EUPRAXIA

EUROPEAN PLASMA RESEARCH ACCELERATOR WITH EXCELLENCE IN APPLICATIONS

WP8: Outreach and Liaison

Prof Carsten P Welsch

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

Internet and social media

Horizon 2020

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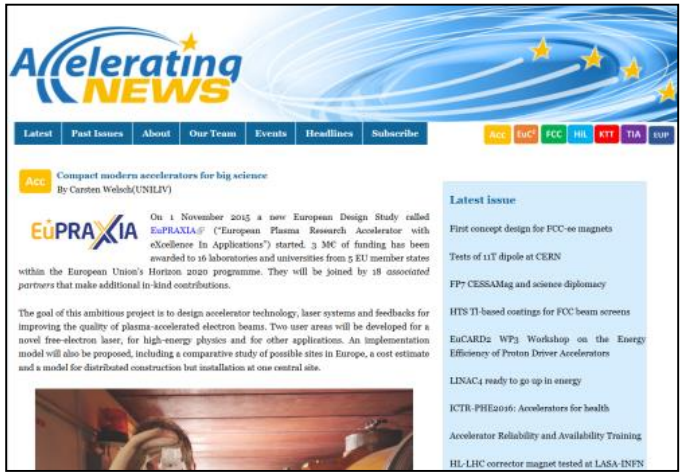
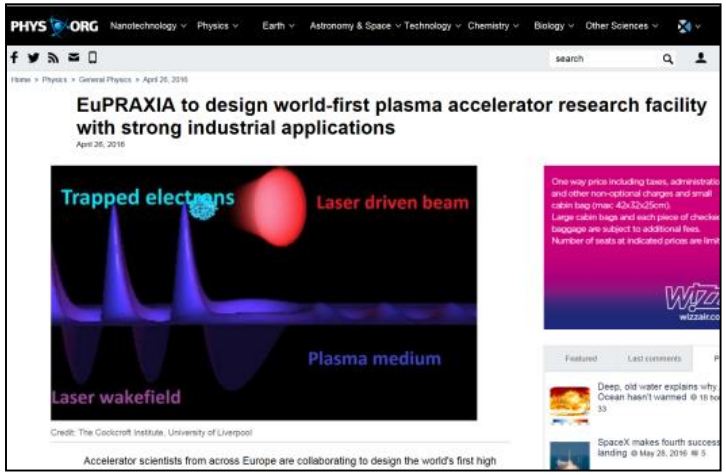
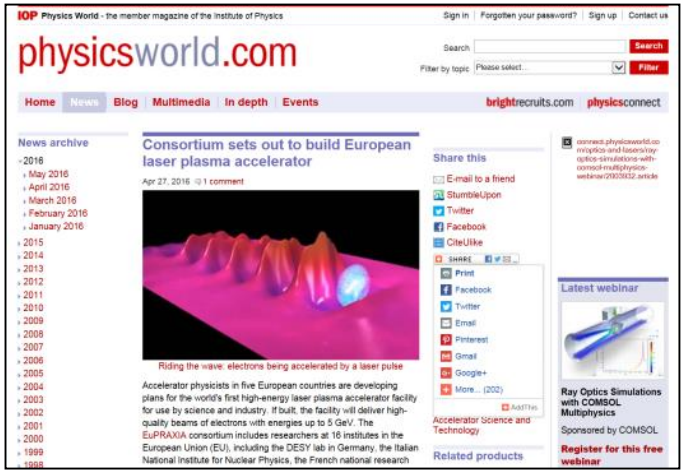
#EuPRAXIA #plasma #accelerator

