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**Three-dimensional charge density wave order in YBCO at high magnetic field**

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Charge density wave (CDW) correlations have been shown to universally exist in cuprate superconductors. However, their nature at high magnetic fields, *e.g.*inferred from nuclear magnetic resonance, Hall coefficient, and sound velocity measurements, is distinct from that measured by x-ray scattering at zero and low fields. In this talk, I will discuss our recent experiment which combines a pulsed magnet with an x-ray free electron laser to characterize the CDW in $YBa_2Cu_3O_{6.67}$ via x-ray scattering in fields up to 28 Tesla. While the zero-field CDW order, which develops below ˜150 K, is essentially two dimensional, a three-dimensionally ordered CDW emerges at magnetic fields beyond 15 Tesla and at temperatures below the zero-field superconducting transition temperature. While the two CDW arrange differently along the c-axis, they share the same incommensurate periodicity in the $CuO_2$ plane. Our observations imply that the two forms of CDW and high-temperature superconductivity are intimately linked.