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Observational properties of bosonic stars at the galactic centre

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Pushed by a number of advances, electromagnetic observatories have now reached the horizon scale of supermassive black holes. The existence and properties of horizons in our universe is one of the outstanding fundamental issues that can now be addressed. Here we investigate the ability to discriminate between black holes and compact, horizonless objects, focusing on the lensing of hot spots and accretion disks around compact objects. We work in particular with boson and Proca stars as central objects, and show that the absence of a horizon gives rise to a characteristic feature – photons that plough through the central object and produce an extra image. This feature should be universal for central objects made of matter weakly coupled to the standard model.

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