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## The potential contribution of a structured laser beam to accelerator alignment technology

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The Structured Laser Beam (SLB) is a type of optical beam characterized by an intense, sharply defined, low divergence core at its center, similar in its transverse intensity distribution to a Bessel beam. The SLB can propagate over a theoretically infinite distance, and has recently been tested up to a distance of 900 m. This test confirmed the low divergence of the SLB core, of about 0.01 mrad in this case. Furthermore, a hollow SLB (HSLB) can be created by feeding the generator with vector beams. These properties open the possibility of creating new types of optical alignment systems that could be used over long distances, for example for particle accelerators. Investigations are on-going to optimize the SLB and fully evaluate its alignment potential. Methods are under development to accurately detect the center of the SLB, based either on the beam intensity distribution or on the measurement of particular polarization states of the HSLB. Moreover, in order to deal with alignment in harsh environment, systems based on passive elements are also of interest. This paper summarizes these studies and includes a discussion of phenomena such as the straightness of the SLB.

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### Footnotes

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Yes

**Primary authors:** GAYDE, Jean-Christophe (European Organization for Nuclear Research); DUSEK, Martin (European Organization for Nuclear Research); MERGELKUHL, Dirk (European Organization for Nuclear Research); NIEWIEM, Witold (European Organization for Nuclear Research (CERN)); POLAK, Krystof (European Organization for Nuclear Research); ROIKOVÁ, Eva (European Organization for Nuclear Research); SULC, Miroslav (Technical University of Liberec)

**Presenter:** GAYDE, Jean-Christophe (European Organization for Nuclear Research)

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