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Planetary Nebulae as observed by Gaia: astrometric and photometric expected performance

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Planetary Nebulae (PNe) are among the most beautiful objects that can ever be observed in the sky with a small size telescope. They present a variety of shapes, from circular, multi-shell, hour glass to butterfly-like, all usually with a high degree of symmetry. They are the irrefutable proof that stars are not immutable objects, but they change with time, they evolve and, often, they have a rapid and certainly showy death. About 90% of the stars in the sky are expected to end their life as PNe, those bright enough to ionize the gas and dust that they expelled while contracting towards the White Dwarf phase, but that are not massive enough to explode as supernovae. PNe are important to understand the chemical evolution of our Galaxy (and also of other galaxies) because they enrich the interstellar medium with products synthetized in the stellar interiors and molecules condensed in the circumstellar shells around their dying bodies. One of the most important problems in current PNe studies is the fact that their distances are poorly known [1]. Paradoxically, these objects are being used as extragalactic distance candles because they are easy to detect and, generally, high luminosity objects. Parallax measurements by the astrometric European satellite Gaia [2] promise to drastically change this situation. In this contribution we review some of the main expected contributions of Gaia data to the study of PNe.

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