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Title:	The Classical and Quantum Analysis of Traversable Wormholes
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Abstract:	The Einstein-Rosen bridge or the Schwarzschild wormhole indicates the idea of remov- ing singularity in classical field theory by transforming the Schwarzschild metric into an Einstein-Rosen coordinate, which indicates exclusion of the interior Schwarzschild region and gluing two identical copies of the exterior Schwarzschild region. But the Einstein- Rosen bridge does not satisfy the traversability condition. Morris and Thorne developed the metric of traversable wormhole for the first time. We have considered the simpliest class of Schwarzschild-like traversable wormholes and found that the Pseudo-Newtonain potential is being modified with respect to the Schwarzschild non-traversable wormholes. In Einstein's gravity, the geometry part indicates the violation of classical energy condi- tions. But in a certain class of f (R) theories of gravity with f (R) = R + αR 2n , we found that the geometry satisfies the energy conditions and that indicates the existence of a clas- sical traversable wormhole in f (R) gravity. To explain the violation of energy conditions in Einstein's gravity, we have considered a real scalar field as the source. The energy con- ditions restricted the possibilities within certain range of the scalar field, which can source the geometry. We have done similar analysis with the metric in f (R) gravity and restricted the scalar field along with the parameters in f (R) theories.
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