

Detection and Dynamics of Exoplanets (DDE): Interplay between theory and observations



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A swarm of dusty objects in orbit around the central star of planetary nebula WeSb 1

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Exoplanets and smaller bodies have been detected orbiting different kind of stars. However, we do not know of any such objects in planetary nebulae, the short-lived stage of stellar evolution between the asymptotic giant branch and white dwarf phases. The planetary activity (destruction and formation) may be accompanied by dust clouds. Hence, we searched for dust occultation events in planetary nebulae using archival photometric data. We show that the central star of PN WeSb 1 features numerous dimming events with typical durations of a few days to weeks that are up to 3 mag deep. This variability is mainly stochastic with an indication of a 400 d period. The occultations are almost grey, indicating dust grains larger than about $0.1\ \mu\text{m}$. Based on our follow-up observations, we argue that the central star is a wide binary and that these events are most probably caused by debris from disintegrated small rocky bodies that escaped from the former asymptotic giant branch star to find safe harbour around the companion star. The latter star dominates the optical spectrum enabling us to see the eclipses. This means that planetary systems are present and undergo violent evolution during the planetary nebula stage.

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