OBSERVING CAPABILITIES OF THE NOT

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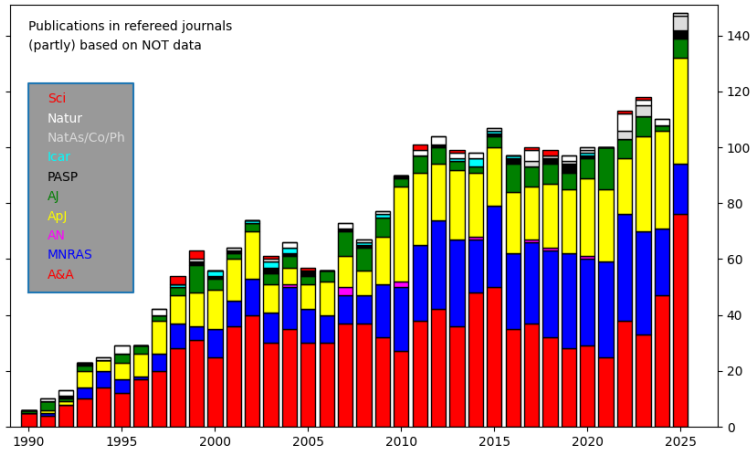
Background

- 2.56-m optical/near-IR telescope
- Located at the Roque de los Muchachos Observatory, La Palma, Spain
  → seeing from ~0.4”, usually below 1”
- Flexible observing for a wide range of science cases



- Can point very low on the sky: down to 6.4° altitude
- Training a new generation of scientists through the **Johannes Andersen Student Programme**

Instruments

- **ALFOSC** (imaging, spectroscopy, polarimetry)
- **FIES** (High resolution spectroscopy)
- **NOTCam** (imaging, spectroscopy)
- StanCam (imaging)
- DiPol-UF (High-speed photometry and high-precision polarimetry)
- SOFIN (spectropolarimetry)

NOT at sunrise

Instruments: FIES

Fibre-fed **E**chelle **S**pectrograph

High-resolution optical spectroscopy

- Fibre-fed for improved stability
- Spectral coverage: 370–830 nm in one fixed setting
- Three resolution modes: approximately **R** = **25,000** / **46,000** / **67,000**
- Located in a heavily insulated building next to the telescope dome
- Used for stellar spectroscopy, chemical abundances, radial velocities, exoplanets

NOT and the FIES building

Instruments: ALFOSC

Alhambra **F**aint **O**bject **S**pectrograph and **C**amera

Optical Imaging

- FOV 6.4 × 6.4 arcmin
- Broad range of filters available
  https://www.not.iac.es/instruments/filters/filters.php

Spectroscopy

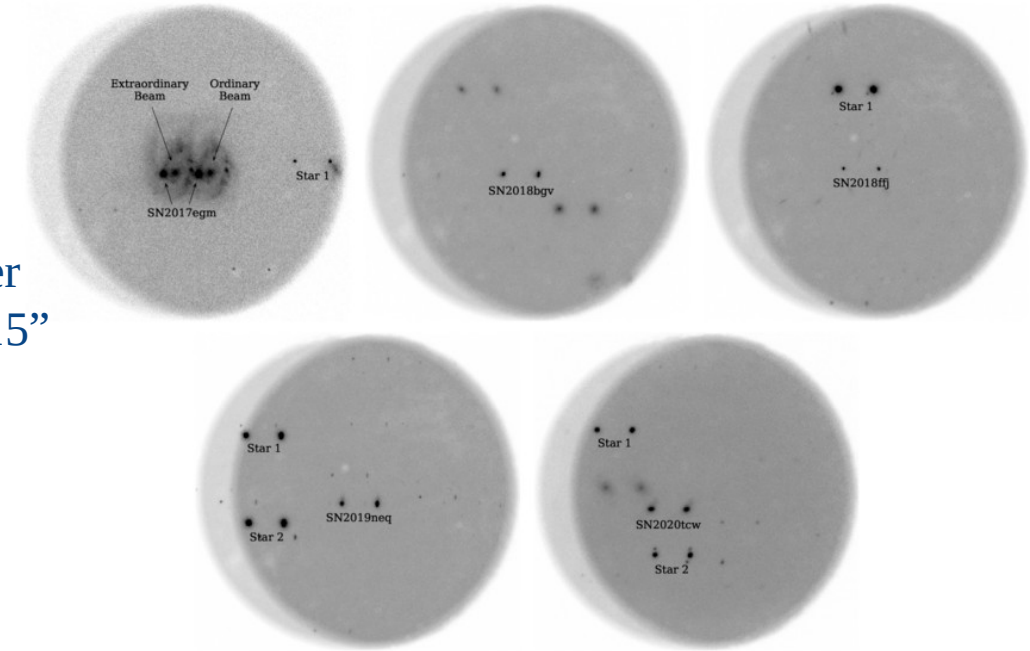
- Low- and medium-resolution spectroscopy
- Multiple grisms and slit options ($\lambda \approx$ 320-1100 nm)
  https://www.not.iac.es/instruments/alfosc/grisms/
  https://www.not.iac.es/instruments/alfosc/slits.html

The Dumbell Nebula observed in B, V, and R -filters using ALFOSC. **Walter Nowotny, 2000**.

