

Researchers test speed of light with greater precision than before

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Researchers from The University of Western Australia and Humboldt University of Berlin have completed testing that has effectively measured the spatial consistency of the speed of light with a precision ten times greater than ever before.

The stringent testing also confirmed a core component of Einstein's theory of Relativity known as 'Lorentz [symmetry](#),' which predicts that the [speed of light](#) is the same in all directions.

The experiment compared the extremely pure microwave frequency signals from two cryogenic sapphire oscillators against each other over the course of a year.

UWA Researcher Stephen Parker from the Frequency and Quantum Metrology Research Group at the School of Physics said the experiment placed the microwave oscillators perpendicular to each other and rotated them on a turntable once every 100 seconds for a year.

"The frequency of the microwave signals directly linked to the speed of light," Dr Parker said.

"If this were to change depending on the direction it was facing it would indicate that Lorentz symmetry had been violated. But the frequencies didn't even change down to the 18th digit (the smallest part of the measurement of frequency), which is remarkable that this symmetry of nature still holds true at such tiny levels."

Dr Parker said the research team were in the process of upgrading their experiment and incorporating new optical [light](#) sources which would open up possibilities for future research.

"This will allow us to improve the sensitivity of our work and explore other ways that Lorentz symmetry could be broken," he said.

"Searching for possible violations of Lorentz symmetry will provide valuable clues for a more comprehensive and unified theory."

The research has been published in *Nature Communications*.

More information: "Direct terrestrial test of Lorentz symmetry in electrodynamics to 10^{-18} " *Nature Communications* 6, Article number: 8174 [DOI: 10.1038/ncomms9174](https://doi.org/10.1038/ncomms9174)

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