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Black Hole Solutions in Non-Minimally Coupled Weyl Connection Gravity

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Schwarzschild and Reissner-Nordstrøm black hole solutions are found in the context of a non-minimal matter-curvature coupling with the Weyl connection, both in vacuum and in the presence of a cosmological constant-like matter content. This special case of non-metricity leads to black hole solutions with non-vanishing scalar curvature. Moreover, vacuum Schwarzschild solutions differ from the ones from a constant curvature scenario in f (R) theories with the appearance of a coefficient in the term linear in r and a corrected "cosmological constant". Non-vacuum Shwarzschild solutions have formally the same solutions as in the previous case with the exception being the physical interpretation of a cosmological constant as the source of the matter Lagrangian as not a simple reparametrization of the f (R) description. Reissner-Nordstrøm solutions cannot be found in vacuum, but only in the presence of matter fields, such that the solutions also differ from the constant curvature scenario in f (R) theories by the term linear in r and corrected/dressed charge and cosmological constant.

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