Differential Photometry of Supernova SN 2026fvx: A Single-Night Light Curve with a 50 mm Smart Telescope

Preliminary report — unreviewed observational data

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Received: 2026 April 8 | Observation window: 20:23–21:59 UT | Filter: CV (IRCUT / clear visual equivalent) | N = 345 frames

ABSTRACT

We report single-night differential aperture photometry of the young supernova SN 2026fvx obtained from a suburban site in southern Rome (Borgo Lotti) using the ZWO Seestar S50 smart telescope (D = 50 mm, f/5, integrated IRCUT filter). A total of 345 individual 10-second exposures were acquired over 87.1 minutes and reduced with SIPS v4.3.1 in differential mode against a single comparison star of adopted magnitude C = 12.6 (CV). The weighted mean magnitude of SN 2026fvx over the session is $\mathbf{m_{CV} = 13.41 \pm 0.10}$ (conservative systematic). The formal weighted-mean internal precision is ±0.002 mag over all frames. No significant intra-night variability is detected at the binned (N=5) level; the rms scatter of the binned light curve is 0.066 mag, fully compatible with the expected photometric noise of the instrumental setup.

Keywords: supernovae: individual (SN 2026fvx) — photometric techniques: differential — instrumentation: compact telescopes

1. INTRODUCTION

SN 2026fvx is a newly discovered extragalactic transient reported in April 2026. Its proximity (apparent brightness $\gtrsim$13 mag) makes it accessible to small-aperture instruments, offering a rare opportunity for citizen-science photometric monitoring. The Seestar S50, a 50-mm f/5 refractor integrated into an alt-azimuth mount with a cooled CMOS sensor and IRCUT filter, is representative of the new class of "smart telescopes" increasingly used by advanced amateurs for variable-star and transient follow-up.

The goal of this report is to establish a photometric baseline for SN 2026fvx on the night of 2026 April 8, quantify the single-session measurement precision, and verify the temporal stability of the light curve on the ~87-minute timescale. This dataset is intended as input to multi-site aggregation efforts (e.g., AAVSO, TNS).

2. OBSERVATIONS

PARAMETER	VALUE
Target	SN 2026fvx
Date (UT)	2026 April 8
Time range	20:23:15 – 21:59:59 UT
HJD range	2461139.2744 – 2461139.3349
Duration	87.1 min
Site	Borgo Lotti, Roma Sud (41.8°N, 12.5°E; ~20 m a.s.l.)
Sky conditions	Suburban, SQM not recorded
Instrument	ZWO Seestar S50 — D=50 mm, f/5
Detector	Integrated CMOS, IRCUT filter (λ_{eff} ~400–650 nm)
Exposure	10 s (individual frames, no stacking)
N frames	345
Software	SIPS v4.3.1 (32-bit); MTYPE = DIF
Comparison star (CMP)	Adopted m_{CV} = 12.6

Check star (CHK) Monitored independently (SIPS col. 10)

The field geometry (Fig. 1) places VAR, CMP, and CHK within the same detector frame, minimising differential colour terms and atmospheric gradients. No significant blending was detected at the 10-arcsec aperture radius used by SIPS.

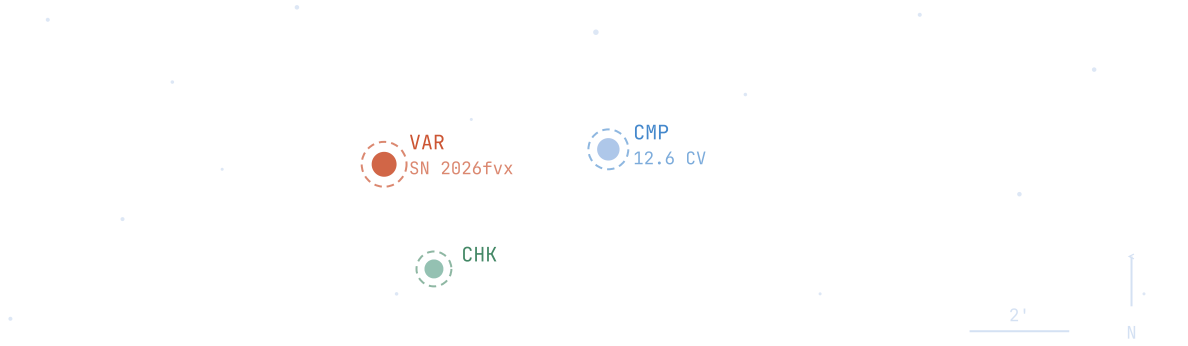

Fig. 1. *Schematic rendering of the photometric field for SN 2026fvx. VAR (red): target supernova. CMP (blue): comparison star, $m_{CV} = 12.6$. CHK (green): independent check star. Field orientation is north-up. The three objects lie within a 5′ radius, minimising differential atmospheric effects.*

