Spectroscopy of the interstellar comet 3I/ATLAS with SALT

Tomasz Kwiatkowski (1), Nicolas Erasmus (2), Oleksandra Ivanova (3), Igor Lukyanyk (4), Sofiia Mykhailova (1)

Observations

3I/ATLAS is the second known comet of extrasolar origin. It was discovered on 1 July 2025, and immediately attracted the attention of many observers.
Studying its composition and evolution lets us probe the solid-body formation in other planetary systems.

Using the DDT time at SALT we observed 3I/ATLAS with the RSS spectrograph on 15 and 29 July 2025:
– wavelength range 0.36–0.74 μm
– resolution R=700
– sidereal tracking
– comet moved along the 3” slit
– 20 exposures 120s each combined
– solar analogue star observed on the same night as the comet
– spectra normalized to unity at 0.55 um

Results

To remove the signature of the Sun, normalized spectra of the comet were divided by the spectra of the solar analogue star, producing so called “reflectance spectra”.

Fig.1. Spectral slope increased from 4 July (blue line) to 15 July (green line). No emission lines detected.

Fig.2. The comet’s relative flux (black) overlaid with a solar-analogue reflectance spectrum (red). Pronounced emission is evident at ~3883.5 Å in the comet spectrum (S/N=5.1), whereas the solar analog shows no corresponding feature, indicating a genuine CN ($B^2\Sigma^+ – X^2\Sigma^+$) violet-band emission. The C3 emission (integrated S/N=3.0) is not confirmed, as there is no traces of simultaneous C2 emission. Other gases are below the 3-sigma detection level.

Fig. 1. RSS spectrum on 15 July 2026: slope (Santana Ross, 2025,A&A, 702, L3)

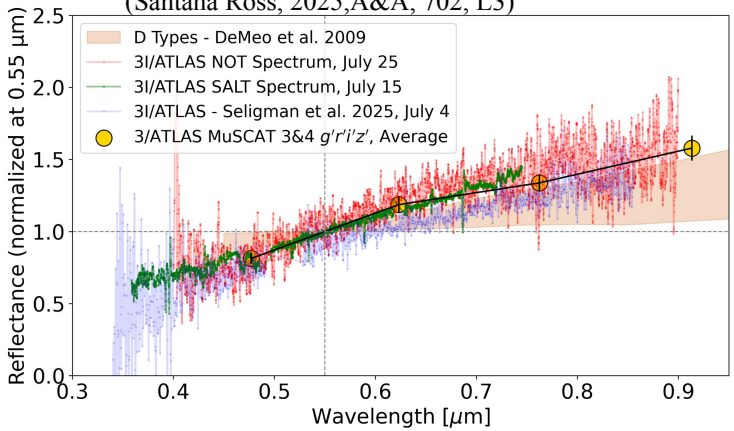
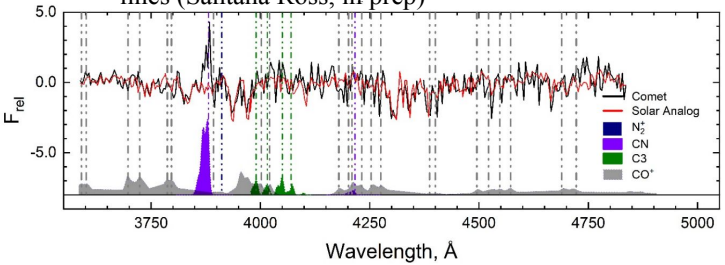


Fig. 2. RSS spectrum on 29 July 2026: emission lines (Santana Ross, in prep)



(1) Astronomical Observatory Institute, Adam Mickiewicz University, Poznań, Poland
(2) South African Astronomical Observatory: Cape Town, South Africa
(3) Astronomical Institute of the Slovak Academy of Sciences, Tatranská Lomnica, Slovakia
(4) Astronomical Observatory of Taras Shevchenko National University of Kyiv, Ukraine