

Free-Electron Laser goes over the rainbow

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Terahertz Spectrum

Somewhere over the rainbow of visible light is an untapped goldmine of research potential, where energy sources, novel materials and environmental research are possible. That goldmine may soon be open to researchers using the Free-Electron Laser at DOE's Jefferson Lab.

In August, the FEL delivered more than 50 watts of [ultraviolet light](#), opening a new band of the [electromagnetic spectrum](#) for experiments.

The spectrum comprises all the colors of light separated into bands by wavelength. The FEL was originally commissioned as an [infrared laser](#) and is also a prolific source of terahertz light at long wavelengths. Just above these is the visible band: the familiar rainbow consisting of red, orange, yellow, green, blue, indigo, and violet. On the shorter side of the visible is ultraviolet.

Many research applications will benefit from the ultrafast pulses of ultraviolet light that the FEL can deliver at the wavelength of 124 nanometers (10 eV photon energy). While current sources of this wavelength of light are severely limited, it is highly prized for its

potential science and technology development applications, including use as a dating method for samples that are beyond the reach of carbon-14 dating and studying the structure of novel materials, such as high-temperature superconductors.

FEL operators are currently testing the FEL's capabilities and are working to transmit the light to specially equipped labs for experiment.

Provided by US Department of Energy

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