

SEDM/SEDMV2 Status

October 19, 2022

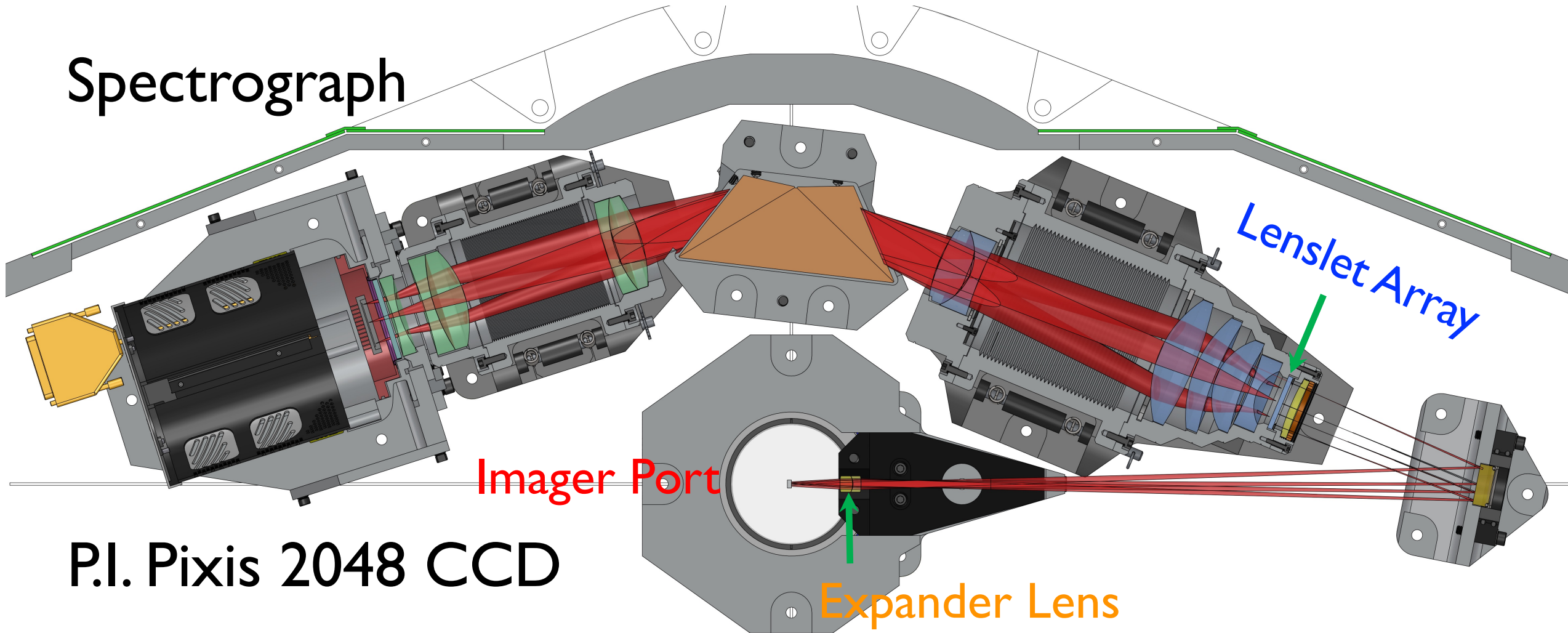
Don Neill

Facility instrument on P60



Hyperspectral imaging spectrograph

Spectrograph



SEDM Team

- Josiah Purdum – Operations
- Don Neill – Instrument Scientist
- Christoffer Fremling – Phot pipeline, ML classification
- Yashvi Sharma – ML classification of spectra, operations analysis
- Jeff Zolkower – Palomar Ops
- John Baker – SEDM master
- Reed Riddle – SEDMv2 software
- Mickael Rigault – IFU pipeline
- Young-Lo Kim – Contsep module, Cosmic Ray rejection
- Jeremy Lezmy – HyperGal subtraction
- Yannick Copin – IFU pipeline (author of Nearby Supernova Factory pipeline)
- Alex Reedy – Andor Camera Software Integration

SEDM Accomplishments On TNS (as of 10-14-2022)

