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GSC 4778 324: A NEW MULTIPERIODIC δ SCUTI STAR

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While observing the high-amplitude δ Scuti star (HADS) V1162 Ori as part of a international multisite campaign, we found a new short-period variable with small amplitude (about 0.01 mag) on our frames. The star, GSC 4778 324, is probably of δ Scuti type.

We observed the field of GSC 4778 324 ($\alpha_{2000} = 05^{\text{h}}32^{\text{m}}34^{\text{s}}.462$, $\delta_{2000} = -7^{\circ}12'40''.116$) on 3 nights in December 1999 and on 4 nights in January 2000. A total of 20.3 hours of CCD-photometry, resulting in 637 datapoints was obtained.

We used a 0.4-m telescope equipped with a ST7 camera and V-filter (according to the Bessel specifications). The frames, made in 2×2 binning mode, were dark-framed and flat-fielded. Aperture photometry was performed using MIRA-AP software package[†].

We refer to Fig. 1 for the identification of the stars that we analyzed:

star 0 = GSC 4778 019, our principal comparison star, following the instructions for the multisite observations of V1162 Ori (Arentoft and Sterken, 1999).

star 1 = V1162 Ori, a high-amplitude δ Scuti star;

star 2 = GSC 4778 285 ($11^{\text{m}}8$);

star 3 = GSC 4778 324 = the new variable star ($10^{\text{m}}4$);

star 4 = GSC 4778 001 ($12^{\text{m}}7$).

All differential magnitudes were computed with respect to our principal comparison star, labelled star 0. Stars 2 and 4 were used as check stars and remained constant. The differences between check star 2 and comparison star show a standard deviation of about 0.005 mag.

Our first two datasets (of length about $0^{\text{d}}07$) showed respectively a maximum and a minimum. The next datasets showed barely any variation (Fig. 2), whereas our last dataset (of length about $0^{\text{d}}14$) showed one maximum and two minima (Fig. 3). This leads us to conclude that the star is very probably a multiperiodic variable. We used Period98 (Sperl, 1998) to perform a preliminary period analysis and obtained a provisional frequency of 13.693 c/d, i.e. a point of $0^{\text{d}}073$. The peak-to peak amplitude associated to this frequency is only 0.014 magnitude. The (preliminary) phase diagram, that combines four datasets, is illustrated in Fig. 4.

G. Handler showed interest in our new variable and performed Strömgren photometry with the 0.5-m telescope at S.A.A.O. He obtained the following colour indices: $V = 10.26$, $b - y = 0.202$, $m1 = 0.168$, $c1 = 0.894$, $\beta = 2.797$ (Handler, 2000). These values put the new variable star right in the middle of the δ Scuti instability strip.

[†]The MIRA AP software is distributed by Axiom Research, Inc.

