CSU PHYSICS COLLOQUIUM

"Coherent X-ray studies of phase transition dynamics"

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120 Engineering (Hammond Auditorium)

Abstract

The greatly increased brightness of synchrotron hard X-ray sources has enabled a new set of experimental methods using coherent X-ray beams. One of these, X-ray photon correlation spectroscopy (XPCS), is sensitive to structural dynamics on length scales down to the atomic scale. I will illustrate the technique with results from two recent studies of dynamics during phase transitions: equilibrium critical fluctuations in a complex liquid [1], and non-equilibrium surface island nucleation during layer-by-layer crystal growth [2]. Continuing upgrades to synchrotron sources promise to make XPCS studies possible for an ever-widening range of materials processes.

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Biography

Brian Stephenson is an Argonne Distinguished Fellow in the Materials Science Division of Argonne National Laboratory. He has previously served as Director of the Advanced Photon Source and Associate Laboratory Director at Argonne, and as a staff member in the IBM Research Division. He received his Ph.D. in Materials Science from Stanford University and S.M. and S.B. in Materials Science from the Massachusetts Institute of Technology. He has received an R&D 100 Award, is a Fellow of the American Physical Society, and has co-authored more than 190 publications and 4 patents.

[1] D. Sheyfer, Q. Zhang, J. Lal, T. Loeffler, E. M. Dufresne, A. R. Sandy, S. Narayanan, S.K.R.S. Sankaranarayanan, R. Szczygiel, P. Maj, L. Soderholm, M. R. Antonio, and G. B. Stephenson, Physical Review Letters 125, 125504 (2020).

[2] G. Ju, D. Xu, M. J. Highland, C. Thompson, H. Zhou, J. A. Eastman, P. H. Fuoss, P. Zapol, H. Kim, and G. B. Stephenson, Nature Physics 15, 589 (2019).