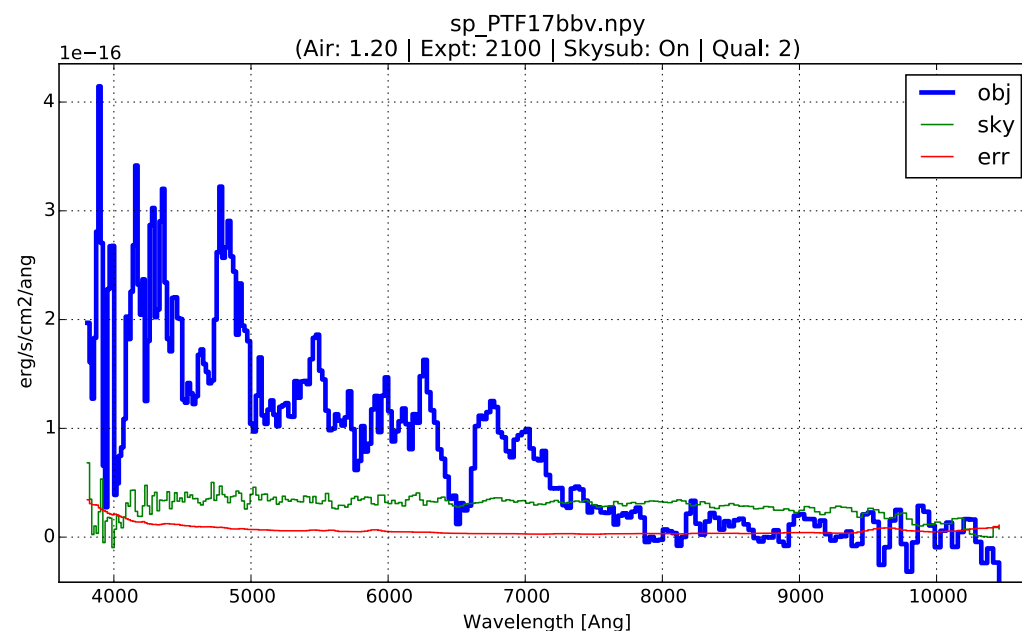
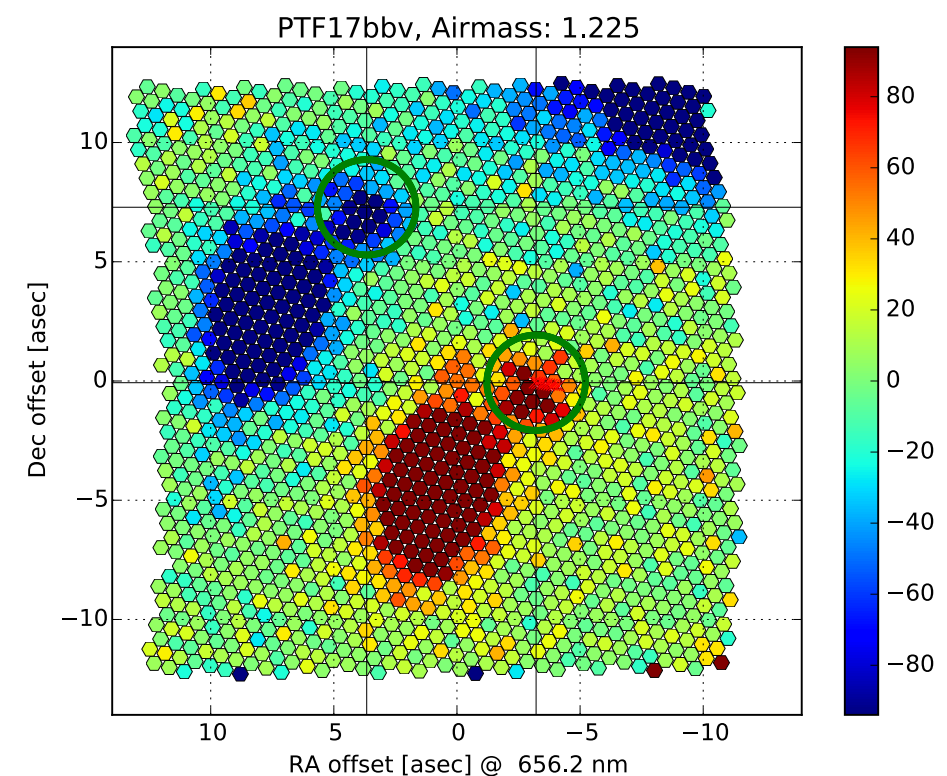
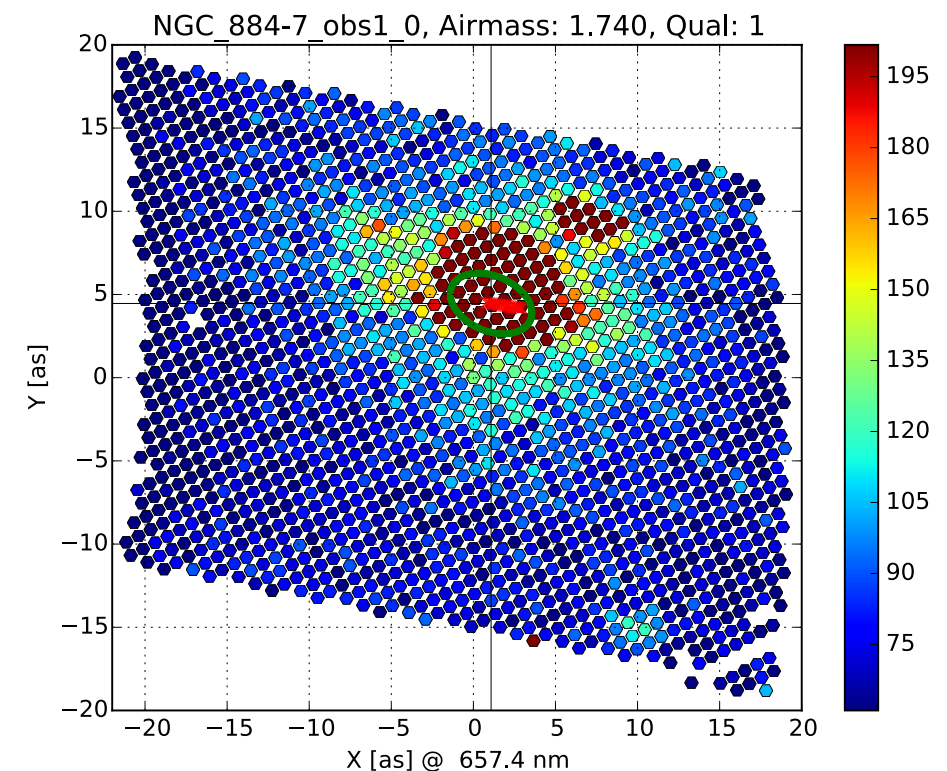
IFU DATA REDUCTION

