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Potentially observable cylindrical wormholes without exotic matter in general relativity

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All known solutions in GR describing rotating cylindrical wormholes lack asymptotic flatness in the radial directions and thus cannot describe wormhole entrances as local objects in our Universe. To overcome this difficulty, wormhole solutions are joined to flat asymptotic regions at some cylindrical surfaces on both sides of the throat. The whole configuration thus consists of three regions, the internal one containing a wormhole throat, and two flat external ones. It remains to find such solutions where the matter content of the internal region and both junction surfaces respect the weak energy condition. Two examples of such configurations have been found, in one of which the internal matter is represented by a stiff perfect fluid and another one with a special kind of anisotropic fluid. In both examples, the resulting configurations do not contain closed timelike curves.

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