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Title: Black holes in extended vector-tensor theories

Abstract: We investigate the static and spherically black hole solutions in the extended vectortensor theories without suffering from the Ostrogradsky instabilities. 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-Nordström-type, and Reissner-Nordström-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.