

# OPTICAL SYSTEM WITH IMAGE INTENSIFIER AND SPATIAL FILTERS FOR LARGE DYNAMIC RANGE TRANSVERSE BEAM PROFILE MEASUREMENTS

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## *Abstract*

We have previously reported<sup>1</sup> on transverse beam profile measurements where dynamic range (DR) was increase by a factor of 100 from typical 500 to about  $5.0 \times 10^4$ . It was shown that for non-equilibrium beam with non-Gaussian transverse distribution the RMS beam size can depend significantly on the DR used for calculations. Consequently, measured emittance and Twiss parameters depend on the DR as well. For the optical system used in <sup>1</sup> diffraction limits the DR at the level slightly above the  $5.0 \times 10^4$  used in measurements. For further increase of the DR spatial filters needs to be used in a way similar to original solar coronagraph<sup>2</sup> and its application to the synchrotron radiation measurements<sup>3</sup>. To increase overall sensitivity to allow large dynamic range measurements with low duty cycle tune-up beam, our systems includes an image intensifier. On contrary to a coronagraph-like scheme, where central bright part of the distribution is not measured, our systems is intended for simultaneous, complete distribution measurements including the bright core and low amplitude halo, which is needed for proper beam size measurements. Here design considerations for the system are presented.

**CONTRIBUTION NOT RECEIVED**

<sup>1</sup>P. Evtushenko et al., in Proceedings of FEL2012

<sup>2</sup>B. F. Lyot, Month. Notice Roy. Ast. Soc, p580, 99 (1939)

<sup>3</sup>T. Mitsuhashi, "Beam halo observation by coronagraph", Proceedings of DIPAC05