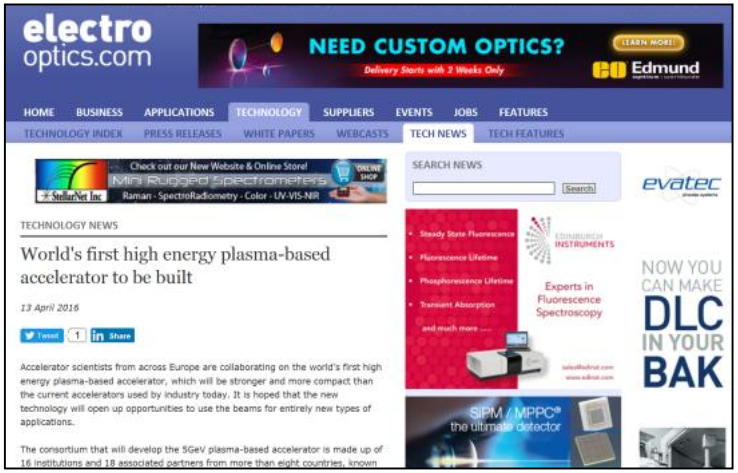
www.eupraxia-project.eu

Feature articles









More than 20 feature articles in magazines, newsletters, and websites

Latest one

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EUP **EuPRAXIA baseline parameters established**
by Dr. Ricardo Torres (University of Liverpool)

Photograph of the participants at the 1st Yearly Meeting of EuPRAXIA (Image:Copyright Pieyre Sylvaine, LLR)

The First Yearly Meeting of the EuPRAXIA consortium took place at the École Polytechnique in Paris, over 26-28th October. Ralph Assmann, Project Coordinator, and Arnd Specka, Deputy Project Coordinator and Host of the meeting, welcomed 59 registered participants from partner institutes, associate partners, and industry.

The Yearly Meeting discussed the fruitful first year of the project, which included the forming of the collaboration board, hiring of new personnel, investigation of facility parameters and a total of eleven workshops and special work package meetings. Scientific results from these events covering all aspects of the project were reported, and included interesting new insights and future directions.

One of the highlights of the meeting was the presentation and approval of the preliminary study concept of EuPRAXIA. The report summarized the scientific input for the preliminary study concept of EuPRAXIA which has been received over the past year. All work packages contributed to this report with summary

Latest issue

A year of successes for HL-LHC

A revolutionary mini-accelerator

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Cryogenic safety tool developed at CERN

Optimized first energy stage for CLIC at 380 GeV

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Designing an elevator system for FCC

Interview with Jon Butterworth

New Collaboration Board for HL-LHC

EuPRAXIA baseline parameters established

THE EuPRAXIA FILES

THE EuPRAXIA FILES

ISSUE 1 – May 2016

Foreword

Novel accelerators have seen strong advances not only in achievable beam energy but also in beam quality. This success story is still developing, as you can see from the publications that we collect in this first edition of "The EuPRAXIA Files". As many of you are aware, the Horizon2020 Design Study EuPRAXIA aims at a conceptual design for a European plasma accelerator with usable beams. Instead of another newsletter we will regularly provide you with summaries of recent publications, letting the science speak for itself. EuPRAXIA has meanwhile had an excellent project start and is gearing up to a workshop in Pisa at the end of June, organized together with the European Network for Novel Accelerators EuroNNAc2 and EuCARD2. For further news on EuPRAXIA please visit our website or read regular updates in "Accelerating news". We wish you some inspirational science readings in this edition of "The EuPRAXIA Files", prepared by the EuPRAXIA outreach team in Liverpool with Ricardo Torres as lead editor.

Dr Ralph Aßmann
EuPRAXIA Coordinator

Research Highlights

Berkeley Lab Scientists Create the First-ever, 2-stage Laser-plasma Accelerator Powered by Independent Laser Pulses

Researchers from the Lawrence Berkeley National Laboratory in the US have made an important breakthrough in the development of ultra-compact high-energy plasma-based accelerators.

In a paper recently published in Nature, they demonstrate for the first time the technique of staging, or sequencing multiple plasma accelerators independently powered. Staging is critical for high-energy physics applications of laser-plasma accelerators, as it enables to achieve higher beam energies, while maintaining accelerating gradients orders of magnitude above conventional technology.

