A New N-Type Carbon Star Identified in the Gaia DR3 Spectroscopic Database

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Abstract

The Gaia Source 6054499677907012352 is a carbon star of late N – sub-types. We present Gaia DR3 BP/RP spectra, G-band magnitude, BP – RP color, radial velocity (RV), and phased light curve in G – band for new discovered C star.

Keywords: *Astronomical Data: Surveys: Catalogs: carbon stars*

1. Introduction

Our attention was drawn to a Gaia Source Number 6054499677907012352 (RA = 12h 16m 03.838s and DEC = - 62d 24m 03.58s, J2000.0) during the checking of the spectra in the SIMBAD VizieR database within a 2 arcmin radius around the position of the carbon (C) stars identified in Gaia DR3 low-resolution (lr) spectral data base by Ye et al. (2025) using deep learning interpretability analysis for C stars (online access at https://J/A+A/697/A107/tableb1/). We classify the above noted object as an N-type C star of late-subclasses. We present Gaia DR3 BP/RP spectra, G-band magnitude, BP – RP color, radial velocity (RV), and phased light curve in G – band for the newly discovered C star.

2. Gaia DR3 BP/RP Spectra

In Figure 1(a,b), we present Gaia lr spectra in the range of 336-1020 nm for the newly confirmed N-type C star DR3 6054499677907012352 (Figure 1(a) (Gaia BP/RP lr spectra are available online in the SIMBAD CDS VizieR database, Catalog I/355/spectra/) and for the Infra-Red (IR) source IRAS 04130+3918 (CDS VizieR Catalog II/125/main/) for comparison (Figure 1(b). The last object was confirmed as C star based on the presence of the silicon carbide (SiC) dust emission at 11.2 μm in the IRAS Low-Resolution Spectrum of this object (see Little-Marenin et al. (1987) for more details).

Table 1 presents some important Gaia DR3 (CDS Vizier Catalog I/355/gaiadr3) (Gaia Collaboration Vallenari et al., 2023) and 2MASS (Skrutskie et al., 2006) data for a newly discovered carbon star.

Table 1. Some Important Data for New Discovered N-Type Carbon Star

Gaia DR3 Number	G-mag	BP-RP color	RV (km/s)	2MASS Number	J mag	H mag	K mag
6054499677907012352	14.86	5.36	13.52	12160384-6224035	9.35	7.4	6.36

3. Variability

Phased light curves for this object are available in Gaia G, BP, and RP bands monitoring base data only (CDS Vizier Catalog I/355/epphot/). Most probably, this object can be classified as a low-amplitude semi-regular (SR) variable star.

In Figure 2, we present the phased light curve in the Gaia G-band.

