Two photon Breit-Wheeler pair production and beaming in the context of laboratory experiments and active galactic nuclei

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Linear Breit-Wheeler pair creation is the lowest threshold process in photonphoton interaction, controlling the energy release in Gamma Ray Bursts and Active Galactic Nuclei, but it has never been directly observed in the laboratory. Using numerical simulations, we demonstrate the possibility to produce collimated gamma beams with high energy conversion efficiency using high intensity lasers and innovative targets. When two of these beams collide at particular angles, our analytical calculations demonstrate a pair beaming effect that may facilitate the experimental observation of the Breit-Wheeler process. This effect has been confirmed in photon collision simulations using a recently developed innovative algorithm that allows us to propose robust experimental designs on facilities like APOLLON, PETAL and ELI-NP. Moreover, we will discuss the effect of the differential Breit-Wheeler cross section on pair beaming and consider this effect in the context of Active Galaxy Nuclei.