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Generation of symmetrical optical caustic beams for precise alignment

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Generating layers of symmetrical optical caustic beams using a specific configuration of cylindrical lenses is an innovative idea with potential application in precision alignment and other fields. The technique allows the generation of layers of non-diffracting beams with opposite accelerating directions. This approach can be extended in two dimensions or to create rotationally symmetric beams. Prior methods have produced similar beams using spatial light modulators, but the presented approach with cylindrical lenses reduces setup complexity and cost, thereby opening the possibility for new applications. In the context of particle accelerators, these include particle acceleration using high-power lasers and alignment of accelerator components. The presented research emphasizes the possibility for this technique to be used as a reference line for precise alignment. It allows the generation of reference lines with a thickness in the order of millimeters for distances of tens to hundreds of meters, which is advantageous for large accelerator facilities. A brief description of the sensors used to detect misalignment is also presented.

Footnotes

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Europe

Primary author: DUSEK, Martin (European Organization for Nuclear Research)

Co-authors: GAYDE, Jean-Christophe (European Organization for Nuclear Research); SULC, Miroslav (Technical University of Liberec)

Presenter: DUSEK, Martin (European Organization for Nuclear Research)

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