General Relativity and Quantum Cosmology

Observables for bound orbital motion in axially symmetric space-times

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The periastron shift and the Lense-Thirring effect of bound orbital motion in a general axially symmetric space-time given by Pleba\'nski and Demia\'nski are analyzed. We also define a measure for the conicity of the orbit and give analytic expressions for all three observables in terms of hyperelliptic integrals and Lauricella's F_D function. For an interpretation of these analytical expressions, we perform a post-Schwarzschild and a post-Newton expansion of these quantities. This clearly shows the influence of the different space-time parameters on the considered observables and allows to characterize Kerr, Taub-NUT, Schwarzschild-de Sitter, or other space-times.

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