

## **Photometry and Spectroscopy of Variable Stars using the NASA ADS and the SIMBAD Database**

Marek Wolf

*Astronomical Institute, Charles University Prague,  
V Holešovičkách 2, CZ-180 00 Praha 8, Czech Republic*  
*wolf@cesnet.cz*

**Abstract.** The application and completion of the SIMBAD Astronomical Database and the NASA Astrophysics Data System are briefly discussed with respect to research in stellar photometry and spectroscopy.

### **1. Introduction**

Photometry and spectroscopy of variable and double stars belong to the traditional source of fundamental astronomical quantities. This field of research brings the important physical properties of stars, such as their masses, radii, temperatures and ages. This topic is also suitable for different student's exercises, their diploma theses and training in practical photometry and spectroscopy with moderate telescopes and different detectors.

### **2. NASA ADS and SIMBAD Database**

Two well-known and broadly used astronomical databases are very efficient for this research as a primary source of information about all types of variable stars. They are the *SIMBAD Astronomical Database*, operated at CDS Strasbourg, France, and the *NASA Astrophysics Data System*, the digital library for physics, astrophysics, and instrumentation funded by NASA <sup>1</sup>.

The NASA ADS has many possibilities for usage: all queries by identifier, author(s), publication date, keywords or title words are frequently used. The SIMBAD database has other efficient queries that can produce the object identifier, coordinates or reference code. Moreover, the plots and image tools, as well as the *Aladin Previewer*, are very efficient in the preparation of maps and finding charts. The *StarPages* and *AstroWeb* are good starting points and sources of all kinds of astronomical information.

#### **2.1. Bibliography**

Concerning the bibliography provided by ADS, one can obtain more than 1,000 items for well-known, bright and frequently observed stars (Vega, Sirius, etc.).

---

<sup>1</sup>The mirror site of ADS in ESO, Garching, Germany, has the best response from our country.

On the other hand, there is less than 5 (and often none) references for neglected, newly discovered or faint variable stars.

For the frequently published objects, it is also very difficult to select all relevant papers from the obtained list or to find the most important, fundamental paper. Usually, we are looking for one or two previous comprehensive studies on our selected star. Such a paper should be not too old, published in some available journal and its content should critically review all previous publications about this object. From the end-user's viewpoint, more than 75 percent of all provided references seem to be redundant. This task can be solved by selection of suitable citation criteria.

## 2.2. Photometric data

For stellar photometry there are two extensive and useful catalogues: *The General Catalogue of Photometric Data*, GCPD, collected by J.-C. Mermilliod, B. Hauck and M. Mermilliod (University of Lausanne) and containing photometric data for more than 80 systems and their references, and *The Hipparcos and Tycho Catalogues – Hipparcos Epoch Photometry Annex* (European Space Agency). Both catalogues are now accessible on the web and offer the original photometric data.

On the other hand, it is very difficult to extract the needed original data from the tables published in many astronomical journals. They are usually given in the *ps*, *pdf* or *html* format, but not ASCII code, which one finds more suitable as a computer readable input file for reading the next independent data reduction, calculations and analysis.

## 2.3. Observatory Publications

Observatory publications, most of them more than 100 years old, contain very useful collections of photometric and spectroscopic data on different types of variable stars. We would like to name here for instance the Harvard, Lick, Victoria, Ottawa, Bamberg, Hamburg, Leiden and many others observatory publications (*Annals*, *Bulletins*, *Circulars*, *Communications*, *Contributions*, *Mitteilungen*, *Veröffentlichungen*, etc.). It would be very appreciated if these materials would be also subsequently included in ADS and SIMBAD. The longer time span for analysis we have, the better and more reliable results we can obtain.

## 2.4. Amateur databases

Many active amateur observers – using now their efficient CCD detectors – produce a large amount of photometric data suitable for professionals in stellar astronomy. Many high quality data sets can be now directly used for an independent data analysis. The data is usually collected in the different databases of these groups of observers: AAVSO, AFOEV, BAAVSS, BAV, BBSAG, BRNO, VSNET, etc., and all these important web sites could be also referred in the SIMBAD database. Moreover, this appreciation will motivate other observers as to the usefulness of their work.

### **2.5. Russian and Chinese literature**

It is very difficult for astronomers, and sometimes practically impossible, to find a requested reference from the old Russian or Chinese literature, either in printed version, nor in computer readable form. Printed in Russian "azbuka" or in Chinese writings, many of these important documents are practically omitted without translation or direct registration. This could be the next topic for completion of both excellent databases.

### **3. Conclusion**

We presented several ideas how to improve or supply the current NASA Astrophysics Data System and the SIMBAD Astronomical Database with respect to the needs of researchers in stellar photometry and spectroscopy. Both databases serve as very efficient tools for current investigation, publication and educational activity in the stellar astronomy.

**Acknowledgments.** This research has made use of the SIMBAD database, operated at CDS, Strasbourg, France, and of NASA's Astrophysics Data System Bibliographic Services.