- iPTF

- Automatic for bright objects.
- Requires A/B pairs to remove background + scattered light for faint (<16.5 mag) objects

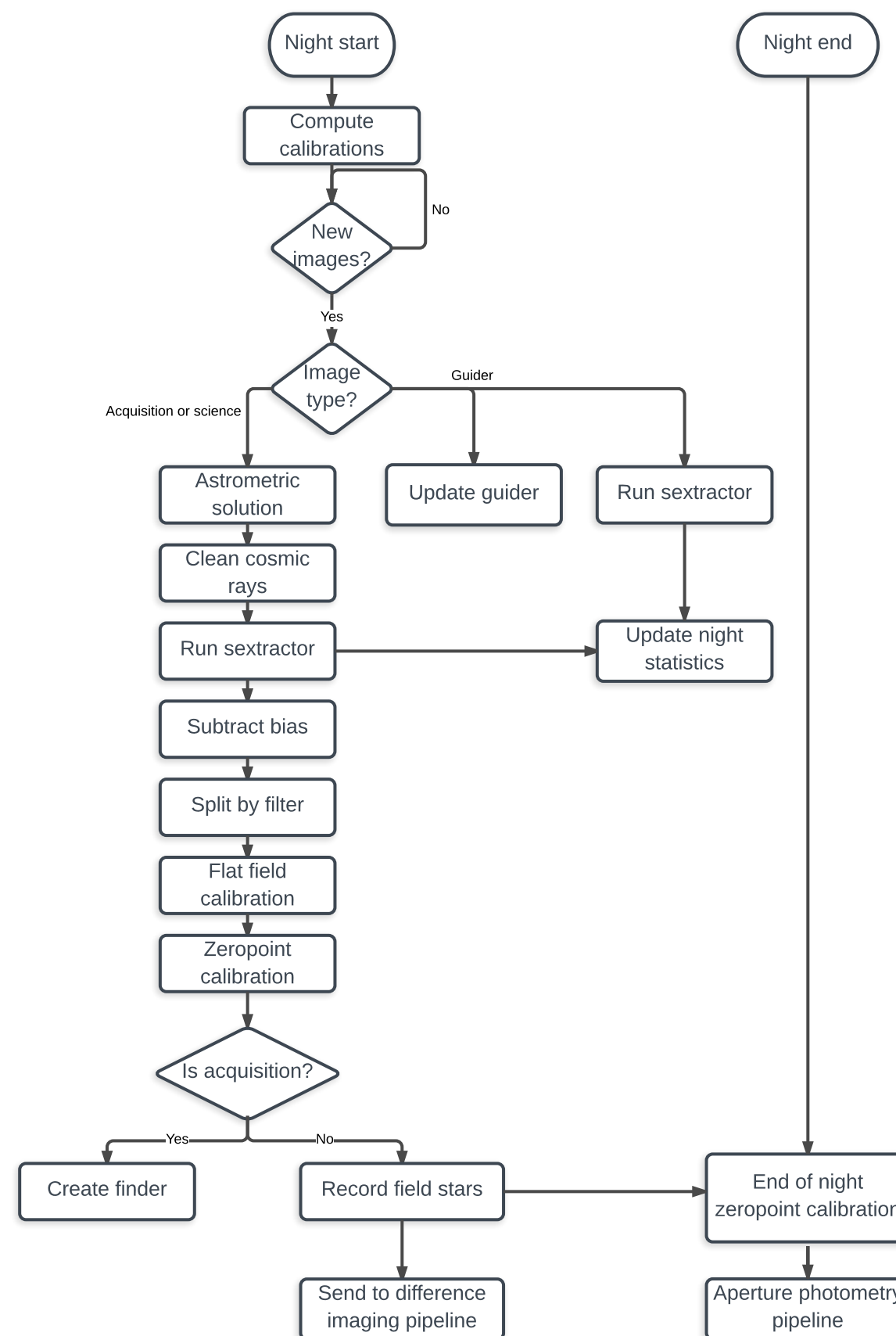
- ZTF

- Improvements ongoing: pysedm
- (see talk by M. Rigault/J. Nordin)