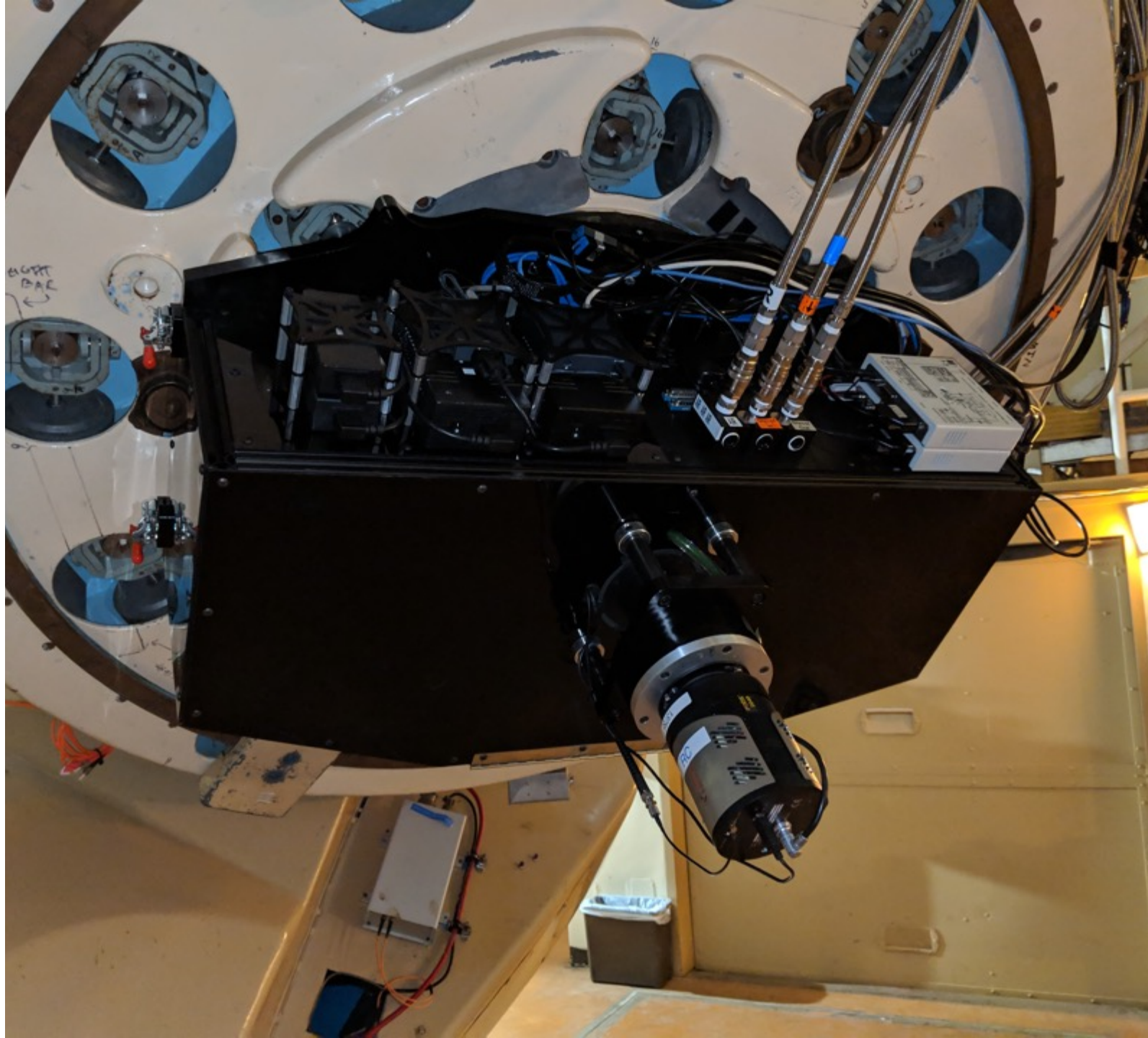
- ***Leading classifier of SNe on TNS website***
 - 4315 having SEDM as official classifier
 - 46% of all TNS classifications since ZTF start
 - 4 times next leading instrument
 - 4620 total classifications including supporting and non-SN
 - 4416 since ZTF start
- Averages 11 spectra every night
 - Averaged over all nights including cloudy and engineering
- Averages 8 ZTF spectra every night
 - SN spectral completeness @ $r \leq 18.5$ > 90%

SEDM Automatic ML Classification

- **SNiascore implemented Nov 30, 2020**
- **SNiascore Fritz classification: Mar 9, 2021**
- **First TNS auto upload: Apr 14, 2021**
 - SN2021ijb = ZTF21aastazz
- 981 BTS SN have SNiascore > 0.9 (on TNS)
 - All but 1 has Fritz type of SNIa-norm
 - Exception: ZTF21aaplnxw SNIa -> SNIc pec
- Subtype classification in progress

