Yosifov, Alexander Y.

Aspects of semiclassical black holes: development and open problems. (English)

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Summary: The current work is a review, dedicated to the study of semiclassical aspects of black holes. We begin by briefly looking at the main statements of general relativity. We then consider the Schwarzschild, Kerr, and Reissner-Nordstrom black hole solutions and discuss their geometrical properties. Later, the thermodynamic nature of black holes is established. In light of this, we formulate the information loss problem and present the most promising approaches for addressing it with emphasis on introducing low-energy quantum corrections to the classical general relativity picture. Finally, in the context of multimessenger astronomy, we look at naked singularities as possible gravitational collapse endstates and their role in the unitarity of quantum mechanics and discuss their observational prospects.

MSC:

83-02 Research exposition (monographs, survey articles) pertaining to relativity and gravitational theory
83C57 Black holes
81Q20 Semiclassical techniques, including WKB and Maslov methods applied to problems in quantum theory

Full Text: DOI

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