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The structure of preserved information in quantum processes HUI KHOON NG, Caltech, ROBIN BLUME-KOHOUT, Perimeter Institute, DAVID POULIN, Caltech, LORENZA VIOLA, Dartmouth College — We present a general operational framework for characterizing the types of information that can be preserved by a quantum process. We demonstrate that *information preserving structures* (IPS) – encompassing noiseless subsystems, decoherence-free subspaces, pointer bases, and error-correcting codes – are isometric to fixed points of unital quantum processes. This implies that every IPS is a matrix algebra. A structure theorem for fixed points of an arbitrary process further provides a simple and efficient algorithm for finding all noiseless and unitarily noiseless IPS for any quantum process. This framework can be extended to study the structure of approximately preserved information.

Hui Khoon Ng
Caltech

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