Recent Instrument Events

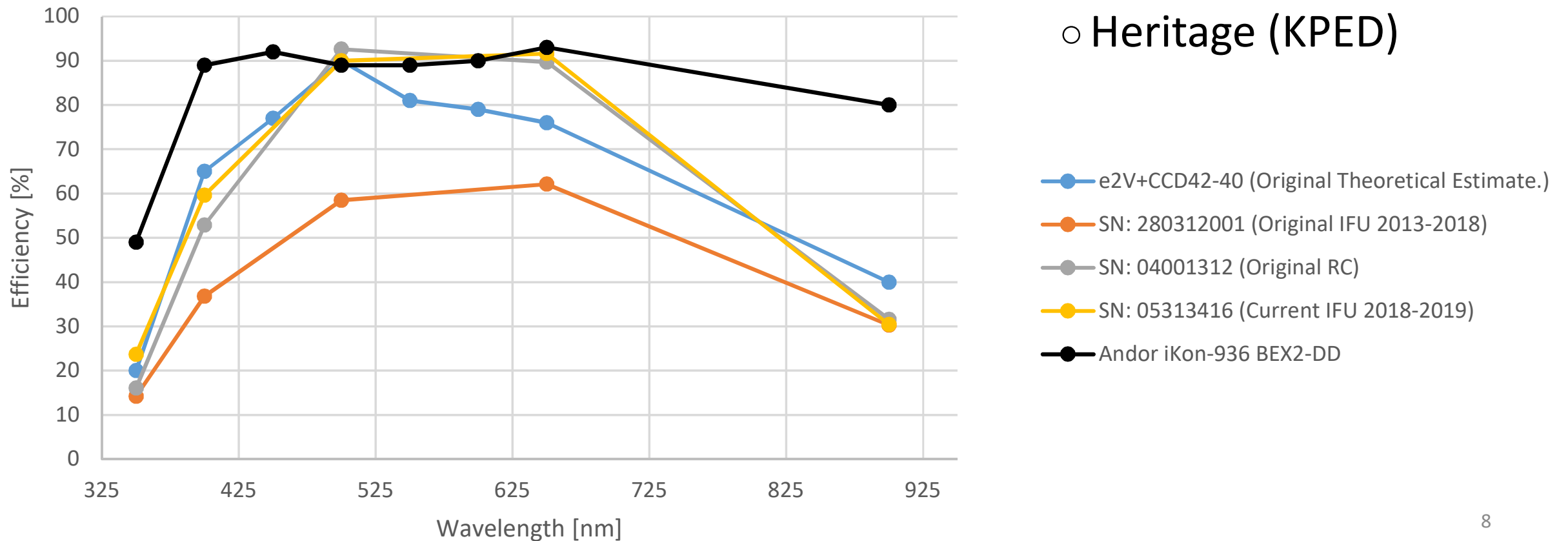
- Instrument has been stable
- Non-sidereal targets
 - Auto-generated ephemeris
- Focusing more reliable
- Preparing for Andor upgrade



Andor Camera Integration Ongoing

- Integrated Andor SDK library with SEDM robot software (Alex Reedy)
- Acquired new computer to host both Andor (IFU) and Pixis (RC/guide) cameras on Linux
- Have spare Pixis camera running on new Linux computer
- Tested software on Linux with both Pixis and Andor camera
- Mechanical adapter fabricated

SEDM: Efficiency Plots



○ Linux API

○ Heritage (KPED)

970

- Dome exposure times were adjusted down
- 20% exposure supplement removed
- Weather station struck by lightning
- Open items:
 - Secondary re-design
 - Repair of weather station

Recent Software / Operations Events

Operations

- Pharos machine replaced with Minar
- Non-sidereal targets no longer need ephemeris
- Multiple manual files can be executed

Pipelines

- Contsep paper published:
 - Kim et al. PASP, 2022 (arXiv:2203.01346)
- Strong host subtraction via scene modeling paper accepted:
 - Lezmy et al. A&A, 2022 (arXiv:2209.10882)

SEDMv2 Project Status

A large white dome-shaped telescope, the Sedona Variable Star and Exoplanet Survey Telescope (SEDM), is situated on a hill. The dome is made of white panels and has a balcony around its base. A person is visible on the balcony. The telescope is surrounded by dense green trees. The sky is clear and blue.

