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Optimisation of Inverse Compton Scattering via spatiotemporal tailoring of scattering pulse

All-optical High-energy X-ray (HEX) beam sources based on Inverse Compton scattering constitute a promising alternative to conventional x-ray sources due to their compactness and tunability. The X-rays are obtained through collision between a laser and relativistic electron beams from laser plasma accelerator. Reaching a low bandwidth of HEX is crucial for practical applications: after minimising the electron beam contributions, the scattering laser pulse will be the dominating factor. By tailoring the scattering pulse and properly matching it with the electron beam, significant reductions in bandwidth, down to a few percent, can be achieved. In this work we aim to obtain, through different approaches to spatio-temporal shaping, a scattering pulse shape that permits the maximisation of both the the interaction length and the overlap of the two beams, ensuring the production of a high number of photons in a narrow bandwidth. Such tailoring enables

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