

The Hamburg Database of Circumstellar OH Masers

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Abstract. A new version of the Hamburg Database of Circumstellar OH Masers at 1612, 1665, and 1667 MHz was released in 2012 January. The database now lists 13170 OH maser observations of stars in the Milky Way. They belong to 6318 different objects and 2324 of them were detected in at least one of the transitions. The database contains flux densities and velocities of the two strongest maser peaks, the expansion velocity of the shell and the radial velocity of the star. Compared to the first version presented in 2007 at the IAU Symposium 242 in Alice Springs new observations published 2008–2011 are included. Interferometric observations and monitoring programs of the maser emission were also added. Access to the database is possible over the Web (www.hs.uni-hamburg.de/maserdb), allowing cone searches for individual objects and lists of objects. A general object search is possible in selected regions of the sky and by defining ranges of flux densities and/or velocities.

Keywords. masers, catalogs, stars: AGB and post-AGB, stars: late-type

1. Introduction

Since the discovery of masers 40 years ago several thousand observations to detect masers in circumstellar shells have been made. Comfortable tools to access these observations were lacking, until we released the first version of the Database of Circumstellar OH Masers (Engels & Bunzel 2008). Prior to this release, catalogues listing 1612 MHz OH masers in AGB stars (OH/IR stars) were published by te Lintel Hekkert *et al.* (1989) and Benson *et al.* (1990). The te Lintel Hekkert *et al.* catalog contains detected OH masers with their flux densities and velocities and covers the literature until 1984. The Benson *et al.* catalog lists references to OH maser observations and covers the years until 1989. The number of detected 1612 OH Masers listed are 439 and 713 respectively. Since then the number of detected masers has been almost tripled.

In the last decade however, no larger surveys for OH masers have been made anymore, and research has shifted towards interferometric and variability studies of known stellar masers. The interferometric studies focus on astrometry and polarization properties of the masers. To take this development into account, we started to add such publications to the database.

2. The database

The literature searched in refereed journals for OH maser observations cover the years 1984 - 2011. Earlier discoveries are included via the catalogue of te Lintel Hekkert *et al.* (1989). Therefore the database is considered to be (almost) complete for 1612 MHz detections, but contains no non-detections published prior to 1984. For the main lines only measurements published after 1984 are contained. The primary table of the database contains the coordinates of the masers, as well as flux densities and velocities of the two

strongest peaks. For the 1612 MHz masers these are usually the outermost peaks, from which the radial velocity of the stars and the expansion velocity of the circumstellar shells are calculated. For more complex spectra, as usually seen for main-line masers, radial and expansion velocities are calculated from the outermost peaks listed in the reference paper. These informations are drawn mostly from observations of single-dish telescopes.

Compared to the first release of the database the number of observations increased from 10774 to 13170 (+22%), while only 50 (+2%) new detections were reported. The marginal increase of newly discovered masers is due to the absence of sensitive surveys in this area.

The interferometric and monitoring observations are kept in separate tables, because they usually provide different parameters than the single-dish observations. For the interferometric observations the database contains entries for the instrument, the spatial resolution, the sensitivity, a flag to mark polarization observations, and the observing date. For the monitoring observations the start and end dates of the observations are given and the range in peak flux densities reported. Currently these tables contain 155 interferometric observations from 18 papers, and 50 monitoring observations from 6 papers.

Updates of the database will be made at least once a year to incorporate observations from upcoming publications. To access the database a web tool is available at www.hs.uni-hamburg.de/maserdb.

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References

- Benson, P. J., Little-Marenin, I. R., Woods, T. C., Attridge, J. M., Blais, K. A., Rudolph, D. B., Rubiera, M. E., & Keefe, H. L. 1990, *ApJS* 74, 911
- Engels, D. & Bunzel, F. 2008, in J. M. Chapman, W. A. Baan (eds.), *Astrophysical masers and their environments*, Proc. IAU Symposium 242 (San Francisco: ASP), p. 316
- te Lintel Hekkert, P., Versteeg-Hensel, H. A., Habing, H. J., & Wiertz, M. 1989, *A&AS* 78, 399