D. Neill

J. Fucik

L. Fahey

R. Riddle

M. Rigault

Y. Sharma

J. Purdum

A. Reedy

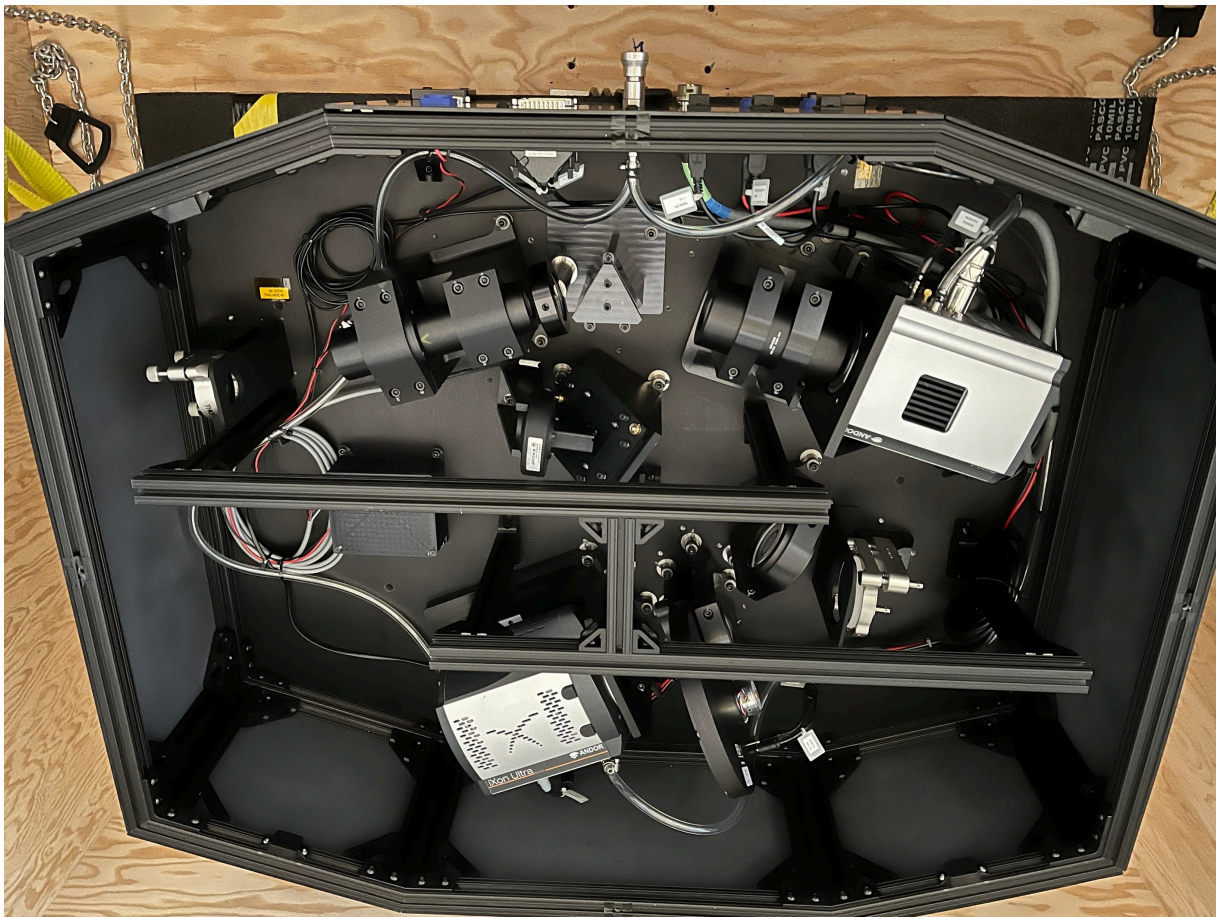


Son of SEDM
(the sequel)

