

NEW POPULATION SYNTHESIS MODEL: PRELIMINARY RESULTS FOR CLOSE DOUBLE WHITE DWARF POPULATIONS

S. Toonen, G. Nelemans & S. F. Portegies Zwart

Department of Astrophysics, IMAPP, Radboud University Nijmegen

An update is presented to the software package SeBa (Portegies Zwart & Verbunt 1996, Nelemans et al. 2001) for simulating single star and binary evolution from the ZAMS until remnant formation including processes as mass transfer phases, common-envelope phases, magnetic braking and gravitational radiation. Stellar evolution has been based on evolutionary tracks described by analytic formulae given by Eggleton, Fitchett & Tout (hereafter EFT, 1989), but in the new version it is based on Hurley, Pols & Tout (hereafter HPT, 2000).

The new version of SeBa is used to study close double white dwarfs. A comparison between simulations using the EFT and HPT stellar evolution tracks shows that the overall double white dwarf populations are very similar.

Using SeBa, we determine the delay times of merging carbon-oxygen white dwarfs with combined masses exceeding the Chandrasekhar mass limit which may lead to supernovae type Ia. The delay time distributions of these mergers for the EFT or the HPT stellar evolution tracks are very similar. The current merger rate with a Galactic star formation rate of Boissier & Prantzos (1999) is $1.3 \cdot 10^{-3} \text{ yr}^{-1}$ and for EFT resp. $8.6 \cdot 10^{-4} \text{ yr}^{-1}$. SeBa is also used to study different prescriptions of common-envelope evolution.

contact: s.toonen@astro.ru.nl