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Holographic maps from quantum gravity states as tensor networks

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We define bulk-to-boundary maps corresponding to quantum gravity states in the tensorial group field theory formalism, for quantum geometric models sharing the same type of quantum states of loop quantum gravity. The maps are defined in terms of a partition of the quantum geometric data associated to an open graph into bulk and boundary ones, in the spin representation. After showing that such maps formally correspond to tensor networks (quantum information structures that efficiently encode entanglement in many-body systems), we determine the general condition on the entanglement structure of the state that makes the bulk-to-boundary map isometric (a necessary condition for holographic behaviour), and we analyse different types of quantum states, identifying those that define isometric bulk-to-boundary maps.

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