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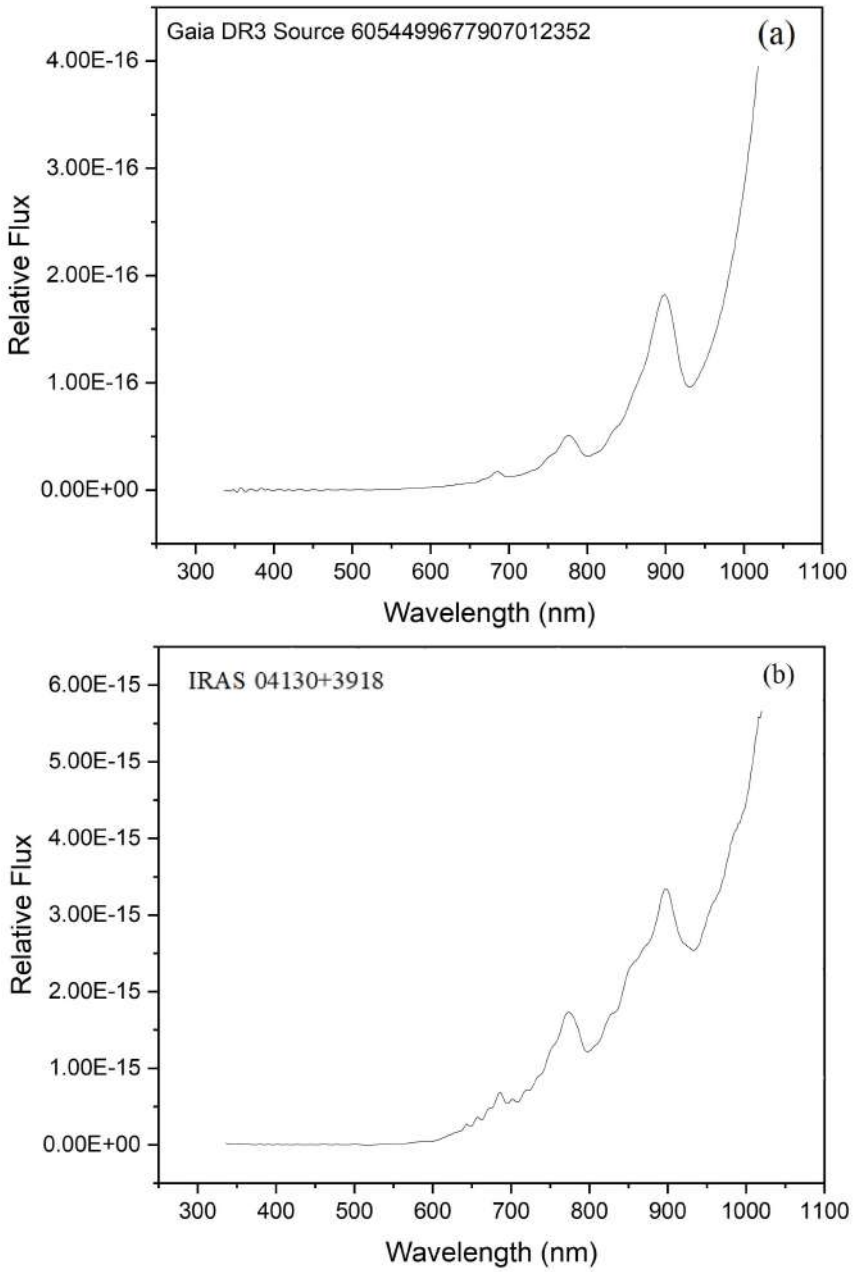

Figure 1. Gaia DR3 low-resolution spectra in the range 336-1020 nm for new discovered N -type carbon star (Figure 1a) and for confirmed dust – enshrouded carbon star IRAS 04130+3918 (Figure 1b). C_2 molecule absorption bands at 4737, 5165, and 5636 Å (Swan bands) are not visible in spectrum of both objects, because of strong depression of radiation in blue part of spectra.

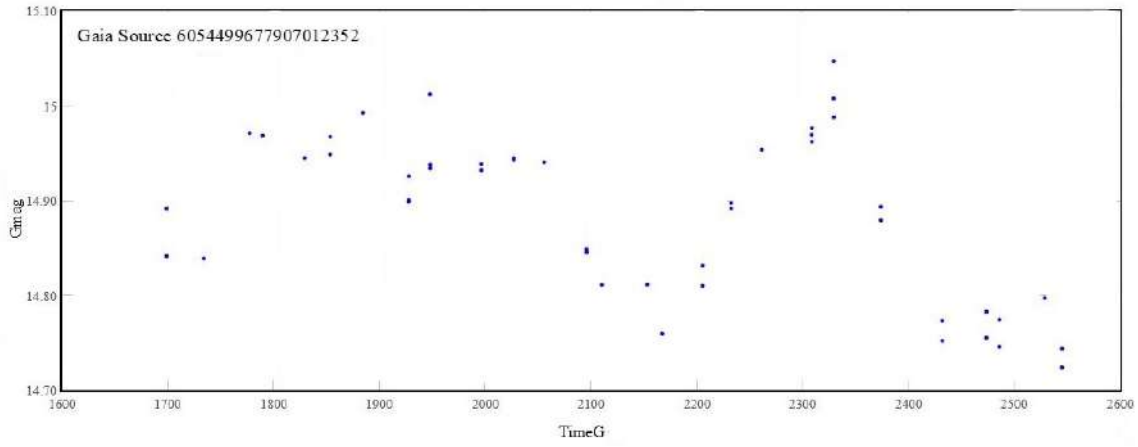

Figure 2. Gaia phased light curve in G-band for new discovered N-type carbon star.

4. Conclusion

The Gaia Source 6054499677907012352 is a N-type C star of late sub-types. Very large Gaia BP–RP color and 2MASS J - Ks color (J – Ks =3.0 mag.) indicate the presence of a cool dusty molecular envelope around this object. This object can be classified as a low-amplitude SR variable.

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