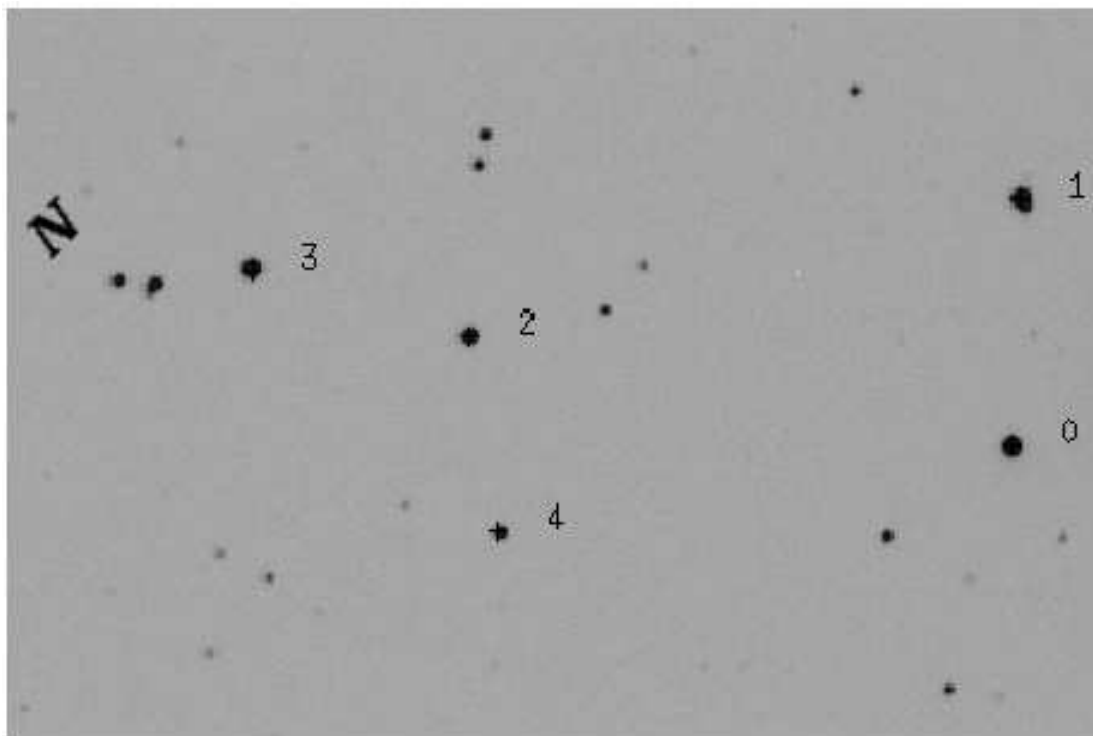


Figure 1. CCD field-of-view for GSC 4778 324 with star labels as discussed in the text. The dimensions are $8'$ by $12'$. The field is rotated to avoid reflections by a bright neighbouring star.

