EUROPEAN PLASMA RESEARCH ACCELERATOR WITH EXCELLENCE IN APPLICATIONS

EuPRAXIA

WP12 Status and Plans for collaboration week

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1st Collaboration Week, 19-23 June, 2017

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 653782.

Outline

WP12 - Accelerator Prototyping and Experiments at Test Facilities

Task: allow linking among existing facilities to perform prototyping experiments

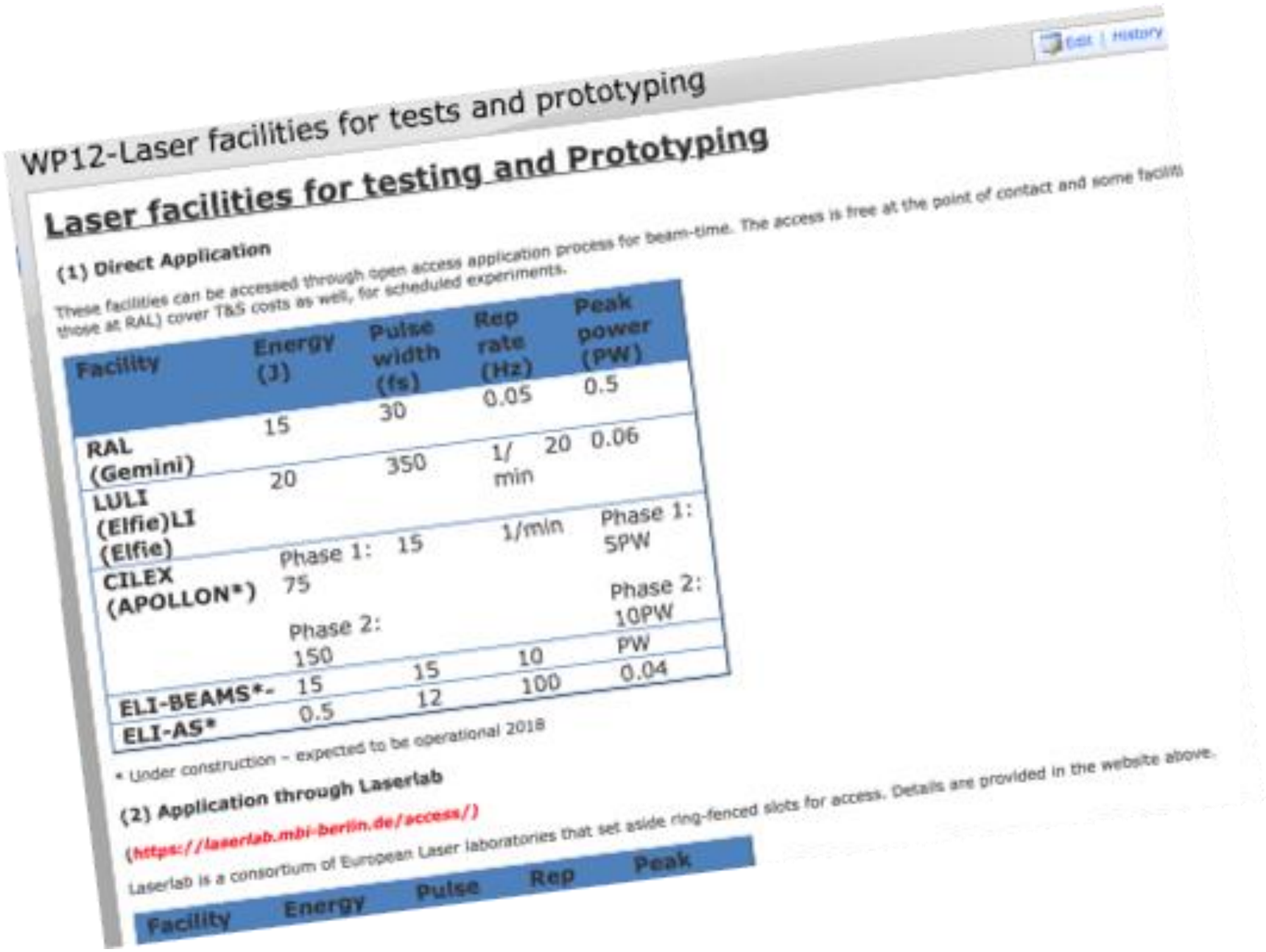
WP12 updates and plans for collaboration week

…

- what was achieved
- is there any input missing/needed?
- is the share of the work with connected WP's fully defined?
- what are the WP's goals and plans for the collaboration week?
- any other problems we should be aware of

We hope …NO

Facilities on web site



WP12-Laser facilities for tests and prototyping

Edit | History

Laser facilities for testing and Prototyping

(1) Direct Application

These facilities can be accessed through open access application process for beam-time. The access is free at the point of contact and some facilit
those at RAL) cover T&S costs as well, for scheduled experiments.

