Bulk Reconstruction of the Code Subspace

Sebastian Fischetti *

fischetti@physics.mcgill.ca

In AdS/CFT, insights from quantum error correction have led to a clear understanding of how to build (approximately) local bulk operators on a fixed background geometry in terms of the operator algebra of the boundary. A full bulk reconstruction, however, requires recovering the bulk geometry and its properties in addition to just these local fields on it. I will discuss aspects of such a reconstruction using ideas from subregion/subregion duality. Specifically, I will provide (i) a uniqueness result which states that for a four-dimensional bulk, second variations of the entanglement entropy of boundary regions are sufficient to uniquely determine the bulk metric wherever the corresponding HRT surfaces reach; and (ii) constructive results which enforce general nonlocal constraints on any emergence bulk geometry, including the familiar quantum focusing conjecture and generalized second law (for spacetimes which are a small perturbation away from pure AdS) and novel constraints on generic spacetimes.

*Department of Physics, McGill University, 3600 Rue University, Montreal, QC H3A 2T8, CANADA