

An analytic random-walk model for the comb coherence

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(Dated: March 12, 2018)

We present an analytical study of the frequency comb coherence due to a random noise in the pulses phases. This kind of fluctuations, which cannot be actively controlled by any feedback system, imposes a stringent limit to the tooth linewidth of extreme ultraviolet (XUV) combs produced by high-order harmonic conversion, and was the subject of our experimental work [1]. Here we discuss a simple expression for the comb lineshape, which depends on a single parameter N_{eff} with the physical meaning of number of coherent comb pulses, inversely proportional to the variance of the phase jumps between subsequent comb pulses [2]. A comparison to the case of CW mono-mode laser with frequency fluctuations is also presented.

PACS numbers: 42.62.Eh, 42.65.Ky, 42.62.Fi

Keywords: frequency combs, phase noise, XUV spectroscopy, harmonic generation

[1] C. Corsi, I. Lontos, M. Bellini, S. Cavalieri, P. Cancio Pastor, M. Siciliani de Cumis, and R. Eramo. Ultimate limit in the spectral resolution of extreme ultraviolet frequency combs. *Phys. Rev. Lett.*, 118:143201, 2017.

[2] R. Eramo, P. Cancio Pastor, and S. Cavalieri. Analytic random-walk model for the comb coherence of a frequency comb. *Phys. Rev. A*, to be published 2018.