

PHYSICS AND ASTRONOMY COLLOQUIUM

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Using Coherent X-rays to Study Structure and Dynamics of Complex Materials

Over the past two decades, there have been revolutionary advances in x-ray sources that have resulted in dramatic increases in the available flux of coherent x-rays. This has made possible two new techniques for studying the structure and dynamics of materials on nanometer length scales. A new approach to x-ray crystallography, known as Coherent Diffractive Imaging, or CDI, can provide images of the physical, chemical, and magnetic structure, as well as strain fields, of materials with nanoscale resolution. The new technique of X-ray Photon Correlation Spectroscopy (XPCS) enables the measurement of slow, nanoscale fluctuations not accessible with other probes. Both CDI and XPCS are applicable to a wide range of condensed matter and materials systems, at both surfaces and in the bulk, in nanostructures, and in biological systems. In this talk, the basis of CDI and XPCS, recent progress in applying them to study a variety of problems, and prospects for continued advances are discussed.



THURSDAY, NOVEMBER 12, 2015 | 4:00 PM | HAWKING AUDITORIUM



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