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Archival HST Search for Extragalactic Novae

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Abstract. An archival search for extragalactic novae was carried out using the data obtained with the *Hubble Space Telescope* (*HST*). Twenty-seven galaxies were examined where most of the targets are beyond the Local Group. Nova rates were calculated for the target galaxies and combined with other known nova rates to show dependence on galaxy types. Here we present the nova detections for six galaxies from our object list.

Keywords. stars: novae, cataclysmic variables — galaxies: stellar content — techniques: photometric

1. Introduction

Investigating classical novae (CNe) in the Galaxy and beyond allow us to compare different stellar populations through galaxies with different Hubble types. Arp (1956) noticed a bimodal distribution of novae in M31 which caused the discussion of two populations of CNe. Duerbeck (1990) was officially first to use the terms disk and bulge novae. In the following years many authors investigated the two populations of novae and concluded disk novae are brighter than old and faint bulge novae Della Valle *et al.* (1992), Williams (1992), Della Valle & Livio (1998). The main advantage of working with nova populations in external galaxies is the constant foreground extinction of host galaxies, which is not the case for the Galaxy. Surveys carried out in face-on galaxies yielded spatial separation of novae. Thus, different populations of novae, namely disk and bulge novae as Duerbeck (1990) pointed out, can be investigated by their positions in their respective galaxies.

2. Data and Method

Data used in this study were taken from the *HST* archive at *MAST* (*Multimission Archive at STScI*). A detailed explanation of the method and analysis can be found in Alis & Saygac (2012). Luminosity specific nova rates (LSNRs) were computed with the mean nova lifetime method described in Della Valle *et al.* (1994).

3. Nova Rates

M100: Data spanning 57 days led to the detection of five novae in M100. One of the novae, namely ID 4126 has been found from this dataset before by Ferrarese *et al.* (1996). LSNR was computed as 10.38 novae per year per $10^{10} L_{\odot,K}$.

NGC 3627: Detection of five novae was possible in the Seyfert galaxy NGC 3627 in an interval of 58 days. LSNR was computed as 9.60 novae per year per $10^{10} L_{\odot,K}$. Details can be found in Alis & Saygac (2012).

NGC 3982: Six novae were found in this dataset which lead to a LSNR 2.84 novae per year per $10^{10} L_{\odot,K}$.

IC 4182: Three novae were detected in the dwarf irregular galaxy IC 4182. Data span 46 days allowed to determine LSNR as 4.83 novae per year per $10^{10} L_{\odot,K}$.

NGC 1326A: It was not possible to detect any nova candidates in NGC 1326A where the data span 50 days. Magnitude limit of our detection is $m_{F555W} = 26$ and computed using artificial star tests.

NGC 4258: No novae found in NGC 4258 in the period of a 40 days. Magnitude limit of our survey determined via artificial star tests revealed $m_{F555W} = 26$ for this dataset.

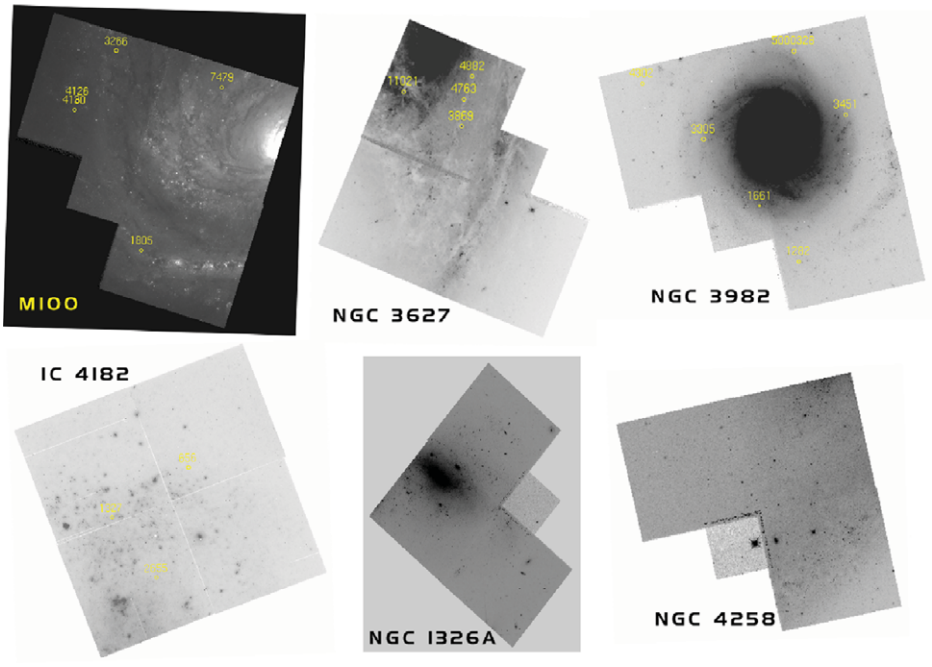

Figure 1. Nova detections superimposed on galaxy images produced with Swarp.

4. Conclusions

An effort to enlarge the sample of extragalactic novae has been undertaken. It is revealed that pointed nova surveys, especially in $H\alpha$, are needed to enhance detections and compute nova rates.

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References

Alis, S. & Saygac, A. T. 2012, *New Astron.*, 17, 101
Arp, H. C. 1956, *AJ*, 61, 15
Duerbeck, H. W. 1990, in: A. Cassatella & R. Viotti (eds.), *Physics of Classical Novae* Berlin: Springer, p. 34
Della Valle, M. *et al.* 1992, *A&A*, 266, 232
Della Valle, M. *et al.* 1994, *A&A*, 287, 403
Della Valle, M. & Livio, M. 1998, *ApJ*, 506, 818
Ferrarese, L. *et al.* 1996, *ApJ*, 468, L95
Williams, R. E. 1992, *AJ*, 104, 725

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