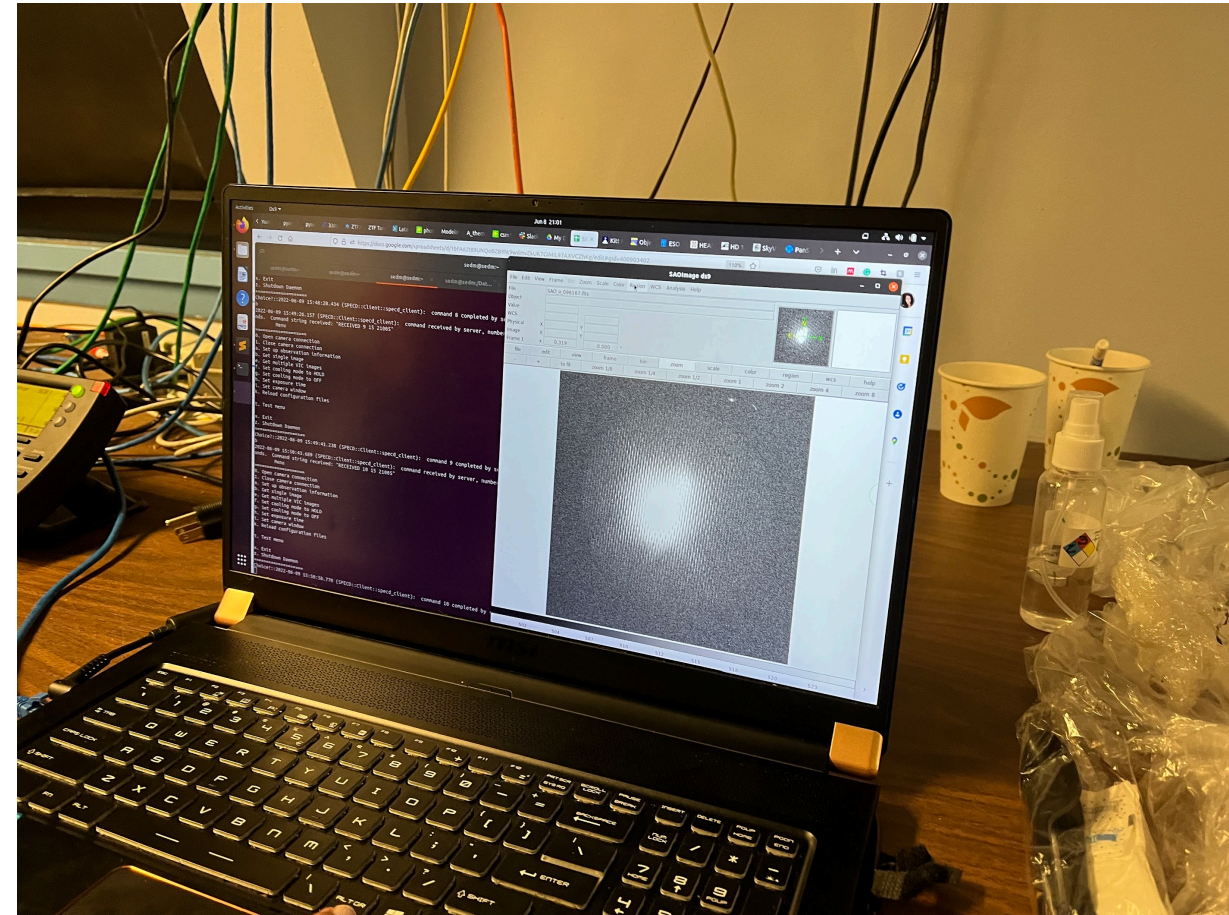
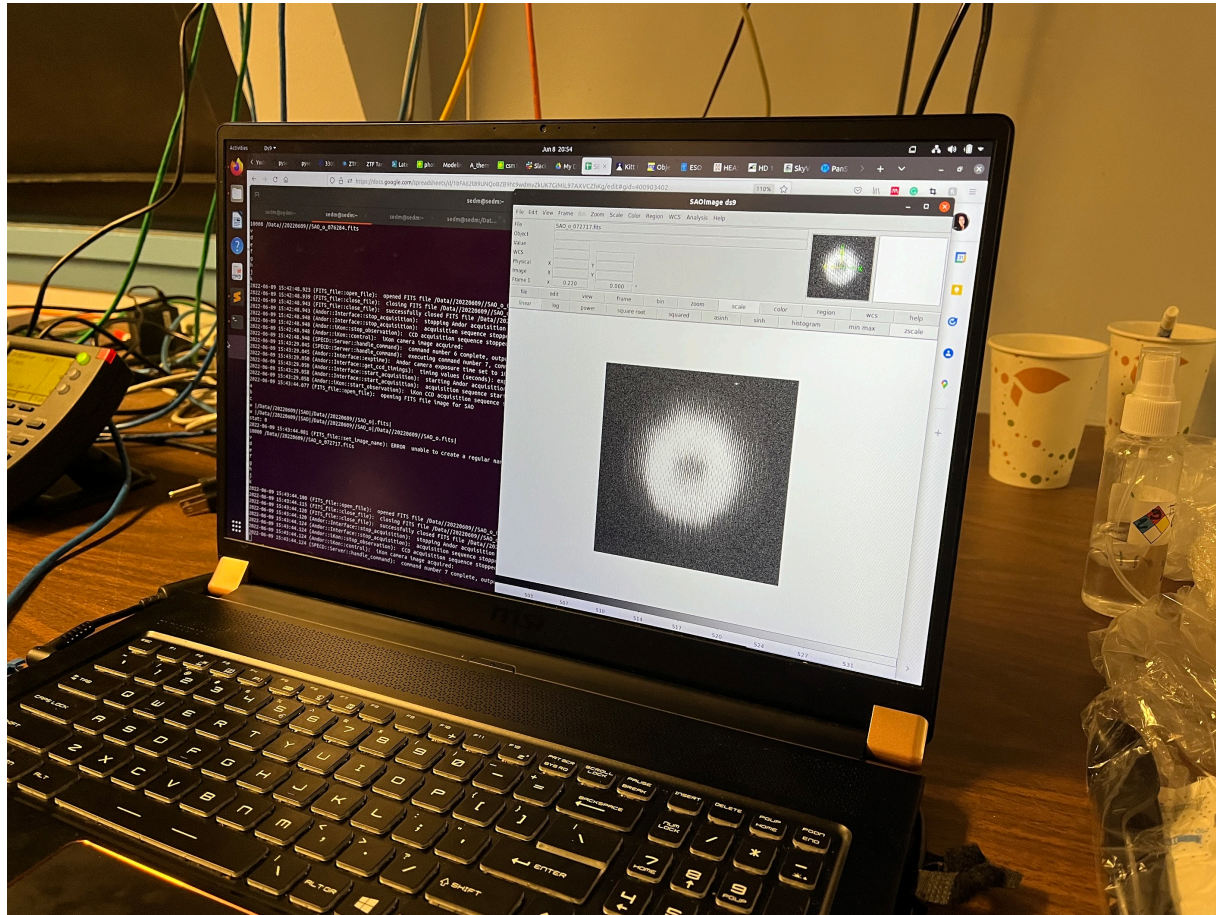
Building SEDMv2: Cast of Characters

