Supertranslations Call for Superrotations

Glenn Barnich[a,*] and Cédric Troessaert[b]
Physique Théorique et Mathématique
Université Libre de Bruxelles and International Solvay Institutes
Campus Plaine C.P. 231, B-1050 Bruxelles, Belgium
[a]Research Director of the Fund for Scientific Research-FNRS
[b] Research Fellow of the Fund for Scientific Research-FNRS
gbarnich@ulb.ac.be and ctroessa@ulb.ac.be

Abstract

We review recent results on symmetries of asymptotically flat spacetimes at null infinity. In higher dimensions, the symmetry algebra realizes the Poincaré algebra. In three and four dimensions, besides the infinitesimal supertranslations that have been known since the sixties, the algebras are evenly balanced because there are also infinitesimal superrotations. We provide the classification of central extensions of $\mathfrak{bms}_3$ and $\mathfrak{bms}_4$. Applications and consequences as well as directions for future work are briefly indicated.