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Spatial structure of a focused x-ray beam diffracted from perfect crystals - what a "standard" microbeam diffraction experiment cannot see ALEXANDER KAZIMIROV, Cornell High Energy Synchrotron Source, Cornell University, Ithaca, USA, VICTOR KOHN, Russian Research Center "Kurchatov Institute," Moscow, Russia, ANATOLY SNIGIREV, IRINA SNIGIREVA, European Synchrotron Radiation Facility, Grenoble, France — An experimental setup with a high-resolution detector at the focus and a crystal between the focusing optics and the focus allows one to study the spatial structure of a focused beam diffracted from crystals [1]. Several interesting phenomenon are observed. First, the initially small focused beam is broadened inside the crystal due to extinction effect. Second, for a sufficiently thin crystal, in addition to the peak reflected from the front surface, a second peak is observed which corresponds to reflection from the back surface of the crystal. Third, the spatial structure changes remarkably as the crystal moves away from the Bragg condition and diffraction become kinematical [2]. The experiments were performed with refractive lenses and perfect thick and thin silicon crystals. The results help to understand the origin of the diffracted intensity in a "standard" microbeam diffraction experiment in which the detector is away from the focus and these features cannot be observed.

[1] Kohn&Kazimirov, Phys. Rev. B, 75 (2007) 224119;
[2] Kazimirov, *et al*, J. Synchrotron Radiation, 16 (2009) 666.

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