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On Black Hole Configurations in Scalar-Tensor Theories

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Scalar-tensor theories predict the existence of many black hole and wormhole type solutions. In general, these solutions imply the violation of the energy conditions. For the black hole solutions other important features are the infinity area of the horizon hypersurface and the zero Hawking temperature. A scalar charge appears leading to violation of the cosmic censorship conjecture. However, the stability analysis of these configurations are ambiguous, since different methodologies seem to lead to contradictory results. The status of black hole configurations in scalar-tensor theories is revised. Some analysis are extended to K-essence models.