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Compton backscattering sources, high intensity lasers and non-linear QED phenomenology

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The development of intense laser sources and of accelerators, capable of providing medium energy high quality electron beams (e-b), has paved the way to the construction of X-ray sources, with significantly large brightness. Even though, the best performing X-ray beams are those provided by Synchrotron or FEL devices, the CBS's (Compton Backscattered Source) are becoming effective competitors in terms of versatility, easier maintenance and construction costs.
The turning point, determining the construction of lasers with intensities exceeding 10^20W/cm^2, has been the use of the Compression Pulse Amplification (CPA) technique, we are reporting the laser intensity evolution during the last decades. It is possible to conclude that the capabilities of this technology are sufficient to reach regions where copious photon backscattered fluxes and brightness can be reached, along with the possibility of observing effects where non-linear QED effects can be observed.
We make a general discussion on the physical aspects of high intensity laser and high energy electrons. We discuss the possibility of observing non-linear effects characterizing X-Ray Compton backscattering sources and multi-photon scattering processes (including pair productions and genuine QED effects associated with quantum vacuum engineering, like pair production).
We comment on the combined effects between high intensity laser and high energy electrons to "simulate" strong field effects like those associated with the Schwinger-Sauter critical field.

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