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## Exact rotating wormholes via Ehlers transformations

In this paper, we construct exact rotating wormholes using the Ehlers solution-generating technique. This is based on the Ernst description of four-dimensional, stationary, and axially symmetric solutions of the Einstein-Maxwell theory. We adopt the static Barceló-Visser wormhole derived from the Einstein-Maxwell-conformal-scalar theory as a seed and demonstrate, through the Ernst approach, how to construct two novel geometries of rotating wormholes. These geometries correspond to the Barceló-Visser wormhole embedded within a rotating and a magnetic background. In the first case, the rotation is a result of a dragging force (due to the rotating background) acting on the initial static wormhole, while in the second case, it is caused by the electromagnetic interaction between the electric charge of the static wormhole and the external magnetic field. We conduct a comprehensive analysis of the geometric properties of these configurations and examine the new features introduced by rotation, such as the emergence of ergoregions. Recent evidence suggests that incorporating slow rotation can stabilize wormholes, rendering these exact, fully rotating solutions particularly appealing.

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