

# Scientists obtain ground-breaking measurements using infrared light

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(Phys.org) —Scientists at the Canadian Light Source (CLS) have obtained high-resolution measurements in the infrared spectrum that could change the way research is conducted using synchrotron light.

CLS Spectroscopist Brant Billinghamurst said he and his colleagues were working on methods to produce intense [terahertz radiation](#) (at the far end of the [infrared spectrum](#)) while conducting research on the Far-IR beamline, an experimental station at the CLS.

The research was recently published under the name "Observation of superradiant [synchrotron](#) radiation in the terahertz region" in *Physical Review Special Topics - Accelerators and Beams*.

Billinghamurst said they tried something unusual with the synchrotron that allowed them the first time to make a high-resolution measurement of superradiant [synchrotron radiation](#).

"For this technique to work, you need a synchrotron, electrons in small bunches, and stable beam. So, it's very specific," said Billinghamurst.

Unlike the high-energy photons needed for experiments using X-rays, the techniques used in the infrared region benefit from turning the synchrotron energy way down, to 1.5 GeV, making it possible for the technique to work.

Billinghamurst pointed out that the idea for synchrotron superradiance

appears in a definitive textbook, *Classical Electrodynamics*, by physicist John David Jackson, in 1962, but that no one had actually reported high-resolution results until now.

These findings have some interesting implications and could allow for spectroscopy in the Terahertz region at higher resolution than is currently feasible. This discovery could have implications for research at synchrotrons around the world. However, there are a number of technical issues that would have to be solved before this would be possible, said Billighurst.

The infrared spectrum is used for a number of experiments at the CLS, including better understanding of the materials that compose the universe.

**More information:** *Physical Review Special Topics*: [prst-ab.aps.org/abstract/PRSTAB/v16/i6/e060702](https://prst-ab.aps.org/abstract/PRSTAB/v16/i6/e060702)

Provided by Canadian Light Source

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