

DIRECT MEASUREMENT: FROM THE WAVEFUNCTION TO THE KIRKWOOD-DIRAC DISTRIBUTION

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Quantum Tomography is indirect in the sense that it infers the wavefunction from a disparate set of measurements. In contrast, using the method of Direct Measurement one can observe the wavefunction in such a way that its real and imaginary components appear straight on our measurement apparatus. In turn, this method functions as a simple operational definition of the wavefunction. At the heart of the method is a joint measurement of complementary observables, such as position X and momentum P . This is made possible using weak measurement. I will describe our original experiment in which we measured the transverse spatial wavefunction of a single photon. I will then review work from various labs around the world that built upon Direct Measurement and applied it to a high-dimensional systems, neutrons, nuclei, detectors, and quantum processes.