A New Spin on the Hole Argument

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Abstract

This brief paper shows how an exact analogue of Einstein's original hole argument can be constructed in the loop representation of quantum gravity. The new argument is based on the embedding of spin-networks in a manifold and the action of the diffeomorphism constraint on them. The implications of this result are then discussed. I argue that the conclusions of many physicists working on loop quantum gravity---Rovelli and Smolin in particular---that the loop representation uniquely supports relationalism are unfounded.

Keywords:	Hole argument, quantum gravity, spacetime, general relativity
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