ELI-ELBA all-optical GeV electron - PW laser collider

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Electron-laser colliders are a unique tool to investigate different fundamental phenomena, as for example the Breit-Wheeler process. Several experiments are working in this direction as of now, both based on conventional electron accelerator technology or on all-optical schemes.

In the landscape of high power laser facilities, ELI-Beamlines has two unique lasers which have the potential to enable laser-electron collisions at unprecedented parameters: L3-HAPLS (30 J, 30 fs, 10 Hz) and L4-Aton (1.5 kJ, 150 fs, 100s shots/day). In ELI-ELBA, the L3 laser pulses are split in two by a 50:50 wavefront splitting mirror. The central part of the beam is focused by a 10 meter focal length off-axis parabola into a gas jet to generate GeV electron beams by laser wakefield acceleration. The outer part of the beam is focused on the electron beam by a f/1.5 off-axis parabola with a hole.

The installation of ELI-ELBA and the results of the technical commissioning at low-power (L3 front-end) will be presented, along with the experiments proposed by the user community. The designed upgrade of ELI-ELBA for 10 PW experiments will be also presented.

Acknowledgments

The authors acknowledge support from the European Regional Development Fund for the following projects: ADONIS (CZ.02.1.01/0.0/0.0/16_019/0000789) and HIFI (CZ.02.1.01/0.0/0.0/15_003/0000449). This research also obtained financial support from TAČR GAMA 2 (TP01010035) project and CTU Student Support Project SGS22/185/OHK4/3T/14. The simulations were carried out in the Eclipse cluster at the ELI Beamlines project.