Supernova Remnants II: An Odyssey in Space after Stellar death
3-8 June 2019, Chania, Crete, Grece

Test observations of galactic supernova remnant G67.7+1.8 with 1.4m telescope Milanković at Astronomical Station Vidojevica, Serbia

PETAR KOSTIĆ
pkostic@aob.rs

ANA VUDRAGOVIĆ
ana@ipb.ac.rs

BRANISLAV VUKOTIĆ
bvukotic@aob.rs

Astronomical Observatory, Volgina 7, P.O.Box 74 11060 Belgrade, Serbia

Summary

We present the optical photometric observations of a galactic supernova remnant to test the possibilities of telescope Milanković at Astronomical Station Vidojevica, Serbia, for observing supernova remnants. The selected SNR, G67.7+1.8, first observed by Mavromatakis et al. (2001), is observed through optical narrow-band filters Hα, Hα continuum and [SII]. The observations are carried with the telescope Milanković, a 1.4 m Nasmyth reflector with 10.5 m focal length, and CCD camera ANDOR iKonL, 2048x2048 pixels (13.5×13.5 μm/pix), with ~ 8×8 arcmin field of view at the telescope.

Introduction

We performed observations of supernova remnant to test the possibilities of our 1.4m Milanković telescope which is in function for almost three years. The remnant G67.7+1.8 was chosen following the papers of Mavromatakis et al. (2001) and Gök et al. (2008). The aim was to observe the remnant (its brightest shock region, more precisely) in Hα, [SII] and Hα continuum filter and make [SII]/Hα image in order to check whether the line ratio [SII]/Hα is higher than 0.4, the empirical limit between the HII regions and the shock regions of supernova remnants. In case of SNRs where the shock induces the collisional excitation, this ratio is > 0.4, while in case of HII regions where we have photoionization from the central star, it is < 0.4, but most usually < 0.2.

Method

The [SII] and Hα line images were obtained by subtracting Hα continuum image from [SII] and Hα images. The more correct way would be if [SII] continuum image would be subtracted from [SII] image, but in lack of [SII] continuum filter we assumed that these two continua are the same and simply used the same Hα continuum filter for both lines. The observations were performed at 27/28. May 2019. The total of 19 images were taken in all three filters with exposure times of 90 seconds. The seeing was changing between 1.5" and 1.7", which corresponds to partially cloudy sky (on the clear sky seeing is usually ~ 1.15", but also the value under 0.8" can be achieved; Jovanović, 2012). We used binning 2×2, so the resolution was 1024×1024, with the field of view of ~ 8.3 arcmin. We took the same number of exposures for [SII] and Hα, although for assumed ratio of [SII]/Hα ≈ 0.5 the total exposure of [SII] images should have been twice longer than for Hα to obtain the comparable signal-to-noise.

Results

The Figures 1 and 2 show the parts of the Hα and [SII] images, respectively. The Figure 3 shows the [SII]/Hα line ratio image with set gray scale range 0.4-0.5 (black-white). The two lower panels represent the MaximDL's Area Plot which show the intensity values through the image. They show the intensities around the crest of the shock region within the two selected squares on the image. We can see that the peak values in the left square is in the interval (0.48-0 .7) and in the right it is above (0.42-0.64). This is in agreement with the expected values for an SNR.

Conclusion

The obtained results give the values of [SII]/Hα that are a bit lower than in the work of Gök et al. (2008) who find the ratios of 0.6-0.8. This might be a consequence of using the same continuum for both [SII] and Hα or relatively high seeing during our observations.