Facility	Energy (J)	Pulse width (fs)	Rep rate (Hz)	Peak power (PW)
RAL (Gemini)	15	30	0.05	0.5
LULI (Elfie)LI (Elfie)	20	350	1/ min 20	0.06
CILEX (APOLLON*)	Phase 1: 75 Phase 2: 150	15	1/min	Phase 1: SPW Phase 2: 10PW
ELI-BEAMS*-	15	15	10	PW
ELI-AS*	0.5	12	100	0.04

* Under construction – expected to be operational 2018

(2) Application through Laserlab

(https://laserlab.mbi-berlin.de/access/)

Laserlab is a consortium of European Laser laboratories that set aside ring-fenced slots for access. Details are provided in the website above.

Facility	Energy	Pulse	Rep	Peak

vocal-external.liv.ac.uk/sites/eupraxia

List of the available facilities

	Contact name	Contact email
STFC-RAL (Gemini)	Dan Symes	dan.symes@stfc.ac.uk
LULI (Elfie)	Arnd Specka	specka@llr.in2p3.fr
CILEX (APOLLON*)	Arnd Specka	specka@llr.in2p3.fr
ELI-BEAMS*	Georg Korn	georg.korn@eli-beams.eu
ELI-ALPS*	Karoly Osvay	osvay@physx.u-szeged.hu
HI-JENA (JETI)	Matt Zepf	m.zepf@uni-jena.de
LLC-LUND	Claes-Göran Wahlström	claes-goran.wahlstrom@fysik.lth.se
LOA	Victor Malka	victor.Malka@ensta.fr
SLIC	Pascal d'Oliveira	pascal.doliveira@cea.fr
CELIA	Stéphane Petit	stephane.petit@celia.u-bordeaux.fr
SCAPA	Mark Wiggins	mark.wiggins@strath.ac.uk
Oxford University	Simon Hooker	Simon.Hooker@physics.ox.ac.uk
Imperial College London	Zulfikar Najmudin	z.najmudin@imperial.ac.uk
ILIL Pisa	Leo Gizzi	la.gizzi@ino.it
LMU/MPQ	Stefan Karsch	stefan.karsch@mpq.mpg.de
HZDR Dresden	Ulrich Schramm	u.schramm@hzdr.de
LUX	Andreas Maier	andreas.maier@desy.de
SINBAD*	Urlich Dorda	ulrich.dorda@desy.de
SPARC_LAB	Massimo Ferrario	massimo.Ferrario@lnf.infn.it

vocal-external.liv.ac.uk/sites/eupraxia

Info needed for each facility

Facility description

STFC-RAL

Facility description:

The Central Laser Facility at STFC-RAL hosts the 350TW Gemini Ti:Sapphire laser that is used extensively for laser wakefield acceleration experiments by visiting user groups. Gemini has two beams with energy of 15J in a 40 fs pulse with a maximum repetition rate of 1 shot per 20 seconds. These beams are fed into a dedicated target area (TA3) containing a large vacuum chamber which can be configured to suit individual experimental needs. For gas target experiments, the standard laser focussing uses a long focal length off-axis parabola (*f*/20) for a spot radius ($1/e^2$) of 16.7 mm with intensity ~2.8 x 10^{19} Wcm^{-2} (normalised vector potential a_0=3.6). A beam layout is also available using an *f*/40 off-axis parabola reducing the intensity to ~6 x 10^{18} Wcm^{-2}.

The second Gemini target area (TA2) receives the laser beam that is split off before the final amplifier with an energy of 1J and compressed to 40 fs. This is focussed with an *f*/17 off axis parabola to a 20 mm spot with intensity 2.7 x 10^{18} Wcm^{-2} (normalised vector potential a_0=1.1). The maximum repetition rate in TA2 is 5 Hz provided that experiments do not exceed radiological safety limits.