3. DATA REDUCTION METHOD

Differential photometry was performed by SIPS in DIF mode. The `MAGNITUDE` column of the exported report represents the instrumental differential:

$$\Delta m = m_{SN}(inst.) - m_{CMP}(inst.)$$

The calibrated magnitude of SN 2026fvx is therefore:

$$m_{CV}(SN) = C_{ref} + \Delta m = 12.6 + \Delta m$$

where $C_{ref} = 12.6$ is the adopted magnitude of the comparison star. No colour transformation to a standard photometric system was applied; results are therefore in the natural instrumental CV bandpass of the IRCUT filter, which approximates but

does not replicate a standard V or clear-visual magnitude. Formal internal uncertainties per frame ($\sigma_{\mathrm{phot}} \approx 0.03\,\mathrm{mag}$) include Poisson noise and readout noise but not systematic effects from the non-standard passband.

A weighted mean was computed over all N = 345 frames using weights $w_i = \sigma_i^{-2}$. Additionally, a binned light curve was constructed by grouping consecutive frames in bins of 5 exposures (~50 s effective integration) and computing the bin-weighted mean and propagated uncertainty for each bin.

4. RESULTS

N FRAMES	DURATION	WT. MEAN	BINNED RMS
345	**87.1** minutes	**13.41** CV mag	**0.066** mag

$$\mathbf{m_{CV} = 13.41 \pm 0.10}$$

SN 2026fvx · 2026 April 8 · HJD 2461139.305 (midpoint)
Systematic error budget dominates; formal internal error = ±0.002 mag