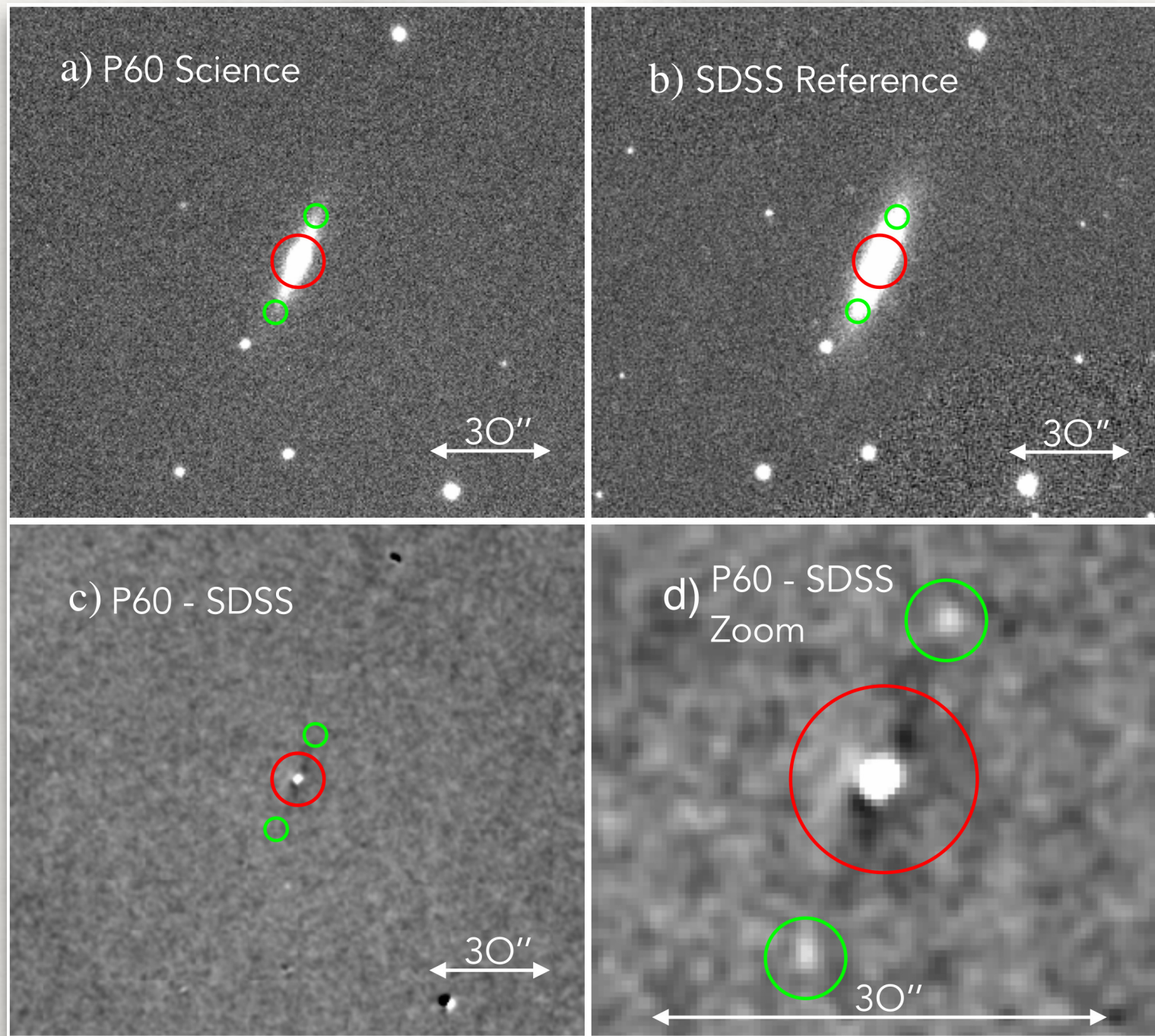


PHOT DATA REDUCTION

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



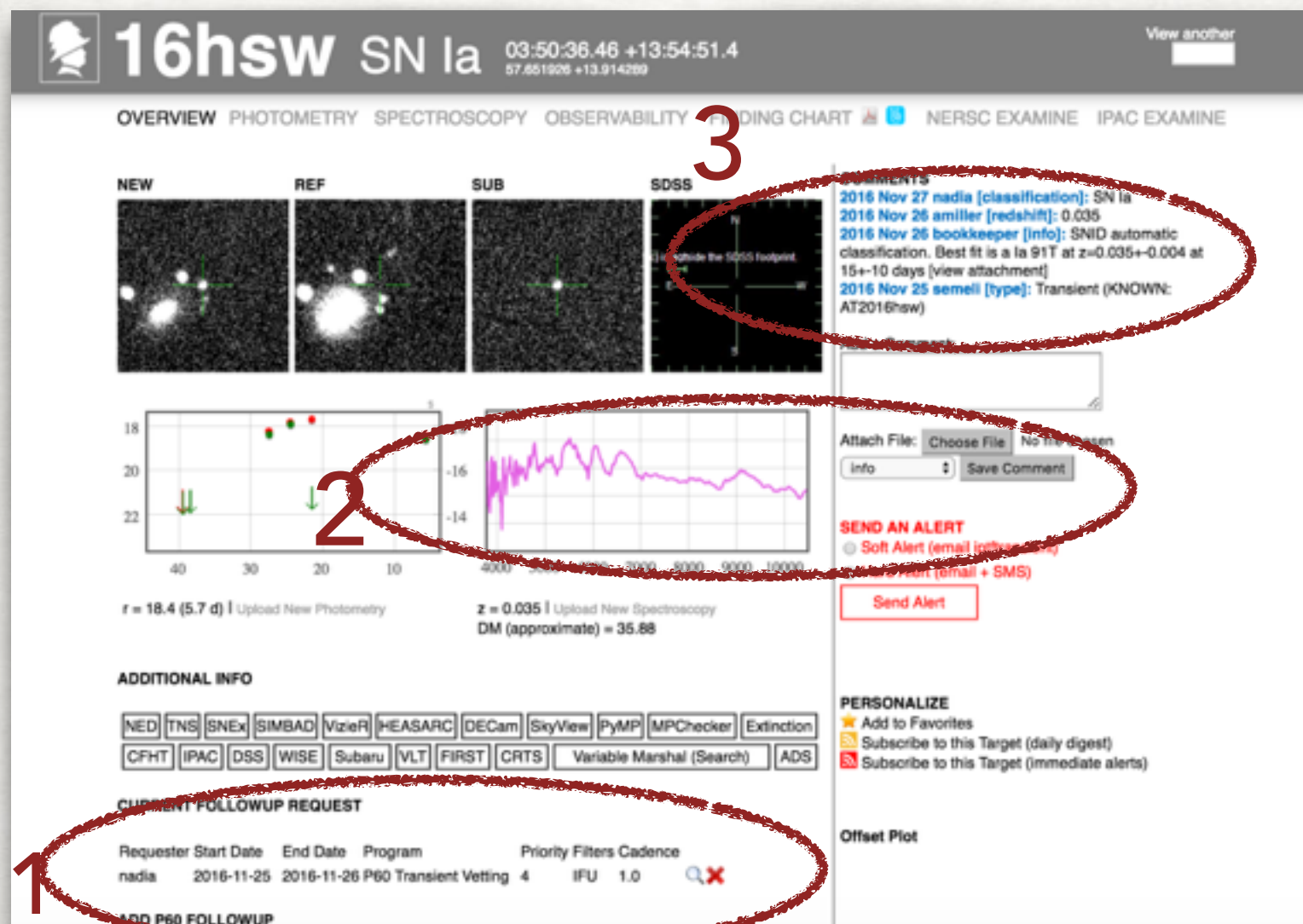
DIFF IMAGING PHOTOMETRIC PIPELINE



