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Symbiotic stars as tracers of Galactic structures

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Abstract. The Gaia mission is expected to provide a total number of symbiotic stars in the Galaxy and their membership in stellar populations. Symbiotic stars with distinct emission lines in their spectra can be used as test objects in the analysis of Gaia data on peculiar stars.

Keywords. stars: binaries: symbiotic, Galaxy: bulge, Galaxy: disk, Galaxy: halo

Symbiotic stars are binary stars consisting of a red giant and a hot white dwarf. The hot component ionizes part of the cool giant's wind, generating a characteristic symbiotic spectrum – a blue continuum and high excitation emission lines superimposed on the red giant's spectrum. About 200+ known symbiotic stars (Belczynski *et al.* 2000) form a heterogeneous class of objects. Here we adopt the classification proposed by Munari (1994), based on the nature of the cool component of the symbiotic star (SyS): (1) classical SyS, cool component M or late K giant, ∼70% of known SyS; (2) Mira SyS, late M Mira, ∼20% of known SyS; (3) carbon SyS, carbon star (giant), ∼5%; (4) yellow SyS, F–G or early K giant or supergiant, ∼5%. Yellow SyS can be divided into yellow S and yellow D' type.

When plotting positions of SyS in Galactic coordinates, a strong concentration towards the Galactic plane can be noticed. Referring to the papers by Munari (1994) and Leedjärv (2006), we suggest the following general trends:

- Classical SyS belong to the bulge / thick disk population.
- Mira SyS belong to the younger (thin disk?) population than classical SyS, concentrating closer to the Galactic plane.
- Yellow SyS are divided between two distinct populations: yellow S-type stars belong to the Galactic halo, and dusty yellow D' type stars to the young Galactic disk.

We have two expectations related to the Gaia mission:

(1) Gaia would provide total number of SyS and their membership in stellar populations. The current discrepancy in the estimates spanning from 3000 to 400 000 (Magrini *et al.* 2003) should be solved. Knowing the number of SyS in the Galaxy would clarify their evolutionary status and role as possible progenitors of type Ia supernovae.

(2) SyS could be used as test objects for analysis of the Gaia data. Many of SyS have narrow strong emission lines in their spectra. This allows to use them as reference stars in the algorithms for recognizing emission-line-stars in the Gaia data.

References

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