Both target areas are equipped with adaptive optics and have independent control of the spectral phase of the pulse allowing user-defined control over the spatial and temporal properties of the laser pulse. CLF experiments are supported throughout the planning stages and implementation by a team of laser staff, plasma physicists, engineering design and support staff. Specialist target requirements are provided by a dedicated Target Fabrication department.

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Mode of access

User facilities
Direct application

Facility
STFC-RAL
LULI
APOLLON *
ELI-BEAMS *
ELI-AS *

* Under construction

Laserlab facilities
Laserlab application

Facility
HI-JENA
LLC-LUND
LOA
SLIC
CELIA

Access also possible through collaborative agreement

Other facilities
Collaborative agreement

Facility
SCAPA
ICL
OXF
QUB
CNR-PISA
SPARC_LAB (INFN)
DESY
MPQ
HZDR-DRESDEN
STFC-DL

Scheduled experiments (past and future)

Scheduled experiments:

ID	PI	Title	Date
16110021	D Symes	Control of high intensity gas target interactions using feedback routines	Nov 2016
17110015	A Thomas	Femtosecond Pump-Probe Laue Diffraction of Lattice Dynamics using Betatron Radiation	July 2017
17110008	S Mangles	Femtosecond Time-Resolved Opacity Measurements of Hot Dense Matter	Aug 2017
17110004	Z Najmudin	Acceleration of electrons in consecutive GeV energy gain laser wakefield accelerator stages	Oct 2017

Contact

Check the informations for each facility

Need information on what need testing

Plenary discussion

Wednesday, 21 of June, 11:00

- Review the facilities (infos to be updated?)

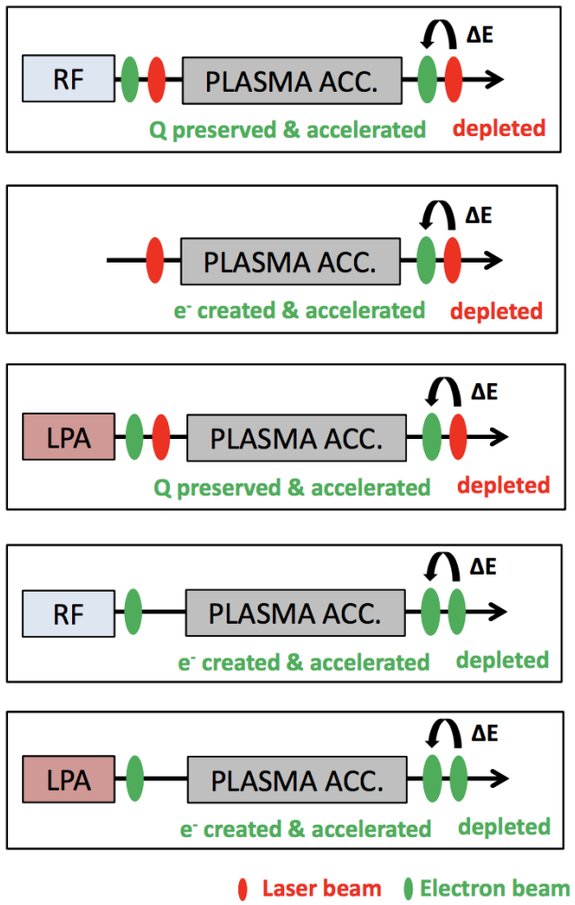
Individual facility research program

- Possible prototyping and experiments …

Input from WP3:
concepts need to be tested

EuPRAXIA Main conclusions of report MS3.1

- Gas cells as media for LPI
- Waveguides for LPAS: channel-GICT can be used
- Laser quality and stability essential for reliable operation
- Efforts on plasma (density) stabilisation required: **more experimental data necessary**
- LPI: combination of schemes (III and density gradient) for control of electron bunch
- Acceleration of externally injected electrons: **more experimental data necessary**



A. Walker, IPAC 17

Input from WP5:
driver removal?

From discussion:
Diagnostics

Plenary discussion

Wednesday, 21 of June, 11:00

- Review the facilities (infos to be updated?)

Individual facility research program

- Possible prototyping and experiments …

Input needed for Wednesday

WP leaders, please, send 1 slide to

andrea.mostacci@uniroma1.it
rajeev.pattathil@stfc.ac.uk

- Access to the facility / Support from the facility
- R&D resources: additional funding for experiments and travel?

Goal of WP12

- Keep an updated status of the facilities
- Sharing the information on needed experiments
- Help in matching the facility and the experiments

Thank you for you attention