Abstract

In this talk, I will present a general formulation for calculating conserved charges associated with exact symmetries in the context of covariant gravitational theories. The method is based on ``covariant phase space method''. Introducing the notion of ``solution phase space'', which is the phase space built by family of solutions parametrized by some parameters, one can calculate the mass, angular momentum, and electric charge etc, in a single formulation, for general family of solutions (including black holes), in any dimension, and with any asymptotics. Moreover, the codimension-2 surfaces of integration are almost relaxed to be chosen arbitrarily. At the end, I will apply the formulation to find conserved charges and first law(s) of thermodynamics for the Kerr-dS black holes, unifying them with the Kerr and Kerr-AdS black holes.

Refs. for more details: "Phys.Rev. D93 (2016), 4, 044074, arXiv:1512.05584" and "arXiv:1602.05575".