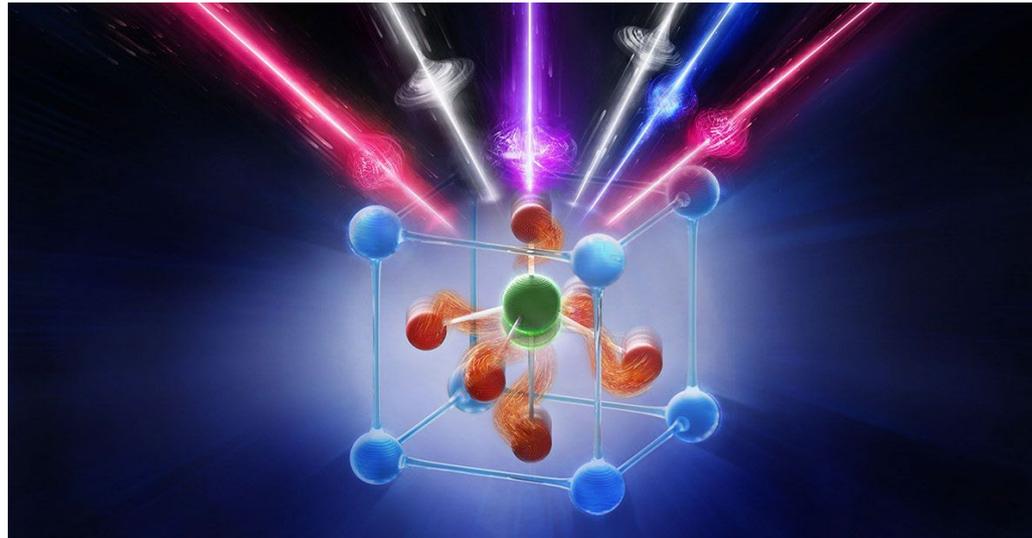


Light-Controlled Ferroelectrics Could Revolutionize Future Electronics

- European XFEL has unveiled a new way to manipulate the properties of ferroelectric materials using light, achieving control on ultrafast timescales.
- The breakthrough points to a future where memory devices and electronic components could become dramatically faster and more energy-efficient.

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Using the exceptionally bright and intense X-ray flashes of European XFEL, together with optical lasers, researchers at the SCS instrument tracked changes in barium titanate's ferroelectric polarization, lattice structure and electronic state under the same experimental conditions - and with a temporal resolution of just 90 femtoseconds. Just 350 femtoseconds after excitation by the laser, the polarization had already changed significantly - without the crystal lattice having had time to vary notably. This decoupling opens up new possibilities for designing future electronic components (blue spheres: Ba atoms green sphere: Ti atom red spheres: O atoms red beam: 800 nm optical laser gray beam: XFEL beam violet beam: 266 nm pump optical laser blue beam: 400 nm optical laser (blue spheres: Ba atoms; green sphere: Ti atom; red spheres: O atoms; red beam: 800 nm optical laser; grey beam: XFEL beam; violet beam: 266 nm pump optical laser; blue beam: 400 nm optical laser (second harmonic generation))). Illustration. ©European XFEL/Tobias Wüstefeld