

Holographic Derivation of BMS Flux-Balance Laws

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The main challenges in formulating a holographic correspondence for asymptotically flat spacetimes stem from the null nature of the conformal boundary and the non-conservation of gravitational charges in the presence of bulk radiation. In this talk, I will present the systematic and mathematically robust approach to understanding and deriving the associated flux-balance laws from geometric principles defined intrinsically at the boundary. I will begin by reviewing key aspects of the geometry at null infinity, known as conformal Carroll geometry. I will highlight that the boundary affine connections contain degrees of freedom that naturally act as sources encoding radiation in a holographic framework. I will then derive flux-balance laws for an effective field theory formulated at the boundary, using novel techniques that introduce “hypermomenta” as the responses to fluctuations in the boundary connection. These equations reproduce the celebrated BMS flux-balance laws in a convenient boundary gauge. Based on arxiv:2505.00077 in collaboration with S. Pekar, P. Marios Petropoulos and M. Vilatte.

Orateur: FIORUCCI, Adrien