Photon flux Monte-Carlo estimations for linac-based laser-electron X-ray generators.

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The idea that laser beam Thomson scattering by relativistic electrons can be a route to X-ray generator to be used in medicine, science and industry appeared in nineties [1]. To increase X-ray yield laser beams can be stored in a cavity and reused. The electrons can be delivered by a linac or a cyclic accelerator. Early experimental study and applications of Thomson X-ray sources utilizing specially constructed linacs have been done by several groups [2-4]. Since then this research field considerably expanded. The efforts to build Thomson X-ray sources more efficient and appropriate for various applications are summarized in [5]. Such X-ray sources are expected to fill in the gap existing between conventional Roentgen tubes and large accelerator based facilities in respect of X-beam intensity, tunability, size, power supply, cost etc [6]. In this paper we present an approach to evaluation, design and conceptual choice of main components of linac-based laser-electron X-ray generators including lasers and photon storage device. The goal can be a multi-purpose facility as well as the one dedicated to definite application. In the latter case the X-ray photon flux in certain spectral and angular widths at a given sample area must be provided.

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