

Newtonian and Carrollian limits of gravity theories in the first order formalism

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In this video, I will talk about a work I did when I was an undergraduate student in physics at Federal Fluminense University (UFF). This work led to two papers, that are available online on the links:

First: <https://dx.doi.org/10.1007/JHEP03%282021%29104>

Second: <https://arxiv.org/abs/2107.10129v3>

We considered the non-relativistic (NR) and the ultra-relativistic (UR) limits of the four-dimensional Mardones-Zanelli action. This provided a generalization of the Newtonian and the Carrollian theories known in literature, that usually have its dynamics described by the NR and the UR limits of the Einstein-Hilbert action. Allowing torsion terms to enter in the action, we found some interesting results. For example, in the NR limit we were able to completely determine the boost connection by solving the new field equations, in contrast to the old ones that didn't provide any information about this field; we also obtained conditions for which we can define the Newtonian absolute time in this new theory. In the UR limit, we found almost general solutions in the presence of matter and were able to prove the validity of Birkhoff's theorem in this limit. The full list of the results are available on the papers.

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