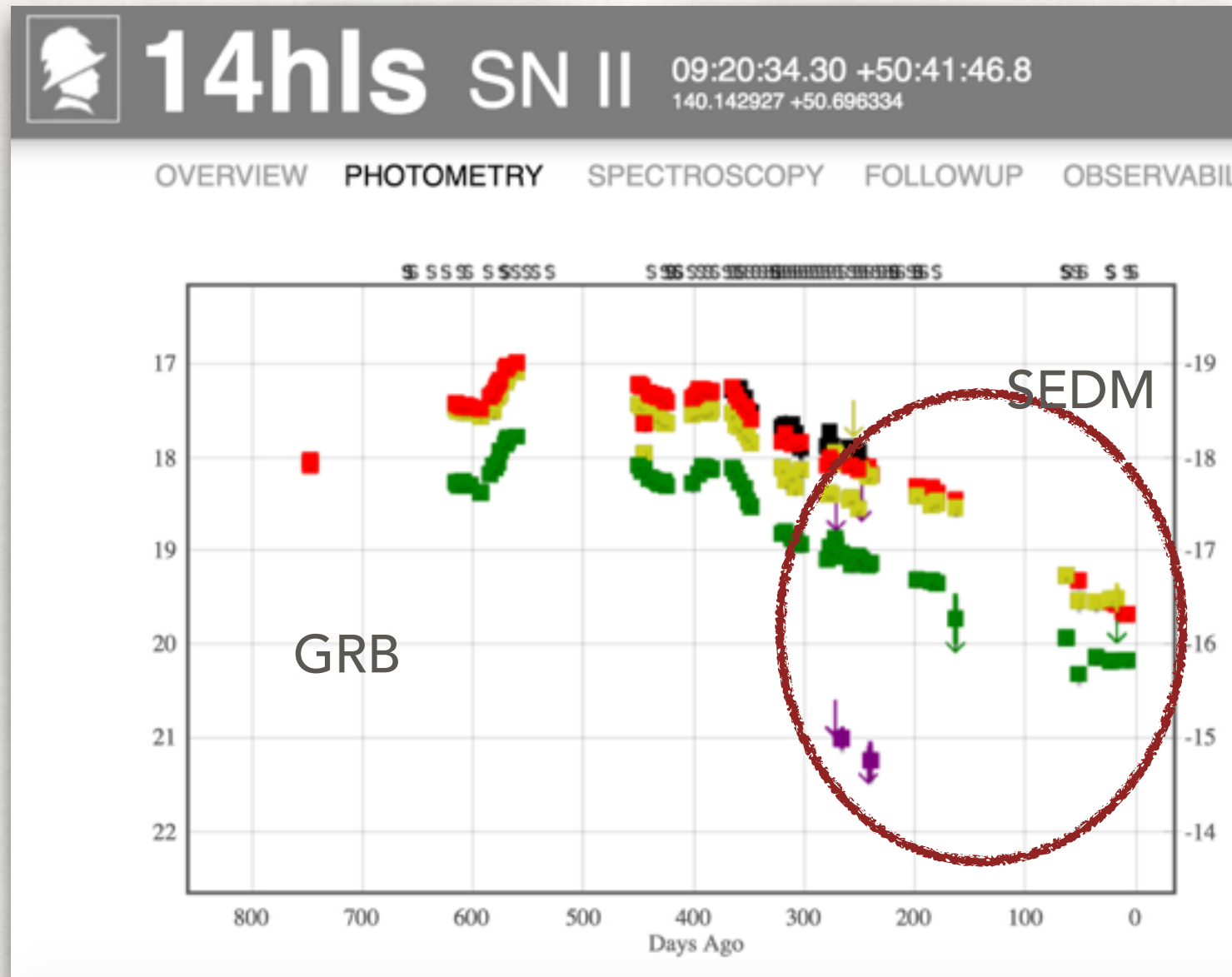
- FPipe - available for GRB Cam and SEDM in SDSS footprint
- Based on Common PSF Method (Gal-Yam +2008)
- Current plans to extend the pipeline to include PS1 catalogs (*gri*)

