

Topological geons with self-gravitating phantom scalar field

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A topological geon is the quotient manifold M/Z_2 where M is a static spherically symmetric wormhole having the reflectional symmetry with respect to its throat. We classify the space of such asymptotically flat solutions of the Einstein-Klein-Gordon equations according to the form of the time-time metric function by using the quadrature formulas of the so-called inverse problem for self-gravitating spherically symmetric scalar fields. In particular, at the first (asymptotical) level of the classification, the Ellis solution separates all geon spacetimes into two classes. We also study possible observable effects associated with geodesic motion near various topological geons.

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