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Physical randomness sources for loophole-free Bell tests MORGAN W. MITCHELL, ICFO - The Institute of Photonic Sciences — We describe the strategy and physics used to select unpredictable measurement settings in the loophole-free Bell tests reported in [Hensen et al. Nature 2015, Giustina et al. PRL 2015, and Shalm et al. PRL 2015]. We demonstrate direct measurements of laser phase diffusion, a process driven by spontaneous emission, rigorous bounds on the effect of other, less-trusted contributions, and exponential predictability reduction by randomness extraction. As required for the cited experiments, we show the six-sigma bound for the predictability of the basis choices is below 0.001%. C. Abellan et al, PRL 2015.

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