Contribution ID: **1** Type: **not specified**

Decoding a black hole metric from the interferometric pattern of relativistic images

Thursday, 5 October 2023 15:00 (20 minutes)

Gravitational Lensing is the effect for which light rays are deflected by a gravitational field. In presence of a black hole acting as a lens, photons can wind several times around it before fleeing towards the observer. This creates two infinite sequences of images of a given source with decreasing magnitude, asymptotically approaching the border of a zone that will remain obscure called shadow. The features of these images are reflected by a characteristic staircase structure in the complex visibility function. Recalling the formalism of the strong deflection limit, we derive analytical formulae for the height, the width, and the periodicities of the steps in the visibility function that can be inverted to determine the metric coefficients, distance and size of the source starting from the images pattern. With respect to diffuse emission by the whole accretion flow, this ideal framework provides clean insight and model-independent information on the metric. Moreover, these formulae can track the changes induced by orbital motion of the source or alternative metrics and ultimately test General Relativity.

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Session Classification: Thursday 14-16