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Measurement-induced state updates in holography

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Detector-based measurements in QFT describe how information about a quantum field's state can be extracted through a non-relativistic system moving in spacetime. This way, the standard quantum measurement postulate can be extended to QFT. The postulate consists of two parts: the Born rule, which relates outcomes to the probability of their occurrence, and the Lüders rule, which prescribes how states update upon measurement. The latter implies that measuring a quantum field induces a state update consistent with the observed outcome. In this talk, we propose that — when the field lives on the conformal boundary of a semi-classical AdS spacetime and the measurement is interpreted holographically — the Lüders rule corresponds to an update of the bulk dual, affecting the semi-classical degrees of freedom in a way consistent with the measurement outcome. Then, we present the features of this update and propose a new entry in the holographic dictionary, relating the information extracted by the measurement to semi-classical parameters characterizing the updated bulk state.

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