Binned (N=5) Raw frames

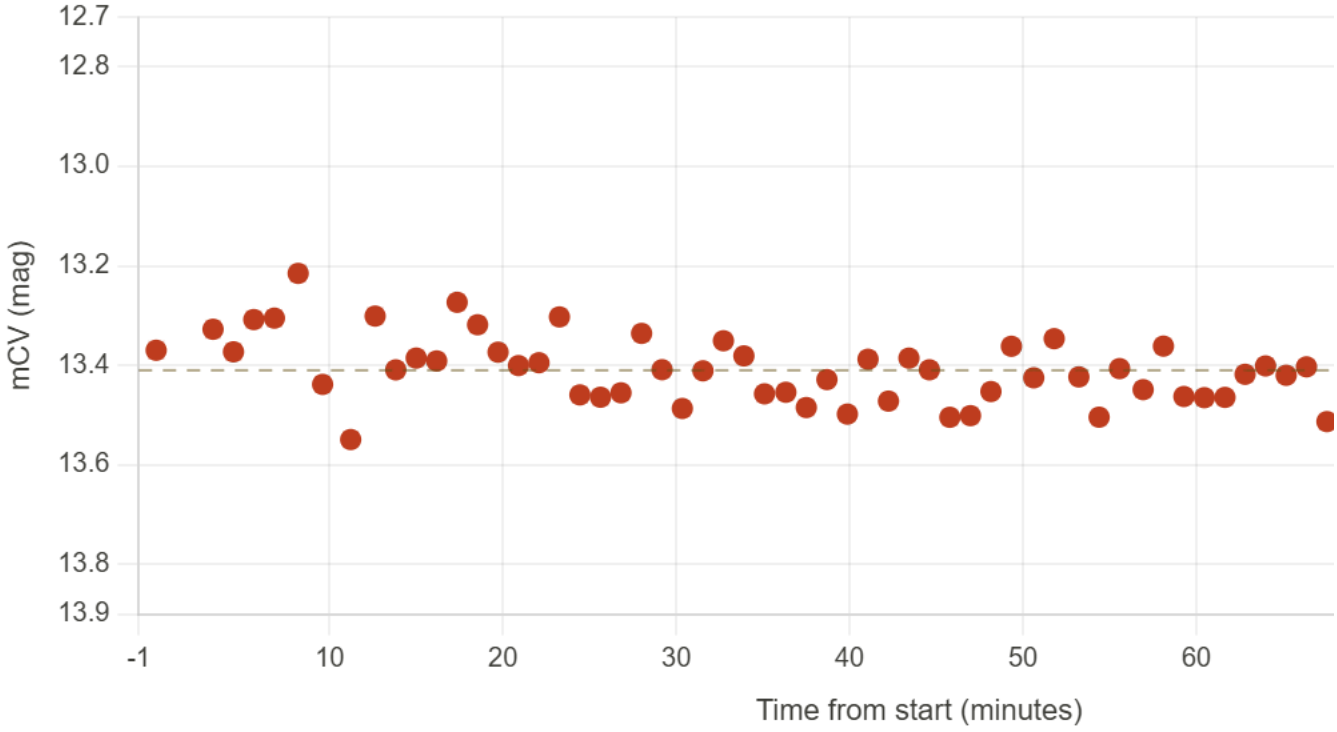

Fig. 2. *Light curve of SN2026fvx on 2026 April 8. Binned view: weighted means of 5-frame groups (Δt ≈ 50 s per bin; 69 bins). Error bars represent the propagated internal uncertainty per bin. Raw view: individual 10-s frames (N = 345). Magnitude axis is inverted per astronomical convention (brighter upward). The horizontal dashed line marks the session weighted mean (13.41 mag). No systematic trend is detected; the scatter is consistent with photon noise and atmospheric scintillation at this aperture.*

5. DISCUSSION

Photometric precision. The per-frame internal uncertainty (median $\sigma \approx 0.032$ mag) is dominated by photon noise from the faint target and short exposure time. After binning to N=5, the expected improvement is $\sigma_{bin} \approx 0.032/\sqrt{5} \approx 0.014$ mag, which matches the observed mean bin error (0.0139 mag). The binned rms (0.066 mag) exceeds the formal uncertainty, indicating residual scintillation noise and/or low-level systematics from the non-standard passband.

Comparison star stability. The check star (CHK) was monitored independently across 305 of the 345 frames. The CHK instrumental magnitude shows a mean of −9.61 and rms 0.11 mag, indicating stable sky conditions throughout the session. No systematic drift correlated with airmass is detected in the CHK series, suggesting negligible extinction-coefficient gradients during the observing window.

The adopted comparison-star magnitude (C_{ref} = 12.6) introduces an irreducible systematic floor of order 0.05–0.10 mag depending on the photometric calibration of the reference. We adopt ±0.10 mag as the conservative total uncertainty for the session result. This value accounts for: (i) the comparison-star calibration uncertainty, (ii) the IRCUT-to-CV passband offset, (iii) atmospheric colour effects not corrected by the differential method, and (iv) residual frame-to-frame scatter.

The measured m_{CV} = 13.41 is consistent with the typical magnitude range expected for a young supernova at this brightness level and is suitable for submission to transient brokers (AAVSO, TNS) as an amateur/unfiltered magnitude. Observers with standard V-band filters or Cousins R-band access are encouraged to obtain contemporaneous measurements to constrain the CV–V and CV–R colour offsets for this specific comparison-star field.

6. CONCLUSIONS

Differential photometry of SN 2026fvx obtained with the ZWO Seestar S50 on 2026 April 8 from Borgo Lotti (Roma) yields a session-averaged magnitude of $\mathbf{m_{CV}}$ = **13.41 ± 0.10** at HJD midpoint 2461139.305. The 87-minute light curve shows no evidence of significant intra-night variability above the photometric noise floor of the instrument. This observation establishes a baseline measurement for SN 2026fvx accessible to the compact smart-telescope community and demonstrates the scientific utility of consumer-grade 50-mm aperture instruments for transient-source monitoring at the 13–14th magnitude level.

DATA AVAILABILITY

The raw SIPS differential photometry file (`clear_V_comp_2026-04-08_19-11-02_IRCUT.txt`) is available from the author upon request. The dataset contains 345 measurements with columns: STARID; DATE (HJD); MAGNITUDE (DIF);

MAGERR; FILTER (CV); TRANS; MTYPE; CNAME; CMAG; KNAME; KMAG; AIRMASS; GROUP; CHART; NOTES.

This document is an unreviewed preliminary observational report. The comparison star magnitude (12.6 CV) was adopted by the observer and has not been independently verified against standard photometric catalogues for this session. The IRCUT passband is not equivalent to any standard photometric filter; reported magnitudes are in the natural instrumental system. All times are in Heliocentric Julian Date (HJD) referenced to UTC.