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White-beam micro Laue-diffraction with an undulator

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High-energy 3rd generation synchrotron sources offer unprecedented opportunities for the characterization of materials. Undulator sources in particular provide more than four orders of magnitude higher peak brilliance than 2nd generation sources which opens new scientific possibilities for the study of small sample volumes and weak scattering. In this talk we describe the use of undulator radiation for micro Laue diffraction on beamline 34-ID-E at the Advanced Photon Source. Both polychromatic microdiffraction tomography and related techniques are discussed and the essential instrumentation to make these experiments possible is described. The implications of the structured undulator spectra and current and future methods to best control this structure for various experiments are also discussed. Finally we speculate on specific strategies that may be possible at PETRA III for advanced characterization of small sample volumes in extreme environmental chambers and discuss undulator and instrumentation choices.

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