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Shadows of supermassive dark compact objects at galaxy centers

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Current images of the supermassive black hole (SMBH) candidates observed at the center of our Galaxy and M87, have opened an unprecedented era to study both, gravity in its strong regime and the very nature of the relativistic sources. Very-long-baseline interferometry (VLBI) data show images consistent with a central black hole as predicted by General Relativity (GR). However, it is important to consider whether similar images can be obtained from other kinds of well-motivated
dark compact objects without abandoning the Einstein theory of Gravity. It has been recently shown that by modeling the dark matter (DM) halos as a self-gravitating system of neutral fermions within GR, they can harbor very dense fermionic cores at their centers, which can mimic spacetime signatures of a BH. Such dense and horizonless cores of DM can satisfy the constraints imposed by observations, i.e. to be supermassive and compact and to lack a hard surface.
In this talk we show the resulting relativistic images of the fermionic cores under the assumption that photons are emitted from standard α discs which are self-consistently solved in the current DM framework.
We repeat the imaging analysis for different DM particle masses and viewing angles. Remarkably, the disk around the DM core casts a shadow surrounded by a ring-like feature of the lensed photons that resembles that expected in the BH scenario.

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