- Caltech
 - Shri Kulkarni: Principal Investigator
 - Don Neill: Instrument Scientist
 - Michael Feeney: initial mechanical design
 - Lauren Fahey: final mechanical design, procurement
 - Jason Fucik: optical design and procurement
 - Yashvi Sharma: Operations Scientist, data analysis pipeline, installation
 - Reed Riddle: Telescope Scientist, software design and development
 - Josiah Purdum: Operations Engineer, installation and operations
 - Alex Reedy: installation
- University of Minnesota
 - Michael Coughlin: Project Scientist, scheduling software, telescope simulator
 - Sam Corey, Sam Hastings: telescope simulator
 - Tyler Barna, Brendan King: installation

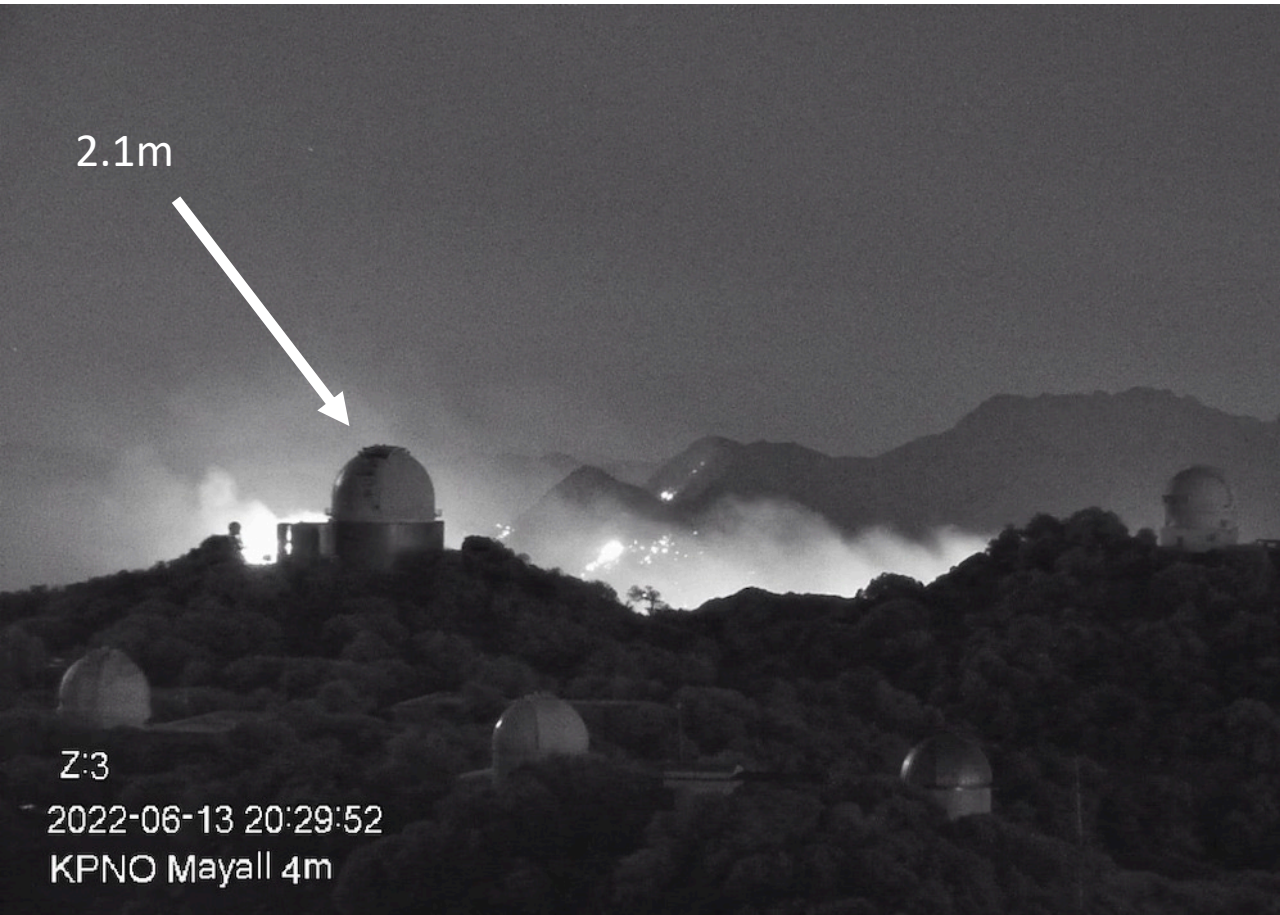
Initial Install: June 7, 2022



First Light: June 8, 2022



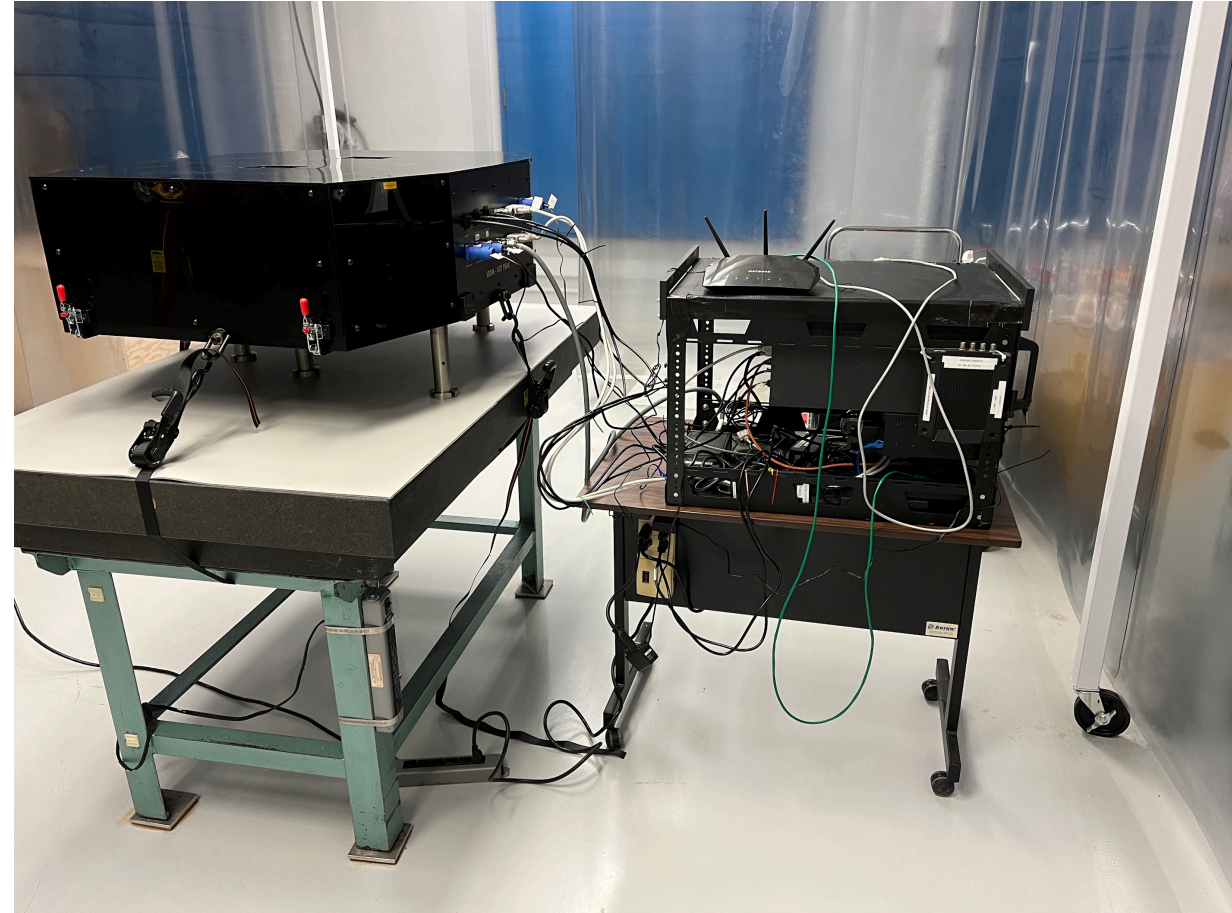
Contreras Fire: June 11, 2022



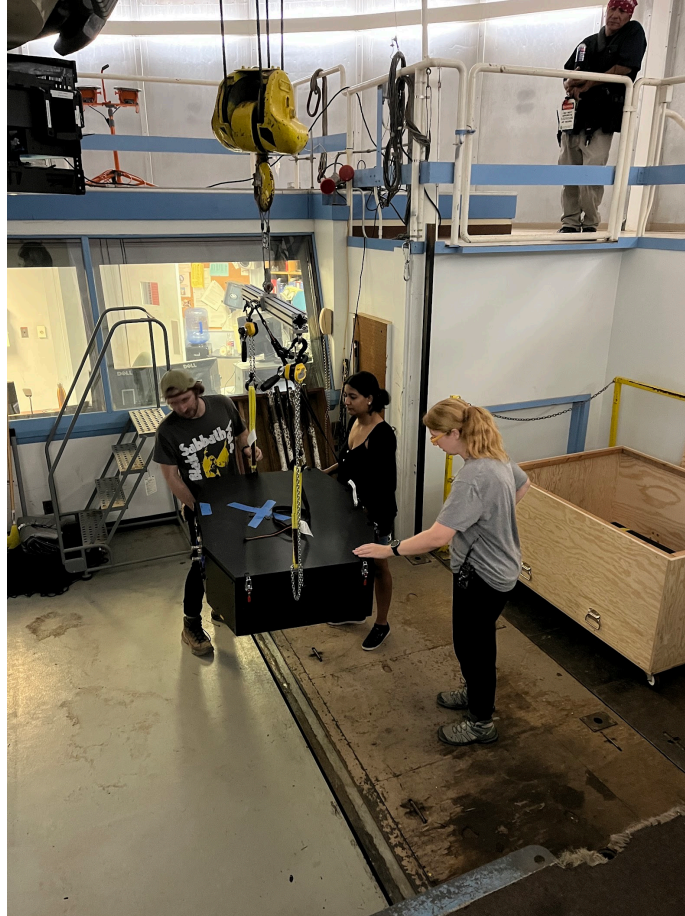
Return to Kitt Peak: September 19, 2022



Prepare for Prism upgrade: September 19, 2022



