

Replies to the referee:

We thank the referee for a detailed report and a good rating of our long-lasting project.

In an effort to focus the paper on substantial aspects and to shorten the main text, we now created four appendices. For convenience, they are now in one file with the main text but as soon as the final version of the paper is accepted for publication, we shall move all appendices to ZENODO.

The Hvar photometry project is a very meritorious, historical undertaking to understand the long-term variability of various types of stars. The manuscript describes the project and summarizes the results obtained for emission-line stars.

It is very worthwhile making the information compiled by the authors available to the general community, which can make good use of it. For instance, an invited talk at a conference on Be stars (there may be one next or even this year) or photoelectric photometry could be a good vehicle. However, I do not think that all this information needs to be published in a scientific journal such as A&A.

Questions for the editor:

a) The Introduction does not frame a scientific context but gives a somewhat lengthy, yet patchy, historical account of the Hvar photometry project. It is exclusively about this project and does not provide any external context. It hardly adds value for the scientific understanding of the rest of the manuscript. Is this in agreement with the scope of A&A?

Reply: We shortened the introduction describing the project and moved it into one-page Appendix A.

b) Table 4 provides valuable information. But photoelectric photometry is a dying art, and so I am wondering whether A&A wishes to publish data about comparison and check stars that CCD photometry is not likely to use. If the editor and the authors accept the main thrust of my comments, their follow-up will require very major modifications of the manuscript. Therefore, I refrain from making comprehensive minor comments now. The annotated copy of the manuscript contains some. I recommend them to the attention of the authors but only request replies to comments made in this report.

Reply: We agree with the referee that the tables with, both, the homogenised UBV values of Johnson standards and standard UBV values for our ensemble of comparison and check stars need not be in the main text and moved all four tables (2,3,4, and 5 in the original version) to Appendix C, now as Tables C.1 to C.4. We do not think, however, that the photoelectric photometry is dying art. It is actually still the best technique to monitor light and colour changes in the blue and ultraviolet parts of the electromagnetic spectrum, where hot stars radiate most of their energy. Besides, it is our experience that with our reduction technique, our improved values can conveniently be used also for programs of CCD photometry with colour filters.

General scientific comments to the authors:

1) Please add a simple, short introduction to Be stars and cite the review by Rivinius, Carciofi, and Martayan.

Reply: Yes, we did it in Sect. 2

2) *Please add a reference to a paper describing the general methods and principles of photoelectric photometry.*

Reply: This would actually require a longer discussion, which would again increase the length of the paper. Instead of that, we added a comment when mentioning the study by Harmanec, Horn and Juza (1994) that all relevant references to papers describing the development of methods and principles of photoelectric photometry are discussed there.

3) *Please purify the sample and retain classical Be stars only, removing unrelated objects like beta Lyr (or at least split the sample into clearly distinguished subsamples).*

Reply: When we started the project, and also now we are of the opinion that the early-type emission-line stars should be investigated in their complexity. We observed also some emission-line stars and binaries of higher luminosity classes so we find appropriate to discuss them, too. However, we now explain our view in Sect. 2 and we added the needed pieces of information into Table 1.

4) *Please add that the disks around classical Be stars are not due to accretion, as initially hypothesized by Kriz and Harmanec, but due to decretion. Please cite the pertinent literature on decretion disks.*

Reply: We also included it into discussion in Sect. 2.

5) *Please state that the variability seen in the Hvar photometry is entirely circumstellar as the stellar amplitudes are too low.*

Reply: We are hesitant to do that. Some campaigns on rapid variability of particular Be stars, cited in our study, showed that the Hvar photometry is capable to detect changes with a full amplitude less than 0.03 mag.

6) *Please emphasize the continued complementarity of the Hvar photometry to space photometry: Hvar can provide the long-term context. As can BeSS: please mention the complementarity of the Hvar photometry and the BeSS spectra.*

Reply: Yes, this is now done both in the abstract and in the text.

7) *Please provide simple statistics of the amplitudes in V magnitude and U-B and B-V colors. Ditto for the timescales, ideally combining them with the amplitudes.*

Reply: Not quite sure how to do that. In spite of a large number of observations, our material is not rich enough for a statistical evaluation. The ranges of variability and the time intervals covered by observations are provided in current Table 2 and are also obvious from the time plots for more frequently observed stars.

8) *The main difference between Be and non-Be stars is that Be stars exhibit outbursts while the latter do not. It surprises that, in the manuscript, there is not a single occurrence of the word ``outburst". This requires an explanation since the Hvar photometry is technically capable of capturing medium and major events.*

Reply: We think that the word ``outburst" is inappropriate in connection with the development of new emission-line episodes, accompanied either by light brightenings or fadings (probably depending on the aspect angle). Outburst is indicative of a violent event and we do not see any such thing to happen.