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

Observations

observation

spec

phot

Calibrations

spec_calib

phot_calib

ref_stars

Requests

request

atomicrequest

QA

telescope_stats

flexure

metrics_phot

metrics_spec

Metadata

classification

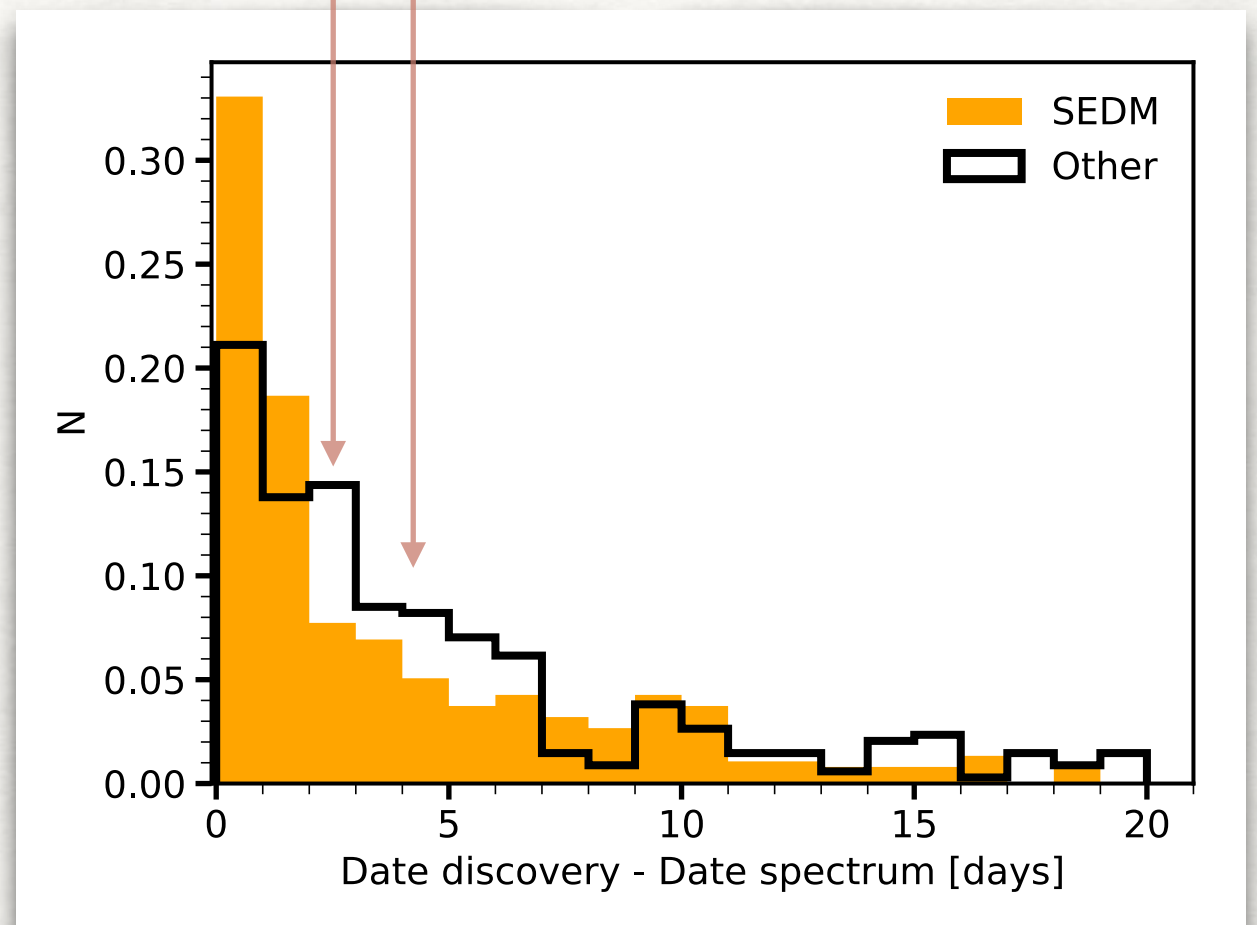
DB STATUS AND FUTURE PLANS

- 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.

