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Quantum random number generation using an on-chip linear plasmonic beamsplitter

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True random numbers are ubiquitous in cryptography, simulation and many other information processing tasks. Here we experimentally demonstrate quantum random number generation with an on-chip linear plasmonic beamsplitter. The beamsplitter has a footprint of 2μm x 10μm and is more compact than a previous demonstration, with a reduction in size by a factor of 2, thereby reducing the impact of loss. At the input grating of the beamsplitter, free-space single photons are converted into single surface plasmon polaritons which propagate along one of two gold stripe waveguides to one of two output gratings where they are converted back into photons. The value of each random bit is determined by the output at which each photon is detected. In our experiment, we achieved a random number generation rate of 2.86 Mbits/s, despite the presence of loss. By applying randomness extraction in the form of a deterministic shuffle followed by the recursive von Neumann algorithm to the generated bits, we obtained a sample of bits which passed the ENT and NIST Statistical Test Suites.

Apply to be considered for a student ; award (Yes / No)?

Yes

Level for award;(Hons, MSc, PhD, N/A)?

PhD

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