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Eupraxia Laser design optimization and industry

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The EuPRAXIA infrastructure design study is paving the way to the development of a compact European plasma-based accelerator comprising novel acceleration schemes to drive radiation sources and large-scale user areas for applications. The laser-driven plasma acceleration schemes foreseen in the project rely on a high average power, PW peak power laser system with unprecedented temporal and spatial quality and stability and perspective industrial strength. These very challenging needs are being examined in view of the current dramatic developments of high average power systems and optical components to guide the architecture and technology down-selection.

A summary of the laser specifications in view of the expected staged accelerator performances and foreseen applications will be given followed by a description of the basic laser design and main subsystems compatible with the project physics requirements, notably concerning pulse minimum duration and bandwidth. A special attention will be given to the description of applicable diode-pumping schemes and available prototypes, and their potential industrial developments. A discussion will follow on the main challenges identified for future project-driven dedicated developments and testing.

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