Final Install on 2.1m: September 29/30, 2022



Current Status Overview



Installed on 2.1m !

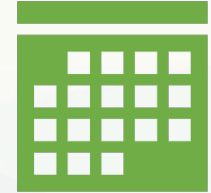
Tri-Prism Installed
Electronics panel installed
Software tested
Cooling lines purged
Waiting for restoration of
Internet



**Budget: Funded through private
donation + partnership**

Now have KP84 until 2025!!
Four Partners with Caltech/ZTF:

- Goddard/U Maryland
- U Minnesota
- Northwestern
- STScI



Commissioning Resumes in November!

Power restored!!
Internet 2-3 weeks after
Re-start commissioning
At least one more visit to KP
Dependent on AZ DOT/Power

First Collab Meeting: Oct 18, 2022

- Fabrication Team
 - Instrument Overview
 - Installation progress
 - Commissioning Status
- Collaboration:
 - Caltech, UMinn, JSI (Goddard/Umaryland), Nothwestern, STScI
 - Better, stronger together
 - Divers set of projects
 - BTS can push deeper
- Collaboration Tools
 - Duty Astronomer
 - Slack channel
 - Allocation tracking
- Yearly meeting

Big Picture

“no mean plans”

- **World domination!**
- Robotic follow-up for ZTF-II, LSST, all time-domain!
- With KP84+ could achieve 100% completeness down to 19+ mag
- Win by focusing on classification:
 - Low resolution -> high throughput
-> many classifications
- Infrastructure and coordination are important: Web/DB
- Future SEDMs: southern/eastern hemispheres?



Acknowledgements & Web pages

- Please cite:
 - Blagorodnova, Neill, Walters et al. 2018 (SEDM instrument)
 - Rigault, Neill, Blagorodnova et al. 2019 (*pysedm* pipeline)
- Acknowledge:
 - SED Machine is based upon work supported by the National Science Foundation under Grant No. 1106171
- SEDM Status:
 - minar.caltech.edu/monitor
- Documentation:
 - www.astro.caltech.edu/sedm
 - www.astro.caltech.edu/sedmkp (draft form)
- Data access:
 - minar.caltech.edu
 - Account required (jpurdum@caltech.edu)
- Twiki:
 - [http://www.oir.caltech.edu/twiki_ptf/bin/view/ZTF/SEDM Operations](http://www.oir.caltech.edu/twiki_ptf/bin/view/ZTF/SEDM%20Operations)