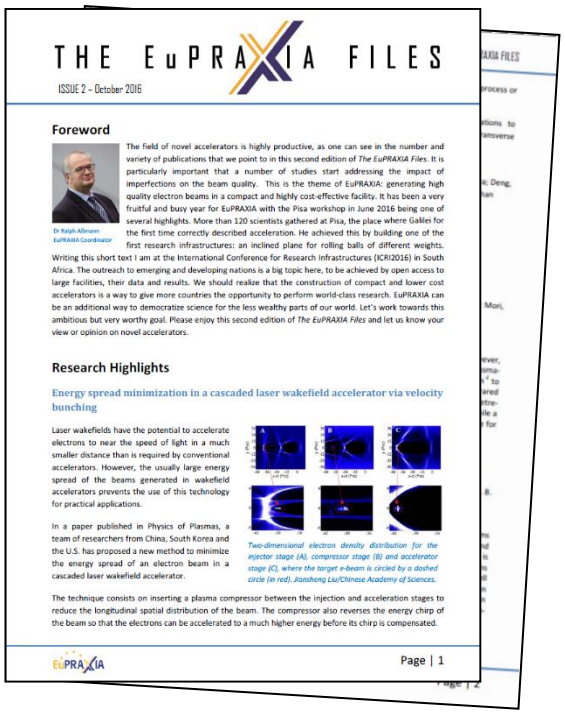
Members of the BELLA Center staging experiment team, from left, are Eric Esarey, Wim Leemans, Jeroen van Tilborg, Carlo Benedetti, Kelly Swanson, Anthony Gonsalves, Joost Daniels, Sven Steinke, and Kei Nakamura. Not pictured are Cameron Geddes, Carl Schroeder, Nicholas Matlis, and Brian Shaw. (Photo credit: Roy Kaltschmidt/Berkeley Lab)

In these experiments, electrons from one laser-plasma accelerator were transported into a second laser-plasma accelerator, powered by a second laser pulse, and accelerated. What was particularly novel about this experiment is that a plasma-based lens was employed to transport the beam between stages and a plasma mirror was used to couple in the second laser pulse. These plasma-based components allowed the system to remain extremely compact.

With this result, one can envision scaling to beam energies of interest for high-energy physics applications in a compact footprint. However, these results are a first step toward that vision—experiments at higher beam energy, with higher efficiency and improved beam quality, will need to be performed to further develop plasma-based technology for next-generation colliders.

Read more at: http://newscenter.lbl.gov/2016/02/01/2-stage-laser-plasma-accelerator/

EuPRAXIA Page | 1


THE EuPRAXIA FILES

ISSUE 2 – October 2016

Foreword

The field of novel accelerators is highly productive, as one can see in the number and variety of publications that we point to in this second edition of *The EuPRAXIA Files*. It is particularly important that a number of studies start addressing the impact of imperfections on the beam quality. This is the theme of EuPRAXIA: generating high quality electron beams in a compact and highly cost-effective facility. It has been a very fruitful and busy year for EuPRAXIA with the Pisa workshop in June 2016 being one of several highlights. More than 120 scientists gathered at Pisa, the place where Galilei for the first time correctly described acceleration. He achieved this by building one of the first research infrastructures: an inclined plane for rolling balls of different weights. Writing this short text I am at the International Conference for Research Infrastructures (ICRI2016) in South Africa. The outreach to emerging and developing nations is a big topic here, to be achieved by open access to large facilities, their data and results. We should realize that the construction of compact and lower cost accelerators is a way to give more countries the opportunity to perform world-class research. EuPRAXIA can be an additional way to democratize science for the less wealthy parts of our world. Let's work towards this ambitious but very worthy goal. Please enjoy this second edition of *The EuPRAXIA Files* and let us know your view or opinion on novel accelerators.

Dr Ralph Aßmann
EuPRAXIA Coordinator

Research Highlights

Energy spread minimization in a cascaded laser wakefield accelerator via velocity bunching

Laser wakefields have the potential to accelerate electrons to near the speed of light in a much smaller distance than is required by conventional accelerators. However, the usually large energy spread of the beams generated in wakefield accelerators prevents the use of this technology for practical applications.

In a paper published in Physics of Plasmas, a team of researchers from China, South Korea and the U.S. has proposed a new method to minimize the energy spread of an electron beam in a cascaded laser wakefield accelerator.

Two-dimensional electron density distribution for the injector stage (A), compressor stage (B) and accelerator stage (C), where the target e-beam is circled by a dashed circle (in red). Jiansheng Liu/Chinese Academy of Sciences.

