



Black hole science in the 2020's

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Abstract

With the detection of gravitational waves from black hole mergers and the first image of a black hole on event horizon scales, we are now entering a new phase in the study of these enigmatic objects. While the past century was the century of particle physics, we may now enter into a century of spacetime physics. We no longer ask questions whether black holes exist, but what type of black holes are these? How do they operate on the smallest and the largest scales? Are there any violations from the predictions of General Relativity? An armada of telescopes at different wavelengths will help us to bring black holes even more into the focus and surveys will map out the population of black holes comprehensively. Of particular importance for our understanding are advances in theoretical astrophysics. Numerical simulations already reproduce many aspects of black hole radiation from jets and disks. A further increase in computing power and more detailed physics will be key to correctly understand the wealth of data we expect from future observatories.