V4334 Sgr (Sakurai's Object) - problems or a test for atmosphere modeling ?

S. Kimeswenger

Institut für Astrophysik, Leopold–Franzens Universität Innsbruck, Technikerstr. 25, A–6020 Innsbruck, AUSTRIA

The central star V4334 Sgr (Sakurai's Object) of the planetary nebula PN G010.4+04.4 underwent in 1995-1996 the rare event of a very late helium flash. It represents only one out of two such events during the era of modern astronomy (the second event was V605 Aql = Nova Aql 1919, see Koller & Kimeswenger, 2001, ApJ, 559). All the other prominent objects of that type originate from events occurring several thousands of years ago (e.g. A30, A78). Hence, only snapshots can be modeled for those objects. These born-again objects, claimed to be possible progenitors for PG1159 class stars in general, all have unusual high carbon abundances. Thus it is of special interest for stellar evolution theory and theory of convection (Herwig, 2001, ApJL, 554, L71) to model the detailed observations obtained during the last four years. Models of the expanding shell depend essentially on basic stellar parameters of the illuminating source (effective temperature, surface gravity and stellar radius). Most of them depend strongly on the assumed distance to the object. Some models may give some constraints on this parameter, but most of them depend on the assumption as input parameter (see Kimeswenger 2001, Ap&SS in press, http://arxiv.org/abs/astro-ph/0105119). V4334 Sgr allows for the first time a dynamic consideration of this type of object from the very beginning.

The object showed us its stellar atmosphere only for about one year before hiding in its shell. I present here a model which is able to describe the complete photometric behavior of the object, including the fine structure dips of the optical light curve during the first two years of the mass loss and the dust formation. Those models depend only weakly on the details of the input from stellar models. Although assuming a distance and the effective temperature and thus the luminosity is needed as start point. This links to a set of questions, concerning the stellar atmosphere models obtained for the first year of its rapid evolution (Asplund et al. 1999, A&A, 343, 507; Pavlenko et al. 2000, 354, 229).