Instruments: ALFOSC

Polarimetry with FAPOL

- Imaging polarimetry and spectropolarimetry
- Linear and circular polarimetry modes
- Uses a wave plate ($\lambda/2$ or $\lambda/4$) and a calcite beam-splitter
- Ordinary and extraordinary images separated by about 15”
- Imaging polarimetry FOV: 140″ diameter
- FAPOL uncertainty in measured P ~0.05%
- 4,8, and 16 polarization angles



Polarimetry of hydrogen-poor superluminous supernovae, **Pursiainen et al. 2023, A&A**

Polarimetry with WeDoWo

- Linear polarimetry
- Uses Wedged double Wollaston prisms
- 10″ wide strips
- Measures polarization angles 0°, 45°, 90°, and 135° simultaneously
- Uncertainty in measured P ~0.1%

Instruments: NOTCam

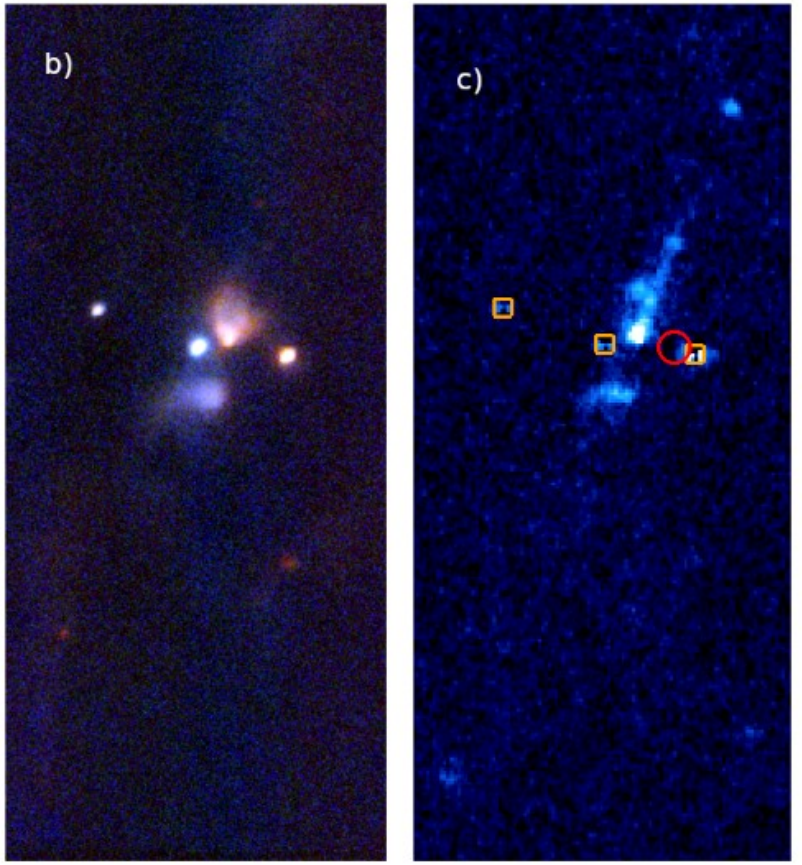
Nordic Optical Telescope near-infrared Camera and spectrograph

Imaging

- Near-infrared imaging: **1.0–2.5 µm**
- Two camera modes:
  - **Wide-field** camera: 0.23″/pixel, FOV 3.9 × 3.9 arcmin
  - **High-resolution** camera: 0.08″/pixel, FOV 1.4 × 1.4 arcmin

