

A NEW STAR IN THE SKY NAMED BÂRLAD

DUMITRU CIPRIAN VÎNTDEVARĂ*

ABSTRACT

We discovered a fast nova with the main telescope at the Astronomical Observatory in Barlad, Vaslui, Romania. The new object is located in the Andromeda Galaxy. The nova discovered in Barlad has also been observed by amateur astronomers in Hungary and China. The new object can be seen as a small star in images taken with the camera on the research telescope.

Key words: nova, discovery, transient, AAVSO, Barlad V2.

Introduction

On the morning of June 9, 2023, following scientific astronomical observations, we observed and reported the appearance of a new object (transient AT2023kdb) in the Andromeda Galaxy (Messier 31).

Material and method

From photometric observations, it appears to be a fast nova, which has diminished considerably in brightness just a few days after it was reported. The possible nova was confirmed optically by Hungarian amateur astronomer Róbert Fidrich, using a 28 cm reflecting telescope, on two different nights: on June 9, 2023, 8 hours after discovery, and on June 12, 2023, when the new transient greatly decreased in brightness, and by astronomer Jingyuan Zhao from China. The magnitude (brightness) at the time of the report was 16.2, and 16.5 at confirmation, reaching around 18 three days later.

The Andromeda Galaxy where the nova was discovered is the closest galaxy to the Milky Way visible from the northern hemisphere (2.5 million light-years), and is one of the most observed and photographed galaxies by amateur astronomers. The new discovery is also published by the Association for Variable Star Observations (AAVSO) under the internal name Barlad V2. The equipment with which the discovery was made is housed in the 2.2 m

Pulsar dome at the Astronomical Observatory (the museum's headquarters at 235 Republicii Street) and consists of the main telescope used for research and astrophotography, a 250 mm f/3 Newton-type telescope, a ASI 1600 mono and Eq6 mount.

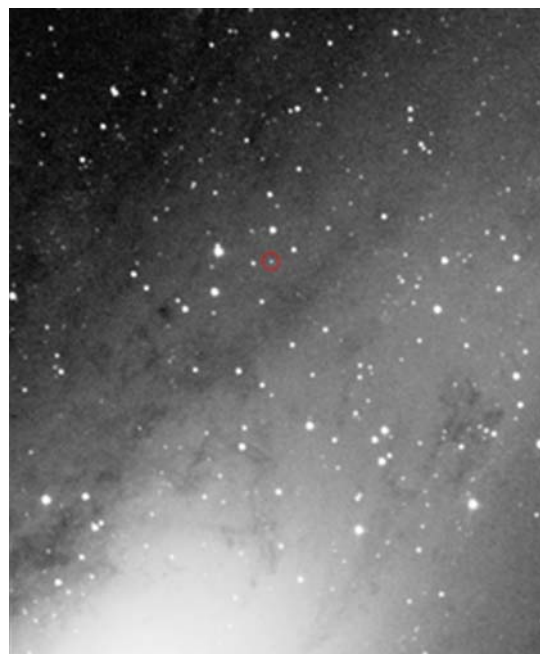


Fig. 1 - A portion of the Andromeda field and the new transient. AT 2023kdb, marked with red circle.

Results and discussions

The novae are time-limited optical phenomena (transients) and usually occur in a binary system consisting of a white dwarf and a giant star.

The white dwarf is a stable cold star that has no nuclear fusion, supported by repulsion between electrons due to the exclusion principle. As a rule, white dwarfs are the evolutionary end result of Sun-sized stars. When our star reaches the end of its life, in about 5 billion years, it will become a red giant, then a planetary nebula, and the core will turn into a white dwarf star.

* „Vasile Pârvan” Museum, Bârlad, România, email: ciprian.dumiitru@gmail.com

The denser giant star, due to strong gravitational forces, starts to pull gas (plasma) from the giant star. After a while, the matter starts to spin and forms a disk of hot matter, mainly hydrogen. There is a place in this system where the matter from the giant star falls onto the disk, and there the temperature rises so much that the hydrogen starts to fuse into helium for a short time. Because of this, the brightness of the system suddenly increases, making it visible from a great distance as a new star in the skies of distant observers.

This is the first time that an extragalactic nova has been discovered in Romania and, in this way, another first in Romanian astronomy is realized in Barlad! The discovery and followup are published on Transient Name Server (TNS).

