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Information Fragility or Robustness of Quantum States and Processes

How quickly can weak noise destroy information in a quantum system? Several forms of this question can be phrased in terms of the ratio between initial and decayed quantum relative entropy. We consider relevant analytic properties of relative entropy, including how it relates to positive semidefinite order and von Neumann algebra inclusion indices. We emphasize regimes of extremely fast or slow decay, including when non-classical features enable such extremes.