The technique consists on inserting a plasma compressor between the injection and acceleration stages to reduce the longitudinal spatial distribution of the beam. The compressor also reverses the energy chirp of the beam so that the electrons can be accelerated to a much higher energy before its chirp is compensated.

EuPRAXIA Page | 1

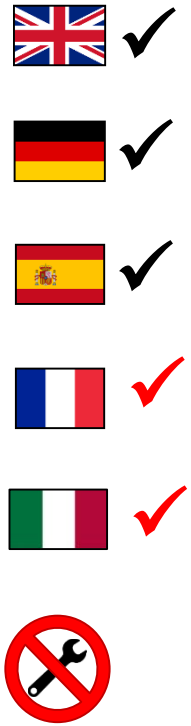
- Collection of abstracts of recently published papers in laser-plasma acceleration
- Quarterly
- Distributed to all beneficiary and associate partners

Promotional material

Horizon 2020

Banners

Leaflets



Poster

Presentation template

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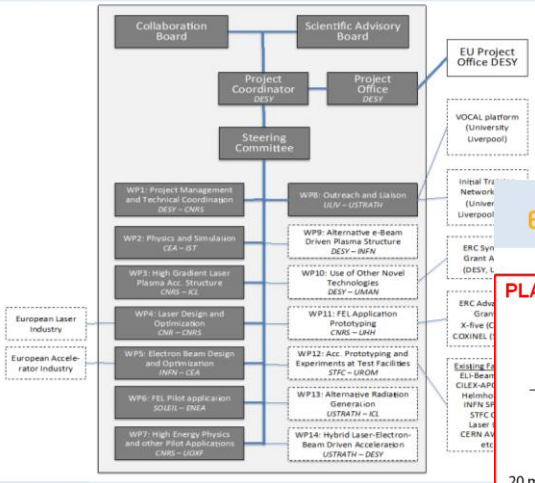
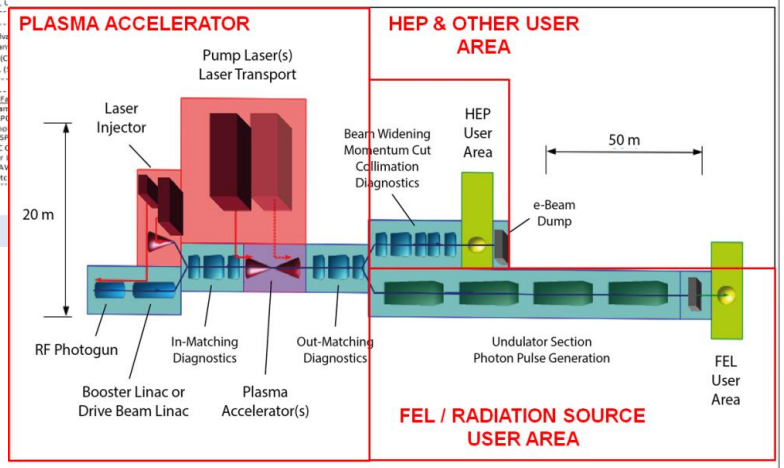
Participating Institutions

Work Breakdown Structure



EuPRAXIA Research Infrastructure



Being finalized…partner names being added.

Christmas Card

The EuPRAXIA consortium is preparing the conceptual design of an innovative European accelerator infrastructure.
Its concept is based on plasma acceleration that is driven by electron beams and high power lasers from the European industry. EuPRAXIA will be the required step to compact machines delivering GeV electron beams and X rays for users from science and industry. A modular approach will ensure the scalability to high beam energy. The project, funded by the EU's Horizon 2020 programme and coordinated by DESY, brings together 16 partners and 22 associated partners from 13 countries. EuPRAXIA is the acronym for "European Plasma Research Accelerator with eXcellence In Applications".

Communication Plans

- Coming next: EuPRAXIA brochure

- Information: Posters and videos
- Educational resources
- Articles about R&D progress in all countries
- Symposium in 2018 (Friday, 6th July)

- Needs input from all partners !
- Please provide news, images, videos, etc.