

WP 9: Beam-driven plasma acceleration

Task 9.1: e-beam driver option and beam preparation (DESY, INFN). Define desirable properties for electron beams as plasma wake drivers and identify mechanisms to produce them (close connection to WP 2 and WP 5). Optimize driver beam properties for the generation of high-quality witness beams (in close collaboration with WP 2).

Task 9.2: plasma target and vacuum system (DESY). Design plasma targets tailored to the generation of high-quality witness beams. Investigate and optimize the plasma target compatibility with vacuum system requirements.

Task 9.3: plasma diagnostics (DESY). Develop diagnostics for the three-dimensional mapping of plasma density profiles.

Task 9.4: beam tailoring and release into vacuum (DESY, INFN). Design of the plasma to vacuum transition for witness-beam parameter preservation and to optimize further beam transport (closely linked to WP 2 and WP 5).

Task 9.5: staging of acceleration modules (DESY). Investigate solutions for staging of multiple beam-driven wake-fields modules for applications at the energy frontier.

Task 9.6: engineering issues and stability (DESY). Investigate the susceptibility of the process to beam and plasma fluctuations (+ INFN). Optimize beam-parameter stability by means of plasma cell, and accelerator engineering.

48 person-months have been agreed with DESY and INFN.

The following deliverables have been agreed: Del 9.1. Baseline design report including electron beam optics, plasma modules, plasma diagnostics and beam transport to both applications (FEL and HEP) (Tasks 9.1 to 9.4) [month 30]. Del 9.2. Staging analysis (Task 9.5) [month 42]. Del 9.3. Tolerance analysis (Task 9.5) [month 42]. Del 9.4. Full design report EUPRAXIA, contribution from WP9 [month 48].

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- **Outline of design by Massimo and Jens until PISA meeting**
- John Dale (DESY), postdoc, to be hired on **50% EuPRAXIA** funding starting June 1st, 2016
- Task 9.1 “Driver beam definition”
- Task 9.2 “Plasma target”,
- Task 9.3 “Plasma diagnostics”,
- Task 9.4 “Beam tailoring and release”
==> being worked on by fraction of 1 PhD and 3 PhDs in-kind by DESY, activity has started
- Task 9.5 “Staging” , activity not started, postdoc to be hired until 2017
- Task 9.6 “Stability”, activity will start in summer 2016

- Alberto Marocchino (INFN), to be hired on **100% EuPRAXIA** funding starting April 1st, 2016 (50% WP5, 50% WP9)
- Task 9.1 “Driver beam definition” started
- Task 9.2 “Plasma target” started
- Task 9.3 “Plasma diagnostics” started
- Task 9.4 “Beam tailoring and release” not started yet
- Task 9.5 “Staging” not started yet
- Task 9.6 “Stability” not started yet