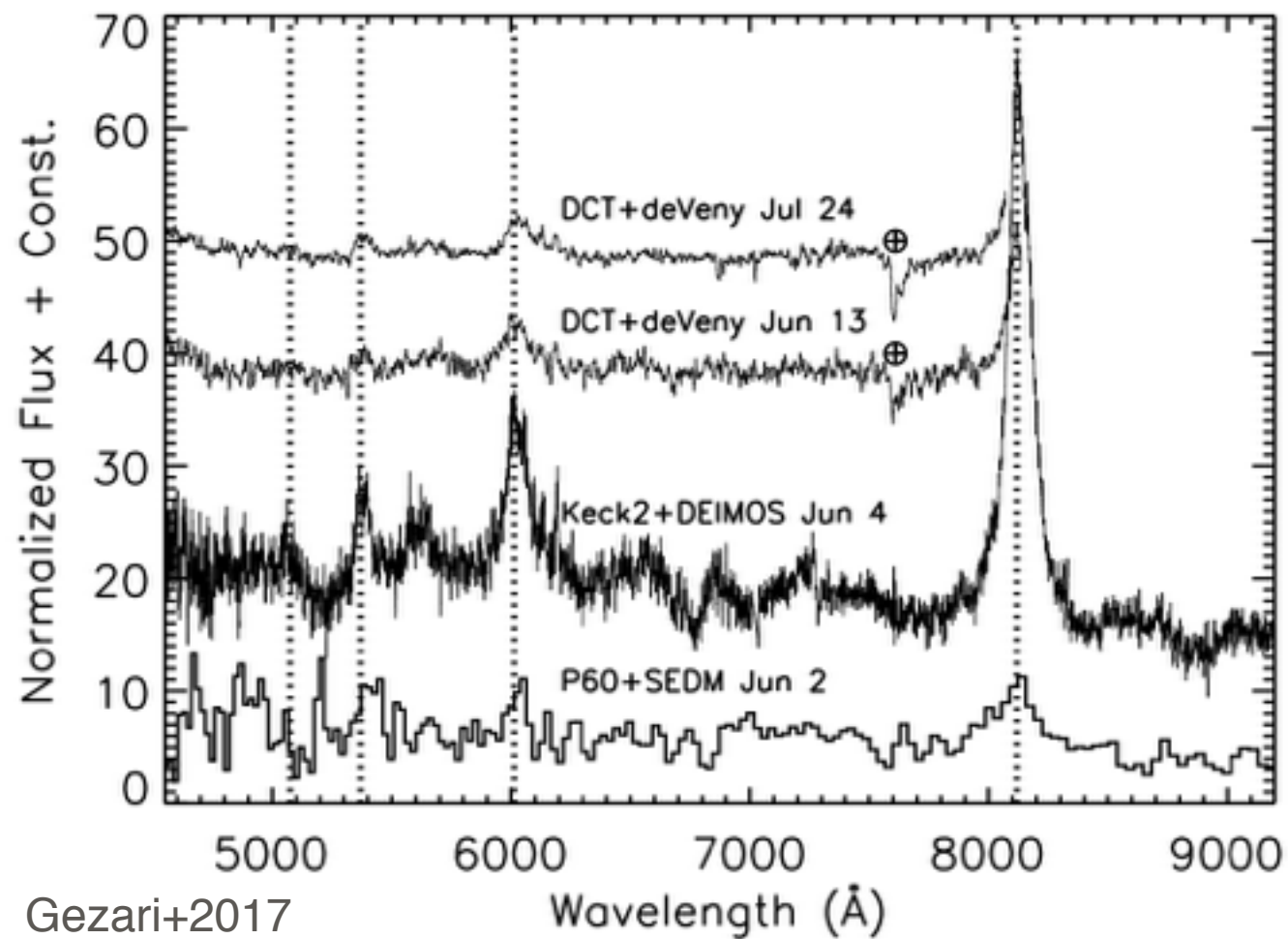
SUMMARY OF RESULTS (IPTF)

