

Abstract Submitted
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Hanbury Brown and Twiss interferometry at a free-electron laser

ANDREJ SINGER¹, University of California, San Diego — Measurements of second- and higher-order intensity correlation functions (so-called Hanbury Brown-Twiss experiment) performed at the free-electron laser (FEL) FLASH in the non-linear regime of its operation are presented. We demonstrate the high transverse coherence properties of the FEL beam with a degree of transverse coherence of about 80% in the vertical direction and a degeneracy parameter on the order of 10^9 . Intensity correlation measurements in spatial and frequency domain yield an estimate of the FEL average pulse duration of 50 fs. These characteristics make the FEL similar to optical laser sources. Our measurements of the higher-order correlation functions indicate that FEL radiation obeys Gaussian statistics, which is characteristic to chaotic sources. A. Singer, U. Lorenz, F. Sorgenfrei, N. Gerasimova, J. Gulden, O. M. Yefanov, R. P. Kurta, A. Shabalin, R. Dronyak, R. Treusch, V. Kocharyan, E. Weckert, W. Wurth, and I. A. Vartanyants. *Phys. Rev. Lett.* **111**, 034802 (2013)

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