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Experimental Information Tradeoffs: Weak Measurement, Uncertainty Relationships, et alia

Tradeoffs in measurement and information are one of the central themes of quantum mechanics. I will try to summarize in this talk a few of our experiments related to modern views of these topics. In particular, I will try to give an example or two of the power of “weak measurements,” both for fundamental physics and for possible precision metrology. One example will involve revisiting the question of Heisenberg’s famous principle, and an interpretation which is widespread but has now been experimentally shown to be incorrect. Then I will also discuss ongoing work on a “quantum data compression” protocol which would allow a small-scale quantum memory to store all the extractable information from a larger ensemble of identically prepared systems.

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