

Influence of a plasma on the shadow of black holes

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If a black hole is seen against a backdrop of bright light sources, it forms as dark disc on the observer's sky, known as the "shadow" of the black hole. If one assumes that light rays are not influenced by a medium, i.e., if one assumes that they are lightlike geodesics of the spacetime metric, the boundary curve of the shadow can be analytically determined, provided that the spacetime is stationary and axisymmetric and that the Hamilton-Jacobi equation for lightlike geodesics separates. In this talk it is discussed under which conditions such an analytical determination of the shadow is possible if the light rays are influenced by a non-magnetised pressure-less electron-ion plasma. Several examples are worked out, not only for black holes but also, for the sake of comparison, for some "black-hole impostors" such as wormholes. In particular, it is discussed if the boundary curve of the shadow can form "fishtails".

The talk is partly based on joined papers with Oleg Tsupko, Gennady Bisnovatyi-Kogan, Barbora Bezděková and Jiří Bičák.

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