- 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

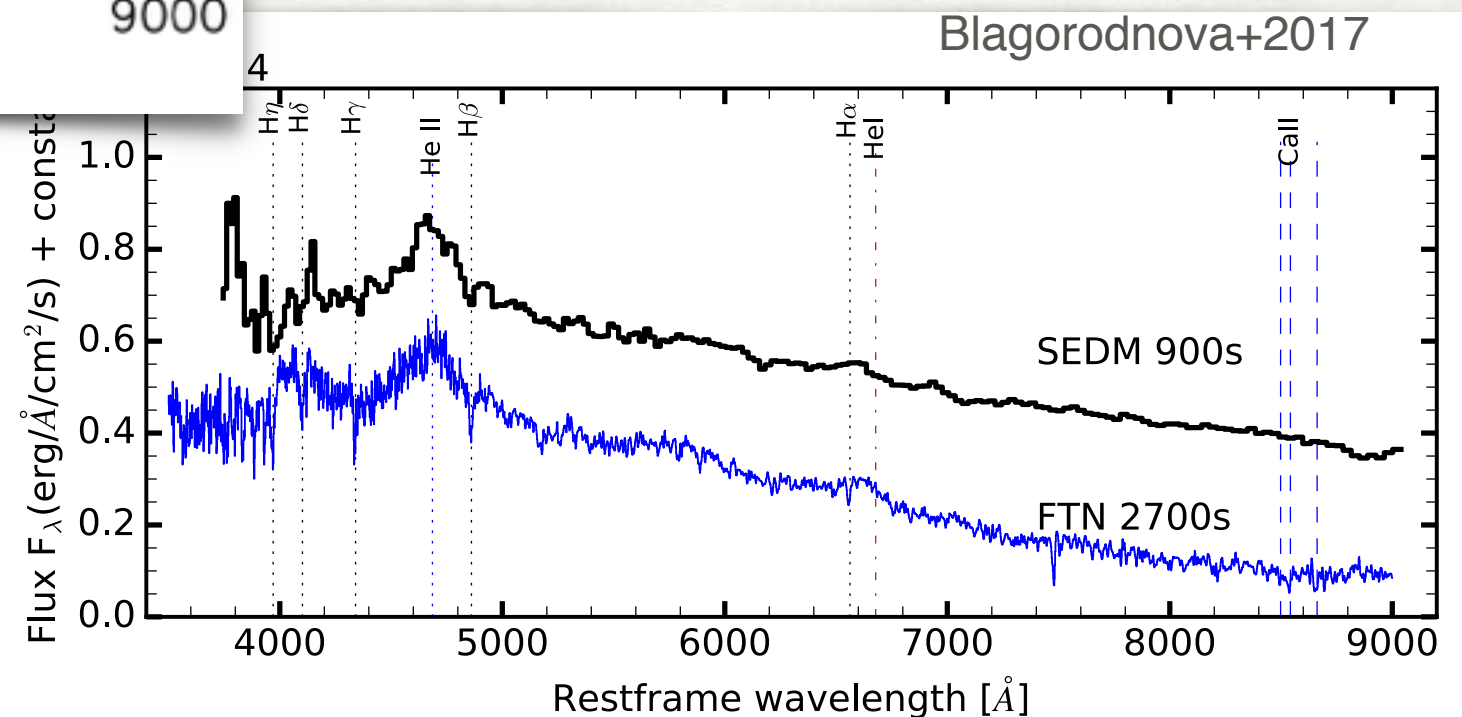
SEDM (4d) Others (2.5d)



