Gravitational Geometry and Dynamics Group Seminar

Wed., March 26, 2025, at 10h00.

Room: Online only and **Zoom ID:** 955 4130 8539

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Gravitational Lensing in the Kerr Spacetime: An Analytic Approach for Light and High-Frequency Gravitational Waves

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Black holes are the most massive objects in the Universe and provide an ideal testing ground for gravity in the strong field regime. Although right now Event Horizon Telescope observations can only tell us that the supermassive compact objects at the centres of the Milky Way and the galaxy M87 cast a shadow and are very likely supermassive black holes described by the Kerr spacetime, it is an interesting question which characteristic features we may be able to observe if much higher resolution observations become available. In my talk I will illustrate this for the example of the Kerr black hole. For this purpose I will place a standard observer in the domain of outer communication and relate the constants of motion to latitude-longitude coordinates on the observer's celestial sphere. Then I will solve the equations of motion analytically and write down a lens equation, redshifts for three different stationary sources, and the travel time. I will discuss the observational implications of my results for sources emitting electromagnetic radiation and high-frequency gravitational waves. As conclusion of my talk I will outline how the presented results can serve as a first step to a self-consistent multimessenger approach, the Maxwell-Einstein-Pauli Observatory.

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