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Compton Sources of Electromagnetic Radiation

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When a relativistic electron beam interacts with a high-field laser beam, intense and highly collimated electromagnetic radiation will be generated through Compton scattering. Through relativistic upshifting and the relativistic Doppler effect, highly energetic polarized photons are radiated along the electron beam motion when the electrons interact with the laser light. For example, X-ray radiation can be obtained when optical lasers are scattered from electrons of tens-of-MeV beam energy. Because of the desirable properties of the radiation produced, many groups around the world have been designing, building, and utilizing Compton sources for a wide variety of purposes. In this review article, we discuss the generation and properties of the scattered radiation, the types of Compton source devices that have been constructed to date, and the prospects of radiation sources of this general type. Due to the possibilities of producing hard electromagnetic radiation in a device that is small compared to the alternative storage ring sources, it is foreseen that large numbers of such sources may be constructed in the future.

Keywords: Compton backscattering; inverse Compton source; Thomson scattering; X-rays; spectral brilliance

Cited by (5):

Nobuyuki Nishimori, Ryoji Nagai, Shunya Matsuba, Ryoichi Hajima, Masahiro Yamamoto, Tsukasa Miyajima, Yosuke Honda, Hokuto Iijima, Masao Kuriki, Makoto Kuwahara. (2013) Generation of a 500-keV electron beam from a high voltage photoemission gun. *Applied Physics Letters* **102**:23, 234103. Online publication date: 1-Jan-2013. [CrossRef]

A Paz, S Kuschel, C Rödel, M Schnell, O Jäckel, M C Kaluza, G G Paulus. (2012) Thomson backscattering from laser-generated, relativistically moving high-density electron layers. *New Journal of Physics* **14**:9, 093018. Online publication date: 1-Sep-2012. [CrossRef]

Charles E. Reece, Gianluigi Ciovati. (2012) Superconducting Radio-Frequency Technology R&D for Future Accelerator Applications. *Reviews of Accelerator Science and Technology* **05**, 285-312. Online publication date: 1-Jan-2012. [Abstract | PDF (3123 KB) | PDF Plus (618 KB)]

John M. J. Madey, Luis R. Elias, Eric B. Szarmes. (2012) Van de Graaf-based 13.5 nm inverse-Compton light source. *Journal of Micro/Nanolithography, MEMS and MOEMS* **11**:2, 021120. Online publication date: 1-Jan-2012. [CrossRef]

Toshiyuki Shizuma, Ryoichi Hajima, Takehito Hayakawa, Mamoru Fujiwara, Takashi Sonoda, Michio Seya. (2011) Proposal for an advanced hybrid K-edge/XRF densitometry (HKED) using a monochromatic photon beam from laser Compton scattering. *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment* **654**:1, 597-603. Online publication date: 1-Oct-2011. [CrossRef]