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# Substellar objects around the sdB eclipsing Binaries

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**Abstract.** The sdB-type eclipsing binary consists a very hot subdwarf B (sdB) type primary and a low mass secondary with short period. They are detached binaries and show very narrow eclipse profiles, which benefits the determination of the precise eclipse times. With the precise times of light minimum, we can detected small mass objects around them by analyzing the observed-calculated (O-C) curve based on the light time effect. For searching the substellar objects orbiting around the binaries, we have monitored sdB-type eclipsing binaries for decades. A group of brown dwarfs and planets have been detected since then. In the present paper, we focus on the target NSVS07826147, which may be another exoplanet host candidate among the group of the sdB-type eclipsing binaries.

## 1. Introduction

The hot sdB-type components in sdB eclipsing binaries are located on the extreme horizontal branch (EHB) in Hertzsprung-Russell diagram. They burn helium in their cores and have very thin hydrogen envelopes [1]. The sdB eclipsing binaries are believed to be formed from binary systems through common envelope(CE) ejection. Their progenitors should be solar-type binary with initial separations less than 5AU, and will evolve into cataclysmic binaries (CVs) [2] when the secondary components filling their critical Roche Lobe. Since 2009, more and more sdB eclipsing binaries have been found to be the host stars of substellar objects by our group and other investigators. Such as HS 0705+6700 [3][4], HW Vir [5], NSVS14256825 [6][7], NY Vir [8][9] and SDSSJ0820+0008 [10] etc. The discovery of the circumbinaries planets and brown dwarfs orbiting these evolved binaries not only increases our knowledge about the diversity of the exoplanets host stars, but also has very important implications for the formation of sdB stars and the fates of low-mass companion systems. Here we report some new results of one sdB eclipsing binary NSVS 07826147, which we have monitored for years.

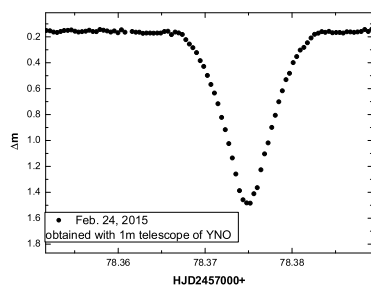
## 2. The progress on NSVS07826147

NSVS 07826147 was classified as sdB eclipsing binary by Kelley & Shaw [11]. For et al. [12] gave the detailed absolute parameters using their photometric and spectroscopic observations. In 2009, We improved its period as 0.16177046 days based on all available times of light minimum at that time [13]. After that, we continue to monitor this target for years with some small

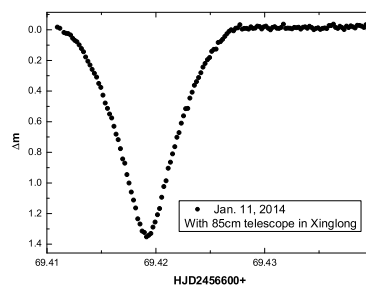


telescopes in china, such as 1m and 60cm telescopes in YNO and 85cm telescope in Xinglong station. Some of the eclipse profiles obtained with these telescopes are displayed on the figures 1-2. With the high precise timings derived by our observations, we constructed the O-C curve of this system, see Figure 3. The O-C curve shows the trend of the periodic variation.

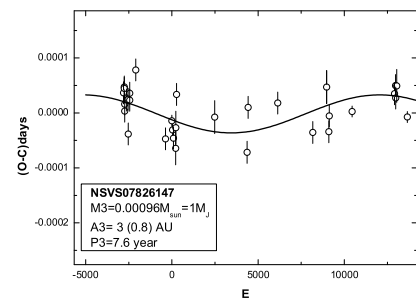
The presence of a tertiary body in the eclipsing binaries can cause the relative distance changes of the eclipsing pair as it orbits the barycenter of the triple system. Seen by a distant observer, the light-travel time of the eclipsing pair will change corresponding to the change of the relative distance. Then the change between the observed and calculated eclipsing timings will follow the strict period variation. By analyzing the O-C curve of NSVS 07826147, we detected a small amplitude cyclic variation. The preliminary result suggests that there is a Jupiter mass planet orbiting around NSVS 07826147 at the distant of 3 AU. The O-C curve and the corresponding fit (solid line) are shown in Figure 3. Thus, NSVS 07826147 may be another exoplanet host star among the group of the sdB-type eclipsing binaries.



**Figure 1.** Obtained with 1m telescope.



**Figure 2.** Obtained with 85cm telescope.



**Figure 3.** The O-C curve and the corresponding fit of NSVS 07826147.

## Acknowledgments

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