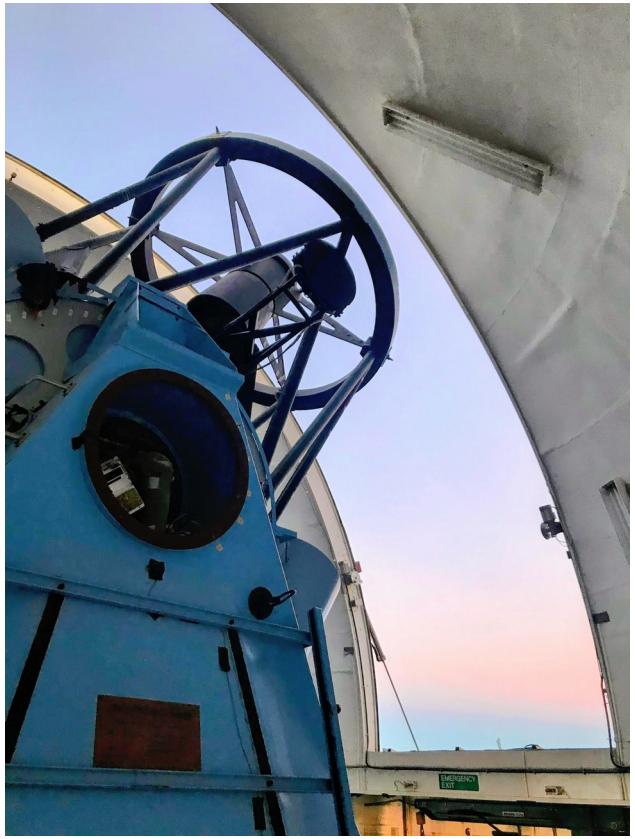
Spectroscopy

- Near-infrared spectroscopy
- Covers the **Z, Y, J, H**, and **K** bands
- Uses both camera modes:
  - **Wide-field** camera: low-resolution spectroscopy, R ≈ 2100
  - **High-resolution** camera: medium-resolution spectroscopy, R ≈ 5500



A protostar with an hour-glass shaped nebula of scattered light in J, H, and K -bands, and its protostellar disk seen nearly edge-on. and its protostellar disk seen nearly Edge-on. The right image shows shocked molecular gas emitting at 2.122 microns. (**Djupvik et al. 2024, OJAp**)

Observing modes



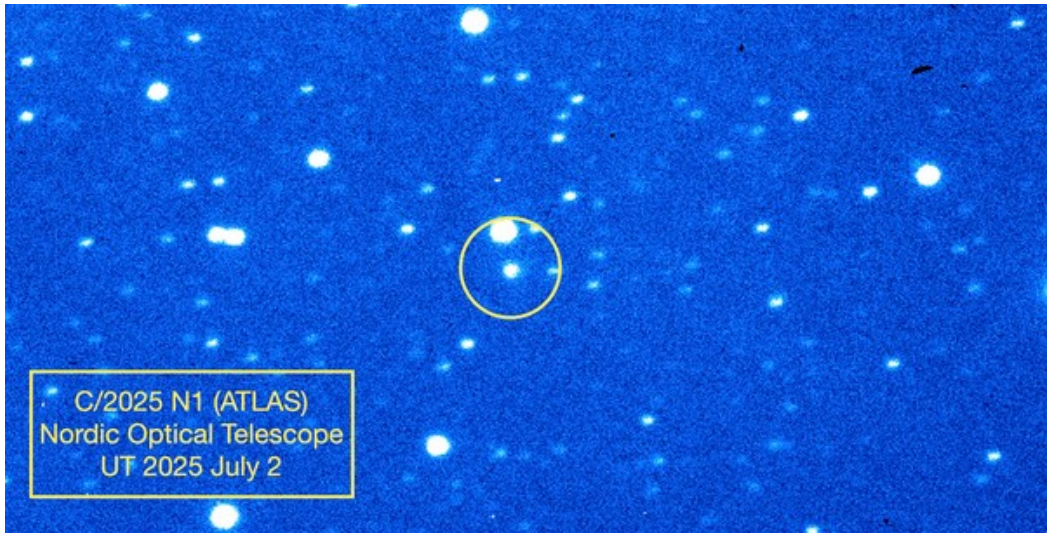
- **Rapid Response Mode (RRM)**
- Target of Opportunity (ToO)
- SoftToO
- Visitor
- Service
- Fast-track
- Monitoring
- Educational (on-site or remote schools)