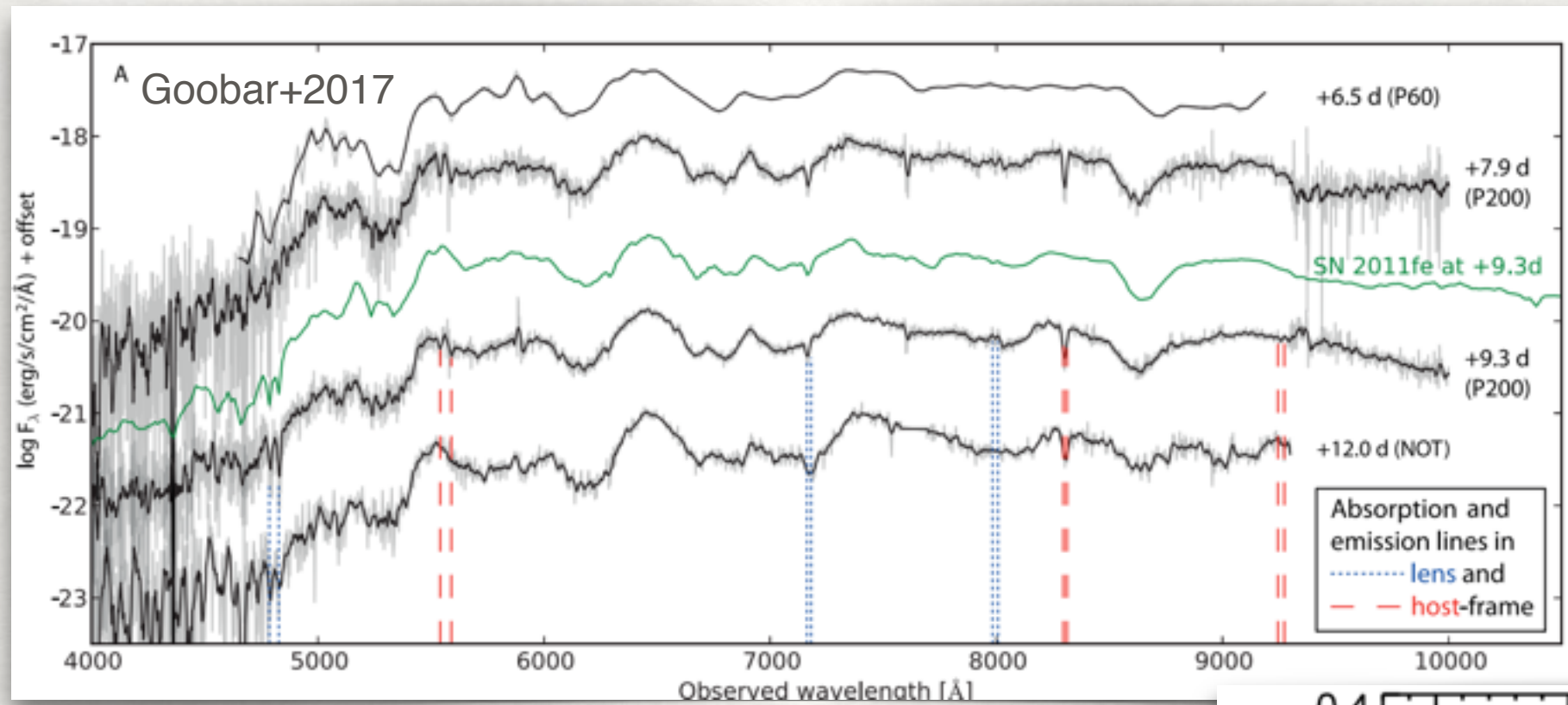
SCIENCE - TRANSIENTS



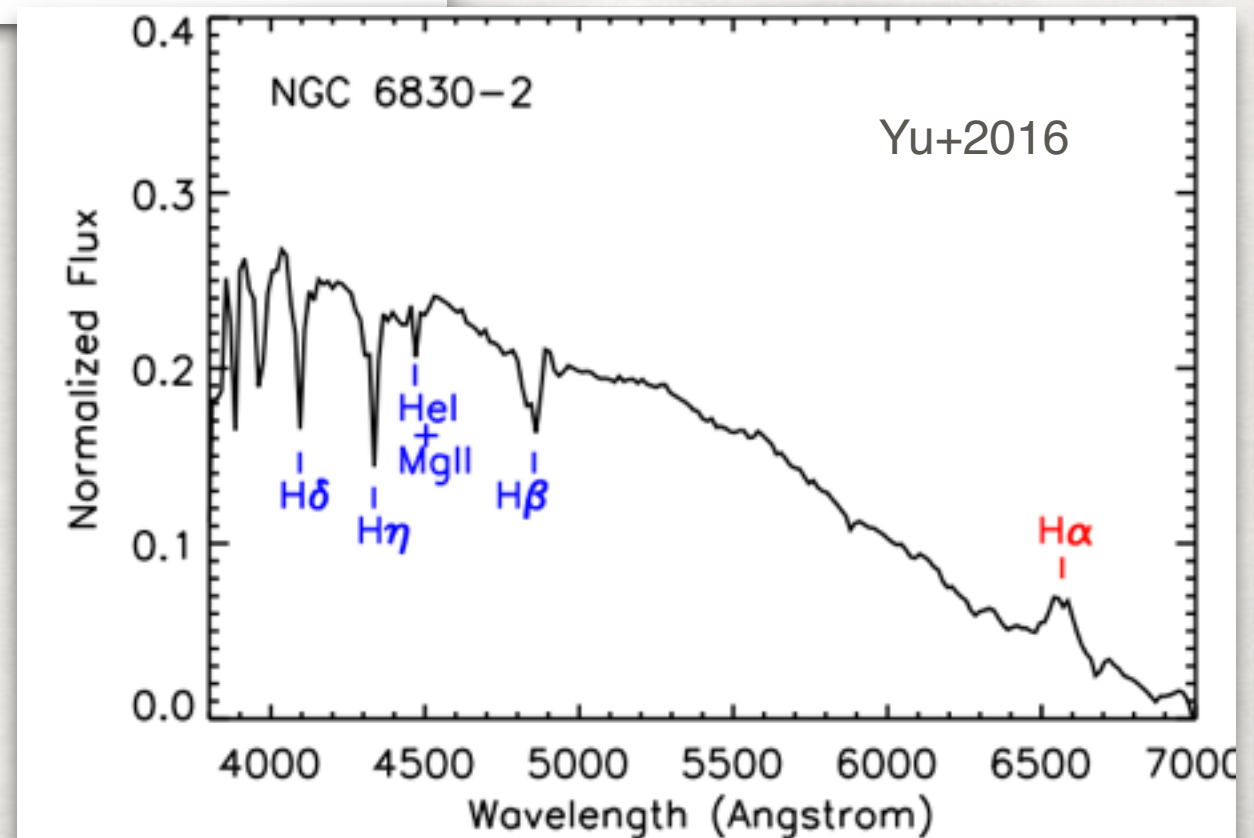
CHANGING LOOK QSO
+
TDE



SCIENCE - TRANSIENTS + STARS

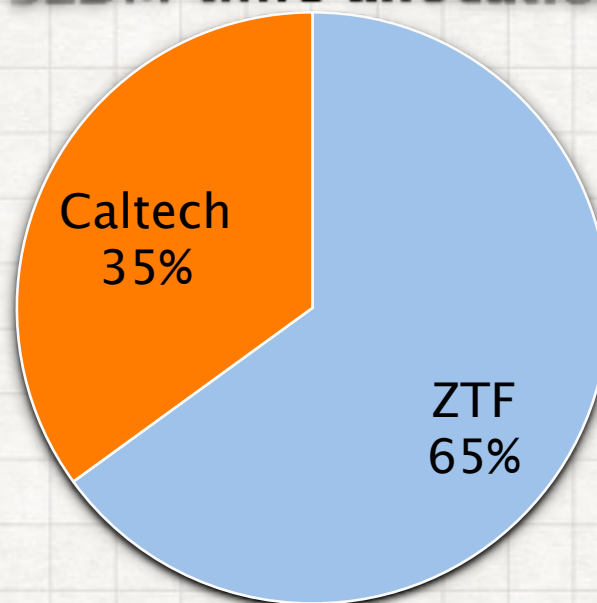


LENSED SN Ia
+
Be STARS



IN ZTF ERA...

SEDM time allocation



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



Robert Quimby [PS]	Andreas Ritter [DRP]	Nick Konidakis [PI]	Reston Nash [optics]
Don Neill [CS]	Choong Ngeow [DRP]	Sagi Ben-Ami [RC]	
	Richard Walters [P60]	Nadia Blagorodnova [Ph]	Karl Vyhmeister [DB]
	Christoffer Fremling [Ph]		