

Channeling 2018



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New Ultrashort OPCPA PetaWatt Class Beamline for Vulcan Laser Facility

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The Vulcan Petawatt Laser Facility is operational from different years, delivering high quality support for the laser plasma community. To keep the facility at world leading level, continuous development is necessary. For that reason, to allow better understanding of the laser plasma interaction at petawatt level, a new laser beamline was proposed to allow betatron radiation probing of the plasma.

The design specification for the new beamline are:

- Pulse length: $< 30\text{fs}$
- Energy: $\sim 30\text{J}$
- Repetition rate: 1 shot every 5min.

There are different laser technology that can provide laser pulses within the requested parameters. Using the expertise in the Central Laser Facility, we decided to use the Optical Chirped Pulse Amplification (OPCPA) for the new beamline.

In this way, a short pulse length could be generated, supporting in principle large bandwidth. While this is not important for betatron radiation, it will open a new set of experiment for QED.

The overall project is aiming to deliver first pulses of 7J in 30fs in the next three years. In the second phase, the addition of a 108mm disk amplifier and an amplification stage will increase the energy up to 30J, with a limited repetition rate of 1 shot every 20min.

Finally, in the third phase a new design of gas cooled disk amplifier, under development, will increase the repetition rate to 1 shot every 5min.

In this contribution, we present the new beamline project in the Vulcan laser system. The overall project is quickly discussed, followed by a more in depth presentation on the work on the Front End and the CPA design.

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