9) *Given the large volume of the data, it would be very attractive to learn more about correlations and trends. At this moment, the Hvar photometry is still the only database covering the long-term variability. But the manuscript mostly describes many trees and appears to neglect the (admittedly complex) forest.*

Reply: We now included new Table 3, where the presence of variability patterns defined in Sect. 3 is given for each more frequently observed object and included some discussion in Sect. 5. (Note that we somewhat changed the abbreviations used for various variability patterns defined in Sect. 4.)

Comments to the authors on specific parts of the paper:

Section 2.1: *The pivotal point of the Hvar photometry project is the forthcoming online database. A detailed description of all methods, etc. must be included with it. In this paper, this information can be much coarser. There is no need to repeat here all equations from Harmanec (1994). Please reduce this section to new information.*

Reply: Since the consistent use of all these equations is essential to obtain good and stable standard values, we prefer to keep it in the main text. Besides, it was not possible to monitor the changes of extinction in the course of observing night back in 1994.

Lines 250-259: *Is it possible/useful to produce a plot of the extinction as a function of time (hour, month, year)?*

Reply: In an effort to shorten the paper a bit, we originally postponed the discussion of the extinction variations for the second paper. At referee's request, we now provide this information in Appendix B.

Section 2.3: *The accuracy is only evaluated in qualitative terms or presented in graphical form. But global representative numbers (not just single best examples) are also needed.*

Reply: Please, note that it is also the value of Tables C.3 and C.4 with our improved standard UBV magnitudes that we provide the rms errors per one observation there. We now also provide Fig. 1, which shows the dependence of rms errors on magnitudes, both for all-sky and differential archives.

Section 3: *The description of the variability patterns given at the beginning is relatively useless if it is not applied to each and every star and also included in Table 6. Some simple statistical evaluation of the distribution of the types and their compatibility/incompatibility is very desirable.*

Reply: As already mentioned, we included Table 3 and some discussion in Sect. 5.

Section 3, LTEMP and LTEMi: *The physical difference should be made clear (referring to the VDD model ?).*

Reply: We do not see the relevance of VDD model here, we refer to the work of Sigut and Patel (2013), which seems more appropriate.

Lines 404-407: *Please cite the work by Okazaki: 1997A%26A...318..5480*

Reply: The citation was added.

Line 443, fourth timescale: *What is it? What are the other three? Why are quotes sometimes used, sometimes not?*

Reply: We thank the referee for pointing out to us that the term "fourth timescale" is confusing in connection with variability patterns defined at the beginning of Sect. 3. We removed that term consistently in the whole paper and replaced it by the abbreviation 'LTCV'.

Section 3: *The second author is famous for his command of the literature on Be stars. However, this paper cannot be a lexicon of Be stars. It is about the Hvar photometry of Be stars. But 80-90% of the text about individual Be stars has nothing to do with the Hvar photometry. I give some random examples in the annotated copy of the manuscript; this information should be removed from the paper since it can be conveniently and safely researched with the ADS and Simbad. Non-Hvar observations should be mentioned only if the Hvar photometry provides an important context or confirmation.*

Star-specific graphics in Sect. 3: *Many appear dispensable because they do not present any intelligible information. They should be removed. Select examples are Nos. 22, 24, 30, 38, 41, etc.*

Replies: We think that it is normal and useful to provide brief information about the studied objects. But we agree that not all these examples have to be in the main text. We now left only 19 stars with well documented history and various interesting types of variability patterns in the main text and moved the rest to Appendix D.

Lines 1281-1290: *How much of the information about the circularity of orbits was obtained through the Hvar photometry? If the fraction is low, this paragraph should be deleted.*

Reply: This piece of information is now in Table 3 and we extended the discussion a bit.

Lines 1291/1292: *It would help to present this conclusion graphically.*

Reply: We are not sure what the referee suggests here.

Figures 55 and 56: *It would be very useful to include information about the accompanying variations in the V band. Please explain in the captions what 'V' and 'Ia' stand for.*

Reply: This is clearly explained in the caption of Fig. 55, but for still better clarity we added V and Ia in brackets there.

Table 5 *should definitely not be published in A&A because the usage of these data cannot be recommended. The online database is a good place for it.*

Reply: This Table, now C.4, is useful at least to provide information about the data accuracy.

As a very important parameter, one would like to see the typical cadence of the observations. For binaries, the period and eccentricity should be included. It would help to add any publications heavily relying on Hvar photometry. MK types would be a clear asset.

Reply: We added the MKK spectral types, binary period and eccentricity, when known, and the type of the binary systems, together with references to original studies to what is now Table 1. The cadence of observations is seen from the time plots for individual objects and will be evident in the online database.

In summary, I congratulate the authors on this huge piece of careful work. However, in A&A, it cannot be equally huge. I strongly encourage the authors to trim the text to what is (and cannot be made) available elsewhere and/or to expand the discussion at the ensemble level.

Reply: Thank you. We now left in the main text only 19 most interesting objects, significantly reducing the main paper.

Dietrich Baade

Replies by Hrvoje Božić and Petr Harmanec on behalf of the authors

