

# Researchers build the fastest laser-based random number generator

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A team of international scientists has developed a laser that can generate 254 trillion random digits per second, more than a hundred times faster than computer-based random number generators (RNG).

Though random number generation has been around for thousands of years, it is increasingly important in computing as it forms the basis of cryptography. With more devices online than ever before, the need for faster encryption that can keep out bad actors has become more crucial. In a sign of the prevailing need for RNGs in modern technology, Google showcased the apparent supremacy of its 53-qubit quantum computer using an RNG problem.

That's why the new system could be a game-changer: It can generate 250 terabytes of random bits per second. In fact, it was so fast that the

team behind it struggled to record its output using a high-speed camera. According to the researchers, their system trumps physical random number generators both in speed and through its ability to create many bitstreams simultaneously. The results are published in the journal *Science*

The new invention utilizes a tiny laser, just one millimeter long, which bounces light between mirrors positioned at either end of an hourglass-shaped cavity before exiting the device, reports *Science News*. Unlike previous laser-based systems, the new process can amplify many optical modes simultaneously.

These interfere with each other to generate rapid intensity fluctuations that the team recorded with a camera, which measured light intensity at 254 spots across the beam about every trillionth of a second. But the speed at which the laser was pumping out data meant the camera could only track it for a couple of nanoseconds before its memory filled up, after which the data was uploaded to a computer.

The random generator system was jointly developed by researchers from Nanyang Technological University, Singapore (NTU Singapore), Yale University, and Trinity College Dublin, and made in NTU. As for

the system's future, the team aim to make it ready for practical use by incorporating the laser into a compact chip. This will enable the random numbers it generates to be fed directly into computer.