

Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Generation of fresh and pure random numbers for loophole-free Bell tests MORGAN MITCHELL, CARLOS ABELLAN, WALDIMAR AMAYA, DANIEL MITRANI, VALERIO PRUNERI, ICFO - The Institute of Photonic Sciences — We describe the physical randomness generation strategy used in the loophole-free Bell tests of 2015 [Hensen et al., *Nature (London)* 526, 682 (2015); Giustina et al., *Phys. Rev. Lett.* 115, 250401 (2015); Shalm et al., *Phys. Rev. Lett.* 115, 250402 (2015)]. A system consisting of telecommunications lasers, detectors, interferometry, and fast analog and digital electronics produces analog signals with a large contribution traceable to spontaneous emission events, and bounded contribution from all other sources. Fast parity-bit randomness extraction is used to produce output bits with excess predictability below 10^5 due to spontaneous-emission events less than 36 ns in the past. This randomness generation strategy satisfies for the first time the stringent requirements identified in modern statistical analyses of loophole-free Bell tests.

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Date submitted: 22 Nov 2016

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