Contributed Talk

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Title: Black holes in the extended vector-tensor theories

Abstract: We investigate the static and spherically black hole solutions in the quadratic-order extended vector-tensor theories without suffering from the Ostrogradsky instabilities, which include the quartic-order (beyond-)generalized Proca theories as the subclass. We investigate the two classes of black hole solutions, for constant and nonconstant norms of the vector field, respectively. In the first case, we obtain the black hole solutions with the Schwarzschild, Schwarzschild-de Sitter/ anti-de Sitter, Reissner-Nordstr\"{o}m-type, and Reissner-Nordstr\"{o}m-de Sitter/ anti-de Sitter-type metrics. We show that the conditions for the existence of these solutions are compatible with the degeneracy conditions for the Class-A theories, and recover the black hole solutions in the generalized Proca and degenerate higher-order scalar-tensor theories in the certain limits. In the latter case, we obtain a variety of the black hole solutions with various asymptotic properties. We also argue the implication of these solutions for stability and strong coupling problems.