- **Differential tracking for non-sidereal objects**

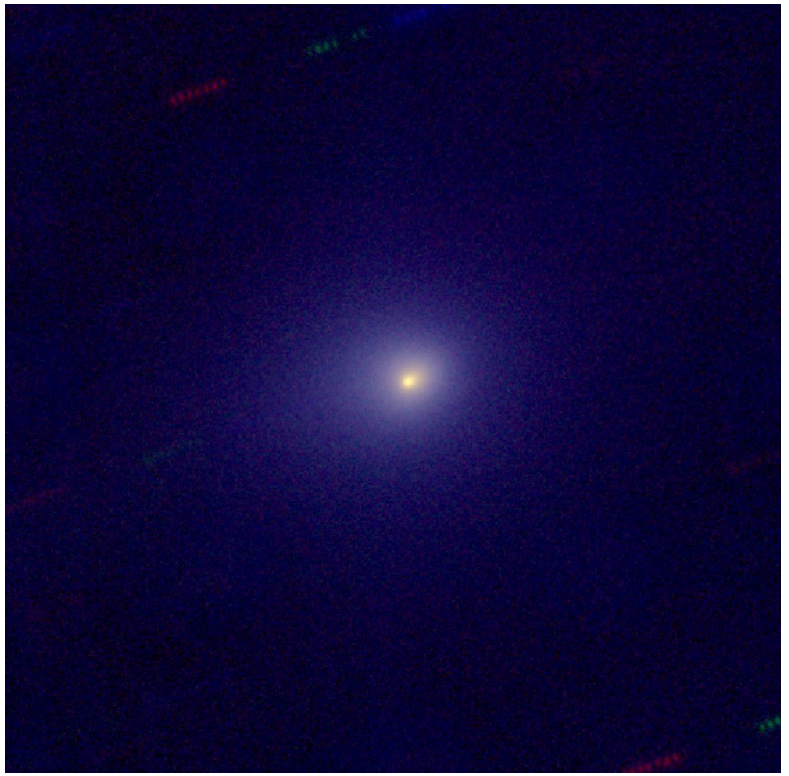
Observing modes: Differential tracking

- Non-sidereal objects (asteroids, comets, planets, satellites…)
- Positions and differential rates are retrieved from JPL Horizon through a software tool (asteph) developed by Grigori Fedorets
- Autoguiding possible until 800–1000″/hour
- > 1000″/hour, blind tracking with continuously updating tracking rates

Observing modes: Differential tracking



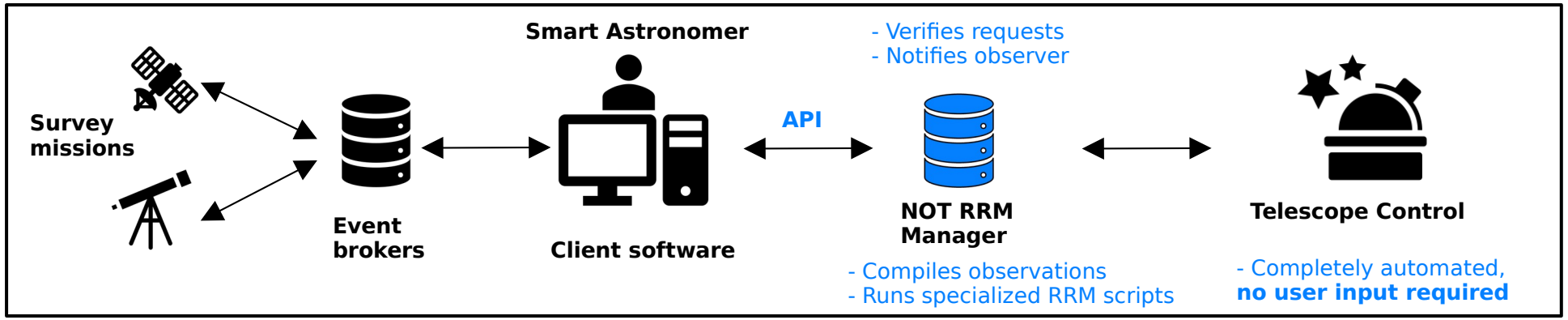
StanCam/NOT 60 second R-band image of 3I/ATLAS (**Jewitt & Luu, ATel 17263**)



NOTCam 25 second J, H, and K -band combined image of 3I/ATLAS (**Amanda Djupvik**)

Observing modes: Rapid Response Mode (RRM)

- Developed by Samuel Grund together with the NOT tech team
- Enables approved users to bypass standard scheduling and trigger immediate observations
- On-target response time estimated at 70-100 seconds for photometry and 3-3.5 minutes for spectroscopy



Structure and user workflow, **Samuel Grund, Annual Danish Astronomy Meeting 2025**

- Speed can be important for fast transients such as

- Differential tracking in development/investigation

Summary

- 2.56-m optical/NIR telescope on La Palma, Spain
- Supports imaging, spectroscopy, and polarimetry
- **Rapid Response Mode** allows fast transient follow-up
- **Differential tracking** for non-sidereal moving objects
- Trains young scientists through the **Johannes Andersen Student Programme**
  - 6-8 students/year at MSc or PhD level

The NOT is a flexible and efficient telescope for a wide range of science cases.

https://www.not.iac.es/