

## Planetary Nebulae catalogue with Gaia EDR3.

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### Abstract

We have created a new Planetary Nebulae (PNe) catalogue by using astrometric and photometric data from Gaia EDR3. Firstly, we have developed an algorithm that selects the most reliable source from EDR3 to be the Central Star (CS) of each PN, among all sources in the neighbourhood of them. This algorithm considers both the angular distance to PN coordinates and also the Gaia colour (BP-RP) of the sources, and catalogues each CS in three different reliability groups. As a result, we have obtained more than 2000 CSPNe with enough reliability.

Then, from Gaia EDR3 parallaxes, we have derived the distances for most of these objects, and we have selected a subset of CSPNe with most accurate parallax and distance values, obtaining a sample of 405 objects that we call the Golden Astrometric Planetary Nebula (GAPN) sample. Then, we have analysed different properties of these nebulae, as their galactic distribution, nebular size, morphology, expansion velocity or kinematical age. In addition, for a group of them, we have studied the evolutionary state of their CSs, from the star's effective temperatures and luminosities, and by using the evolutionary tracks from Miller-Bertolami (2016). Thus, we have been able to estimate the CSPNe masses and evolutionary ages, that has allowed us to contrast this information with the spectral type of the stars.

Finally, we have also searched for and detected several wide binary stars within GAPN sample, by using EDR3 parallaxes and proper motions. In addition, we have also been able to shed some light on the close binarity in CSPNe.