





Conservation Laws \rightarrow Symmetries

$$[G_{\epsilon}^{\dagger}, A_B]_{\text{gr}} = i \partial_B \epsilon$$

are "large gauge transformations" that go to angle-dependent constants at null infinity. They act non-trivially on physical states & can be measured via the electromagnetic memory effect: EM analog of well-known gravitational memory effect.

Bieri, Garfinkle gr-qc 1307.5098
 Pasterski hep-th 1505.00716
 Susskind hep-th 1507.02584