

Fastest random number generator: Sounds of silence proving a hit

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Random number generator.

(Phys.org) -- Researchers at The Australian National University have developed the fastest random number generator in the world by listening to the 'sounds of silence'.

The researchers – Professor Ping Koy Lam, Dr Thomas Symul and Dr Syed Assad from the ANU ARC Centre of Excellence for Quantum Computation and Communication Technology – have tuned their very sensitive light detectors to listen to vacuum – a region of space that is empty.

Professor Lam said vacuum was once thought to be completely empty, dark, and silent until the discovery of the modern quantum theory. Since then scientists have discovered that vacuum is an extent of space that has

virtual sub-atomic particles spontaneously appearing and disappearing.

It is the presence of these virtual particles that give rise to random noise. This ‘vacuum noise’ is omnipresent and may affect and ultimately pose a limit to the performances of fibre optic communication, radio broadcasts and computer operation.

“While it has always been thought to be an annoyance that engineers and scientists would like to circumvent, we instead exploited this vacuum noise and used it to generate random numbers,” Professor Lam said.

“Random number generation has many uses in information technology. Global climate prediction, air traffic control, electronic gaming, encryption, and various types of computer modelling all rely on the availability of unbiased, truly random numbers.

“To date, most random number generators are based on computer algorithms. Although computer generated random numbers can be useful, knowing the input conditions to the algorithm will lead to predictable and reproducible output, thus making the numbers not truly random. To overcome this issue, [random number](#) generators relying on inherently random physical processes, such as radioactive decay and chaotic behaviour in circuits, have been developed.”

Dr Thomas Symul added: “Vacuum noise is one of the ultimate sources of randomness because it is intrinsically broadband and its unpredictability is guaranteed by quantum theory. Because of this, we are able to generate billions of random numbers every second.”

Dr Syed Assad said the team has linked their table-top laser experiment directly to the internet. “We can easily push this technology even faster but currently we have already reached the capacity of our Internet connection,” he said.

The [random number generator](http://photonics.anu.edu.au/qoptics/Research/qrng.php) is online and can be accessed at <http://photonics.anu.edu.au/qoptics/Research/qrng.php>. Moreover, anyone who downloaded live random numbers from the ANU website will get a fresh and unique sequence of numbers that is different from all other users.

In collaboration with QuintessenceLabs, an Australian quantum technology company, the ANU team is now looking into commercialising this device. The team hopes to have this technology miniaturised down to the size of a thumb drive.

Provided by Australian National University

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