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Theory: Carrollian and Galilean limits of deformed symmetries in 3D gravity

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Non-Lorentzian kinematical symmetries, especially the ones corresponding to the Galilei or Carroll relativistic limits (i.e., the speed of light taken to infinity or to zero), are nowadays the subject of vigorous investigations. This also concerns (quantum) deformations of such symmetries, described in the formalism of Lie bialgebras and Hopf algebras. The case of 2+1-dimensional spacetime is of particular interest due to the emergence of deformed symmetries already in the classical theory of gravity. Based on the complete classification of deformations of (2+1)d spacetime isometry algebras, one may derive their Carrollian and Galilean counterparts. In fact, all quantum deformations of (anti-)de Sitter-Carroll algebra are easily obtained via its well-known isomorphism with either Poincaré or Euclidean algebra, while quantum contractions from the (anti-)de Sitter to (anti-)de Sitter-Carroll case lead to (almost) the same results. The analogous contractions from the (anti-)de Sitter to (anti-)de Sitter-Galilei case provide a variety of (or possibly all) coboundary deformations of (anti-)de Sitter-Galilei algebra. Finally, Carrollian and Galilean contractions of deformations of Poincaré algebra lead to coboundary deformations of Carroll and Galilei algebras, which can also be recovered via contractions in the limit of vanishing cosmological constant.

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