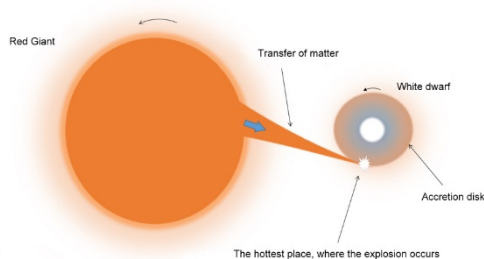


Fig. 2 - Formation and evolution of a binary system that will become a novae

Conclusions

In recent years, the Astronomical Observatory of our institution has made several discoveries of particular importance for Romanian astronomy, such as: the bright red nova in the Messier 101 Galaxy in 2015, the variable star Barlad V1 in 2019, and now, a nova in the Andromeda Galaxy, which will be named Barlad V2.

Unfortunately, at the time of writing, the nova discovered last year in the Andromeda Galaxy has no spectrum and therefore cannot be officially classified as a nova in the TNS database. There are several contributing causes for this, such as the fact that the nova dimmed very rapidly in brightness and large spectroscopic telescopes were no longer able to analyze the transient.

Another reason is that these types of transients in the Andromeda Galaxy, such as novae, but also some faint supernovae in distant galaxies, are no longer a priority object of study for the scientific world. In principle, the mechanism of the formation of these cosmic events is pretty much

known, and they are not of major interest in providing time for scientific astronomical observations. It refers to the time spent using a telescope at night acquiring scientific images. The major observatories of the world have a very strict and very clear schedule in the use of working time. Only in exceptional circumstances, when a particular astronomical phenomenon occurs, is a derogation/modification of the originally established working program made.

Rezumat

În dimineața zilei de 9 iunie 2023, în urma unor observații astronomice cu caracter științific, am observat și raportat apariția unui nou obiect (transient AT2023kdb) în dreptul Galaxiei Andromeda (Messier 31).

Din observațiile fotometrice rezultă că este o novă rapidă (fast nova), care a scăzut considerabil în strălucire, doar la câteva zile de la raportare. Posibila novă a fost confirmată optic de astronomul amator din Ungaria, Róbert Fidrich, utilizând un telescop reflector de 28 cm, în două nopți diferite: pe 9 iunie 2023, la 8 ore după descoperire, și pe 12 iunie 2023, când noul transient a scăzut foarte mult în strălucire, dar și de astronomul Jingyuan Zhao din China. Magnitudinea (strălucirea) în momentul raportării a fost 16.2, iar la confirmare 16.5, ajungând în jur de 18, trei zile mai târziu.

Novele sunt fenomene optice cu durată limitată în timp (transiente) și, de regulă, apar într-un sistem binar format dintr-o pitică albă și o stea gigantă. Aceasta fiind mai densă, datorită forțelor gravitaționale puternice, începe să tragă gaz (plasmă) de pe steaua gigantă.

În ultimii ani, la Observatorul Astronomic din cadrul instituției noastre s-au realizat mai multe descoperiri de o importanță deosebită pentru astronomia românească, cum ar fi: nova roșie luminoasă din galaxia Messier 101, în anul 2015, Steaua variabilă Barlad V1, în 2019, și, iată, acum, o novă în Galaxia Andromeda, ce va purta numele Barlad V2.

Aceste rezultate au fost posibile și prin implicarea unor sponsori care au sprijinit activitățile organizate de instituția noastră sau au contribuit la achiziția unor echipamente. De exemplu, în vara anului 2022, cu sprijinul companiei private S.C. Safir S.R.L., am reușit să achiziționăm un nou telescop pentru cercetare și astrofotografie, cel cu care am reușit să facem și noua descoperire!

De asemenea, în ultimul timp am început să lucrăm cu o parte din membrii Astroclubului „Perseus” la dezvoltarea unor noi softuri personalizate în domeniul cercetării în astronomie, utilizând

inteligența artificială. Unul dintre aceste programe a fost folosit cu succes și a contribuit din plin la noua descoperire din 9 iunie 2023.

Acknowledgements

These results were also made possible by the involvement of sponsors who supported activities organized by our institution or contributed to the purchase of equipment. For example, in the summer of 2022, with the support of the private company S.C. Safir S.R.L., we were able to purchase a new telescope for research and astrophotography, the one with which we were able to make the new discovery!

Also, lately we started to work with some of the members of the Astroclub "Perseus" on the

development of new customized software in the field of astronomy research using artificial intelligence. One of these programs has been successfully used and contributed greatly to the new discovery on June 9, 2023.

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