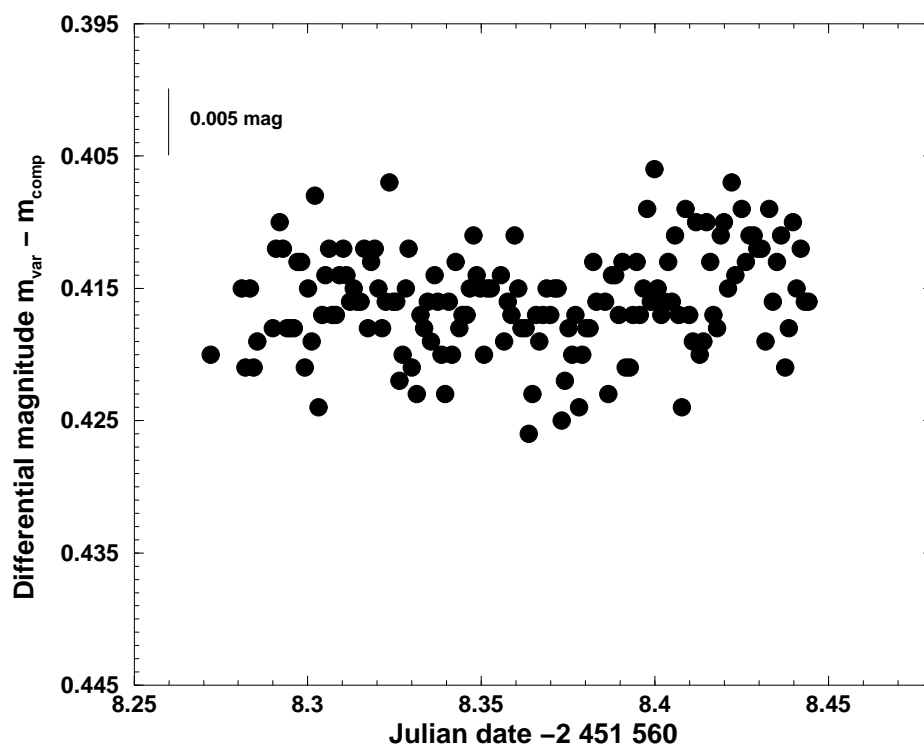


Figure 2. Light curve of GSC 4778 324 on 24/01/2000

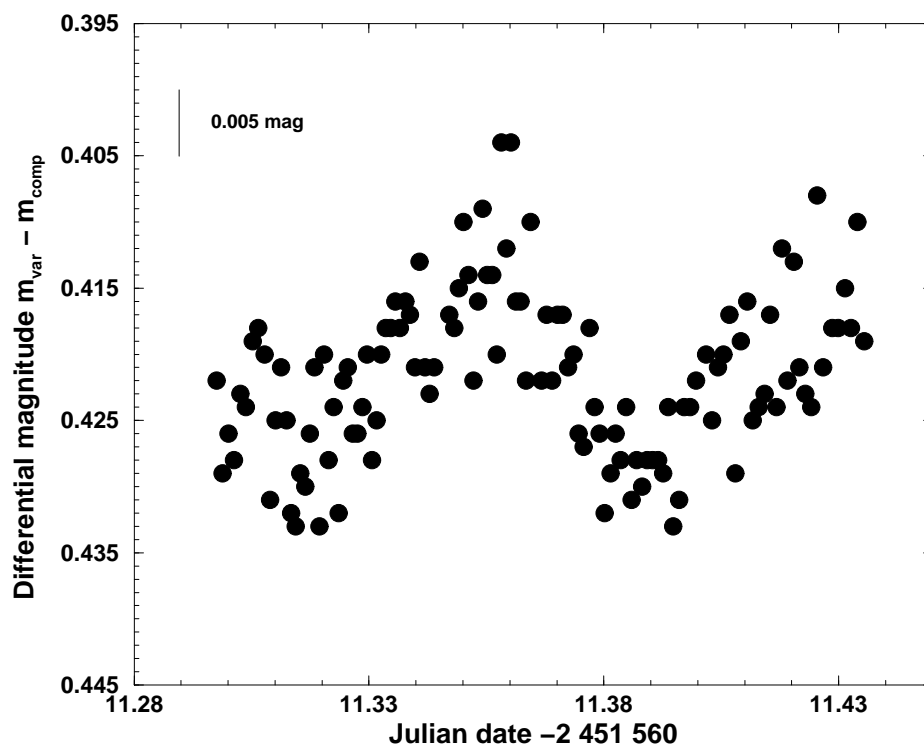


Figure 3. Light curve of GSC 4778 324 on 27/01/2000

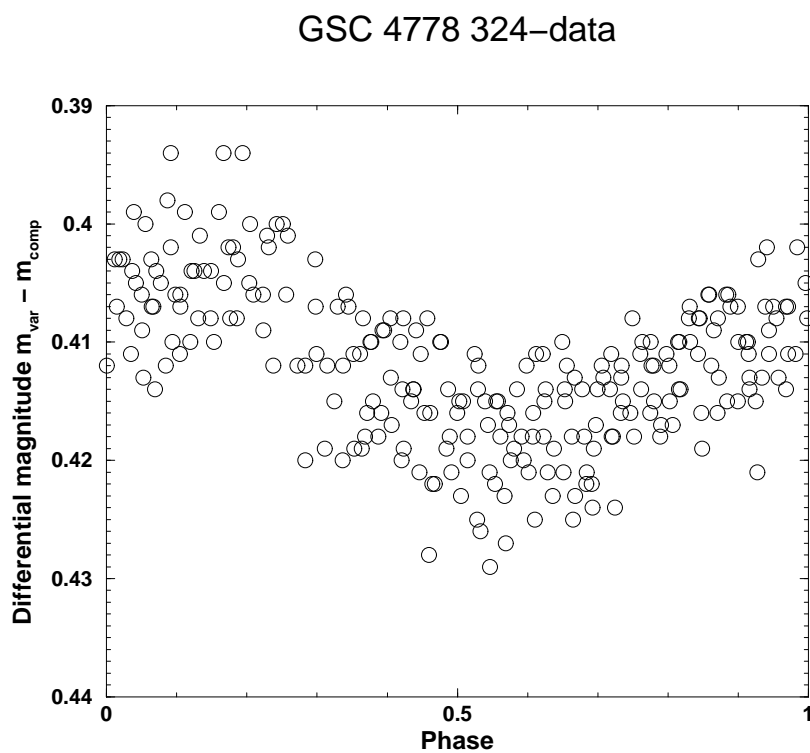


Figure 4. Phase diagram of four datasets against the (preliminary) frequency of 13.693 c/d

The small amplitudes and short-period variations we observed as well as the colours obtained by Handler (2000) lead us to state that GSC 4778 324 is a new δ Scuti variable. The fact that these variations could be detected on some days only and hardly to no longer on some other days, indicates that it is a multiperiodic variable. Further observations are encouraged for trying to solve the complete frequency spectrum.

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References:

- Arentoft, T., Sterken, C., 1999, <http://homepages.vub.ac.be/~tarentof/welcome.html>
Handler, G., 2000, *Inf. Bull. Var. Stars*, No. 4817
Sperl, M., 1998, Manual for Period98 (V1.0.4) A period search-program for Windows and Unix, (<http://dsn.astro.univie.ac.at/period98>)