

# Conserved charges for gravity with locally anti-de sitter asymptotics

Aros, Rodrigo

Contreras, Mauricio

Olea, Rodrigo

Troncoso, Ricardo

Zanelli, Jorge

A new formula for the conserved charges in 3+1 gravity for spacetimes with local anti-de Sitter asymptotic geometry is proposed. It is shown that requiring the action to have an extremum for this class of asymptotia sets the boundary term that must be added to the Lagrangian as the Euler density with a fixed weight factor. The resulting action gives rise to the mass and angular momentum as Noether charges associated to the asymptotic Killing vectors without requiring specification of a reference background in order to have a convergent expression. A consequence of this definition is that any negative constant curvature spacetime has vanishing Noether charges. These results remain valid in the  $\Lambda = 0$  limit. © 2000 American Physical Society.