Contribution ID: **1000** Type: **Talk in the parallel session**

Perfect Fluid Warp Drive Solutions with the Cosmological Constant

Wednesday, 7 July 2021 08:00 (15 minutes)

This is the fourth paper of a series where we examine solutions of the Einstein equations with the Alcubierre warp drive geometry having different matter and field sources (Santos-Pereira et al. 2020, 2021; Refs. [1–3]). The Alcubierre metric describes a spacetime geometry that allows a massive particle inside a spacetime distortion, called warp bubble, to travel with superluminal global velocities. In this work we advance solutions of the Einstein equations with the cosmological constant for the Alcubierre warp drive metric having the perfect fluid as source. We also considered the particular case of non interacting particles content, or dust, with the cosmological constant, which generalizes our previous dust solution [1] which led to vacuum solutions connecting the warp drive with shock waves via the Burgers equation. The energy conditions for these cases were also
analyzed. The results show that the shift vector in the direction of the warp bubble motion creates a coupling in the Einstein equations that requires off-diagonal terms in the energy-momentum source. Therefore, it seems that to achieve superluminal speeds by means of the Alcubierre warp drive spacetime geometry may require a complex source configuration and distribution of energy, matter and momentum in order to produce a warp drive bubble. In addition, warp speeds seem to require more complex forms of matter than dust for stable solutions and that the negative matter might not be a strict requirement to achieve global superluminal speeds.

Primary author: SANTOS PEREIRA, Osvaldo Luiz (Universidade Federal do Rio de Janeiro)

Presenter: SANTOS PEREIRA, Osvaldo Luiz (Universidade Federal do Rio de Janeiro)

Session Classification: Wormholes, Energy Conditions and Time Machines

Track Classification: Alternative Theories: Wormholes, Energy Conditions and Time Machines