

# Call for observation of the outburst activity of symbiotic binary AG Draconis

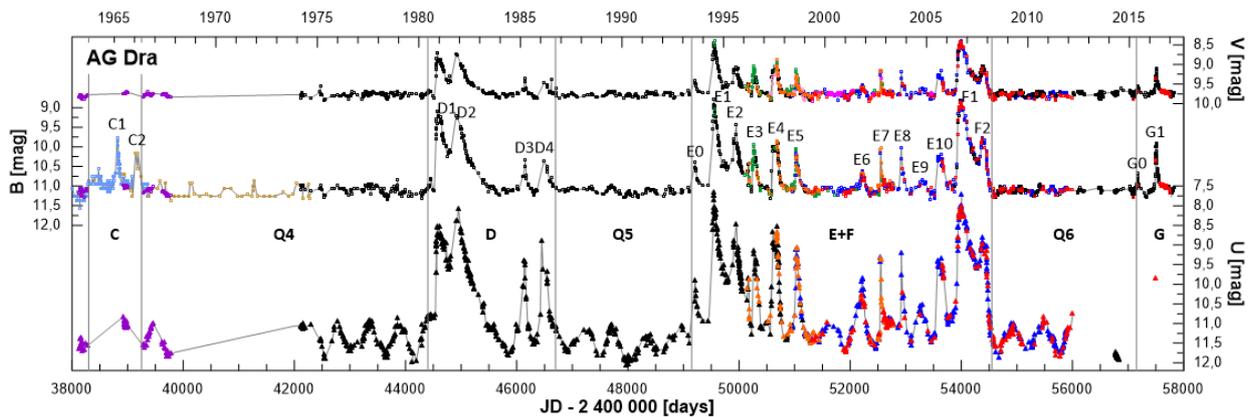
Rudolf Gális<sup>1</sup>, Jaroslav Merc<sup>1</sup> & Laurits Leedjärv<sup>2</sup>

(1) Department of Theoretical Physics and Astrophysics, Institute of Physics, Faculty of Science, P. J. Šafárik University, Park Angelinum 9, 040 01 Košice, Slovakia, rudolf.galis@upjs.sk

(2) Tartu Observatory, Observatooriumi 1, Tõravere, 61602 Tartumaa, Estonia

AG Dra is one of the best studied symbiotic systems, thanks to its relatively high brightness and high Galactic latitude favorable for observations. The system undergoes characteristic symbiotic activity with alternating quiescent and active stages. During quiescence, the mean magnitude of AG Dra is 11.4, 11.1 and 9.8 mag in *U*, *B* and *V* filter, respectively. The amplitude of the brightness variations decreasing with wavelength, from 1.3 mag in the filter *U* to 0.4 mag in the filter *V*. The active stages consist of several outbursts of about 1–1.4 mag in the *V*/visual band and up to 2.3 and 3.6 mag in the *B* and *U* bands, respectively. Major outbursts occur in intervals of 12–15 yr (in 1936, 1951, 1966, 1980, 1994 and 2006), and are usually followed by minor-scale outbursts in intervals of about 1 yr (Hric et al. 2014). Using UV and X-ray observations, González-Riestra et al. (1999) showed that there are two types of outbursts: cool and hot ones. In our recent paper (Leedjärv et al. 2016) we demonstrated that the outbursts of AG Dra can be clearly distinguished also according to behavior of the prominent emission lines in optical spectra.

After seven years of flat quiescence following the 2006–08 major outbursts, in the late spring of 2015, AG Dra begun rising again in brightness toward what appeared to be a new minor outburst (Fig. 1). The recent outburst activity of AG Dra was definitely confirmed by a more prominent outburst in April 2016. The photometric observations suggest that these outbursts are of the hot type. Such behaviour is quite unusual, because the major outbursts in the beginning of active stages are usually cool. Moreover, the spectroscopic observations suggest that the minor outburst of AG Dra in April 2016 demonstrates the behaviour of both hot and cool outbursts. Is it a new type of outburst or some kind of transition between (or combination of) the hot and cool outbursts?



**Figure 1:** *UBV* LCs from the period 1963–2016 with marked active stages (C, D, E + F and G) and quiescent ones (Q4, Q5 and Q6). Particular outbursts are assigned as C1, C2, D1 – D5, E0 – E10, F1, F2 and G0, G1. The thin curves show spline fits to the data points.

Another interesting question is the next evolution of activity of the symbiotic binary AG Dra. According to our detailed period analysis of photometric and spectroscopic observations we know that the median of the time interval between outbursts is around 365 days. It is worth noting that these time intervals vary from 300–400 d without an apparent long-term trend. Nevertheless, can we expect the major cool or minor hot outburst during the late spring of 2017? Or maybe none of them and AG Dra will return to quiescence as we have already detected such behavior during the weak activity stage 1963–66. In any case, AG Dra clearly demonstrates the importance of long-term monitoring of symbiotic stars in order to disentangle the nature and mechanisms of their active stages and outbursts.

According the aforementioned, we kindly ask the *ARAS* observers for spectroscopic monitoring of AG Dra in the coming period. The spectroscopic observations with a cadence of 5–10 days will be sufficient to monitor AG Dra during ongoing quiescent stage. Daily monitoring is highly desirable during next potential outbursts, which will be announced by the special alert based on photometric observations of this interesting symbiotic binary.

Thank you very much in advance.

References:

- González-Riestra R., Viotti R., Iijima T., Greiner J., 1999, *A&A* 347, 478  
Hric, L., Gális, R., Leedjärv, L., Burmeister, M., Kundra, E., 2014, *MNRAS* 443, 1103  
Leedjärv, L., Gális, R., Hric, L., Merc, J., Burmeister, M., 2016, *MNRAS* 456, 2558