
Black hole imitators: revisiting the case for Proca stars

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Abstract

In April 2019, the Event Horizon Telescope (EHT) collaboration announced to the world the first photograph of a black hole. A peculiar image whose striking feature is a central dark region surrounded by a bright orange ring (due to hot matter accreting into the black hole). The central dark region is what we call the shadow of the black hole, and it is a consequence of the extreme light bending in the vicinity of the hole. From a theoretical point of view though, black holes might not be the only objects capable of such extreme distortion of light. Some families of exotic stars can become compact enough to alter light trajectories and produce images that resemble the ones of black holes. Thus, understanding the distinctive features of such images is going to be essential for us to be able to probe the nature of the astrophysical objects out there.

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