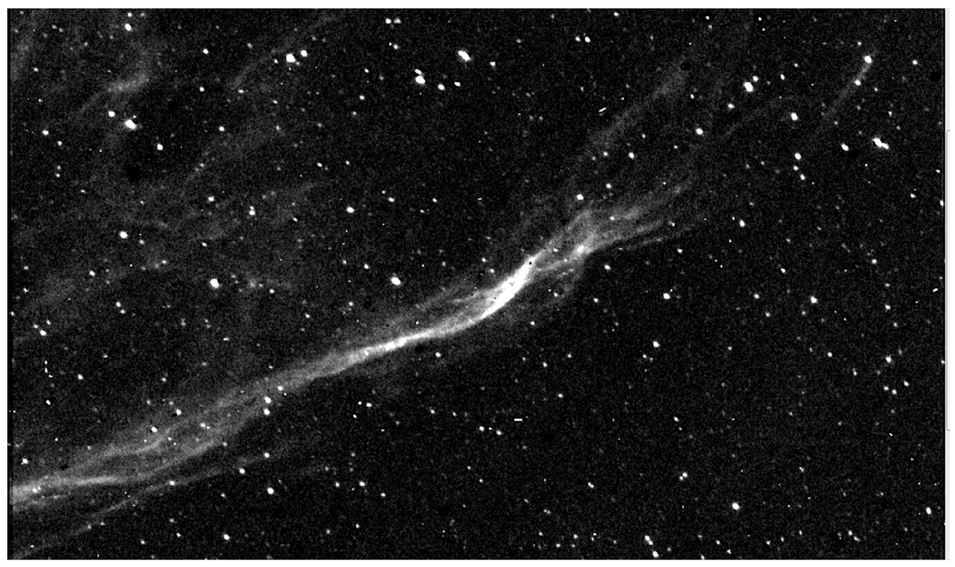

Figure 1. (Hα - Hα continuum) image

Figure 2. ([SII] - Hα continuum) image

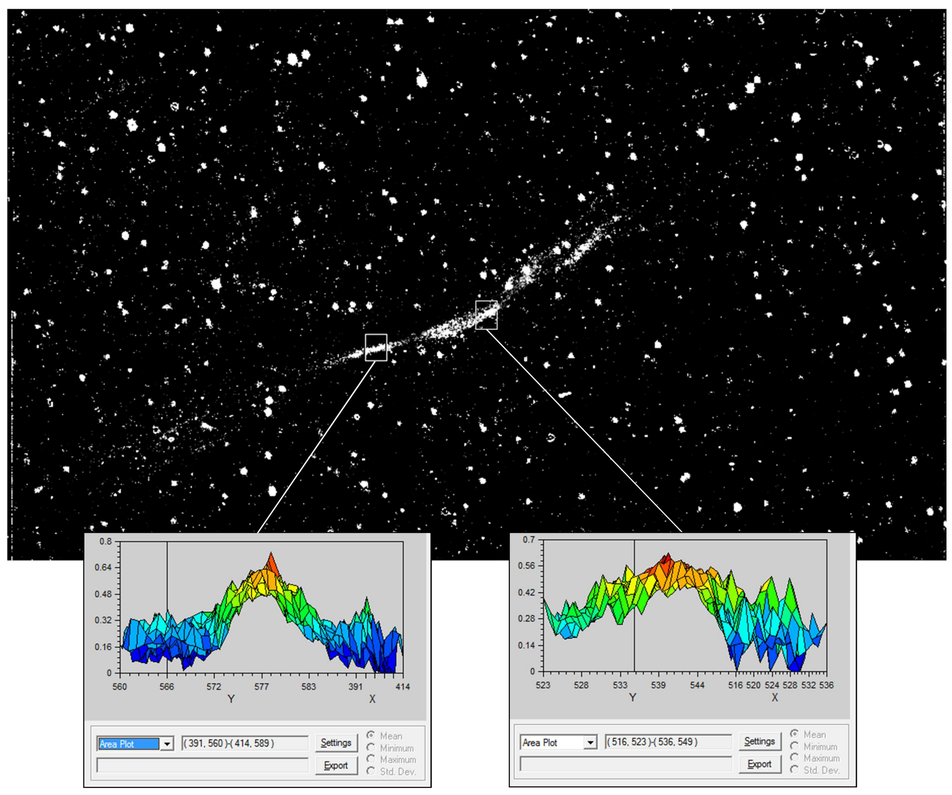

Figure 3. [SII]/Hα image.

Literature

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Acknowledgements. This work was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia through project no. 176021, "Visible and Invisible Matter in Nearby Galaxies: Theory and Observations". We thank the Ministry of Education, Science and Technological Development of the Republic of Serbia for the continued support related to the construction works at the Vidojevica Astronomical Station. We acknowledge the financial support by the European Commission through project BELISSIMA (BELgrade Initiative for Space Science, Instrumentation and Modelling in Astrophysics, call FP7-REGPOT-2010-5, contract No. 256772).