European Network for Novel Accelerators (EuroNNAc)

R. Assmann, DESY

EuCARD-2 is co-funded by the partners and the European Commission under Capacities 7th Framework Programme, Grant Agreement 312453

What Is EuroNNAc?

- A network that provides a **platform for exchange, for definition of common goals, for lobbying, for collaborative funding requests on novel accelerators**.
- Build links between conventional and novel accelerator specialists.
- Assumption: Together we are stronger!
- Founded in 2011 in a meeting at CERN with immediate great interest from the community.
- Sponsored by EU and big labs, **interested in the success of novel accelerators for the future of HEP/photon/nuclear science and accelerator applications for society**.

From Acceleration to Accelerators

Plasma Acceleration

proven

Build a plasma accelerator with usable beam quality!

to be done

Plasma Accelerator

(goal: same energy, 10 times lower cost, 10 times lower size)

Organization

- **Coordinators**:
  R. Assmann (DESY), B. Holzer (CERN), A. Specka (Ecole polytechnique), J. Osterhoff (DESY).
- EuCARD1&2 “EuroNNAc WP” leader and central network budget: R. Assmann (DESY). Also deputy EuCARD2 coordinator.
- Decisions from coordinators and **member’s board**: 1 person per participating institute.
- We will continuously adjust our structure.

Member's Board

Member's board	Institute	Country
Francois Amiranoff	LULI	France
Ralph Assmann	DESY	Germany
Seth Brussard	EINDHOVEN University oF Technology	Netherlands
Graeme Burt	Lancaster University	Great Britain
Swapan Chattopadhyay	Cockcroft Institute	Great Britain
Liming Chen	Inst. of Physics, Chinese Academy of Sciences	China
Weiren Chou	Fermilab	USA
Jim Clarke	STFC Daresbury Laboratory	Great Britain
Marie-Ammanuelle Couprie	Soleil	France
Tom Cowan	Helmholtz-Zentrum Dresden-Rossendorf	Germany
Brigitte Cros	LPGP	France
Massimo Ferrario	INFN-LNF	Italy
Danilo Giulietti	Pisa University and INFN	Italy
Leo Gizzi	CONSIGLIO NAZIONALE DELLE RICERCHE, INO	Italy
Florian Grüner	University of Hamburg	Germany
Mark Hogan	SLAC	USA
Simon Hooker	University of Oxford	Great Britain
Dino Jarosszynski	University of Strathclyde	Great Britain
Roger Jones	Manchester University	Great Britain
Chan Joshi	UCLA	USA
Malte Kaluza	Helmholtz-Institute Jena	Germany
Stefan Karsch	LMU Munich & MPIQ	Germany
Georg Korn	ELI	European Project
Igor Kostyukov	Institute of Applied Physics RAS	Russia
Bernhard Holzer	CERN	European Organization
Yutong Li	Institute of Physics, CAS	China
Konsztantin Lotov	Budker INP	Russia
Wei Lu	Tsinghua University, Beijing	China
Victor Malka	LOA	France
Phillippe Martin	IRAMIS/CEA	France
Mauro Migliorati	University of Rome LA SAPIENZA	Italy
Gerard Mourou	IZEST	International network
Patric Muggli	Max Planck Institut für Physik	Germany
Mitsuaki Nozaki	KEK	Japan
Jens Osterhoff	DESY	Germany
Alexander Pukhov	University of Düsseldorf	Germany
Jean-Luc Revol	ESRF	European Organization
Markus Roth	GSI	Germany
Carl Schroeder	LBNL	USA
Mike Seidel	PSI / EPFL	Switzerland
Andrei Seryi	John Adams Institute	Great Britain
Zhengmin Sheng	Shanghai Jiao Tong University	China
Luis Silva	Instituto Superior Tecnico de Lisboa	Portugal
Susan Smith	ASTeC	Great Britain
Arnd Specka	Laboratoire Leprince-Ringuet (Ecole polytechnique - CNRS/IN2P3)	France
Achille Stocchi	LAL	France
Daniel R. Symes	STFC Central Laser Facility	Great Britain
Toshi Tajima	ICUIL	International committee
Gyoergy Vesztergombi	KFKI-RMKI	Hungary
Claes-Göran Wahlstroem	Lund University	Sweden
Xijie Wang	Shanghai Jiao Tong University	China
Carsten Welsch	Liverpool University	Great Britain
Matthew Wing	UCL	Great Britain
Vitaly Yakimenko	BNL	USA
Mitsuhiro Yoshida	KEK	Japan
Najmudin Zulfikar	Imperial College	Great Britain

Guidance, input, major decision. For example: act as International Advisory Board for EAAC2013.

EuroNNAc

European Network for Novel Accelerators

EINDHOVEN University of Technology

University of Oxford
University of Strathclyde
Manchester University
Lancaster University
Cockcroft Institute
STFC Daresbury Laboratory
John Adams Institute
ASTeC
STFC Central Laser Facility
Liverpool University
University College London
Imperial College

Instituto Superior
Tecnico de Lisboa

LULI
Soleil
LPGP
LOA
IRAMIS/CEA
Laboratoire Leprince-Ringuet
(Ecole polytechnique - CNRS/IN2P3)
LAL

European Organization for
Nuclear Research (CERN)
PSI

University Düsseldorf
LMU University Munich
DESY
GSI
Max-Planck-Institute for Quantum Optics
Max-Planck-Institute for Physics
Helmholtz Institute Jena
Helmholtz-Zentrum Dresden-Rossendorf
University Hamburg

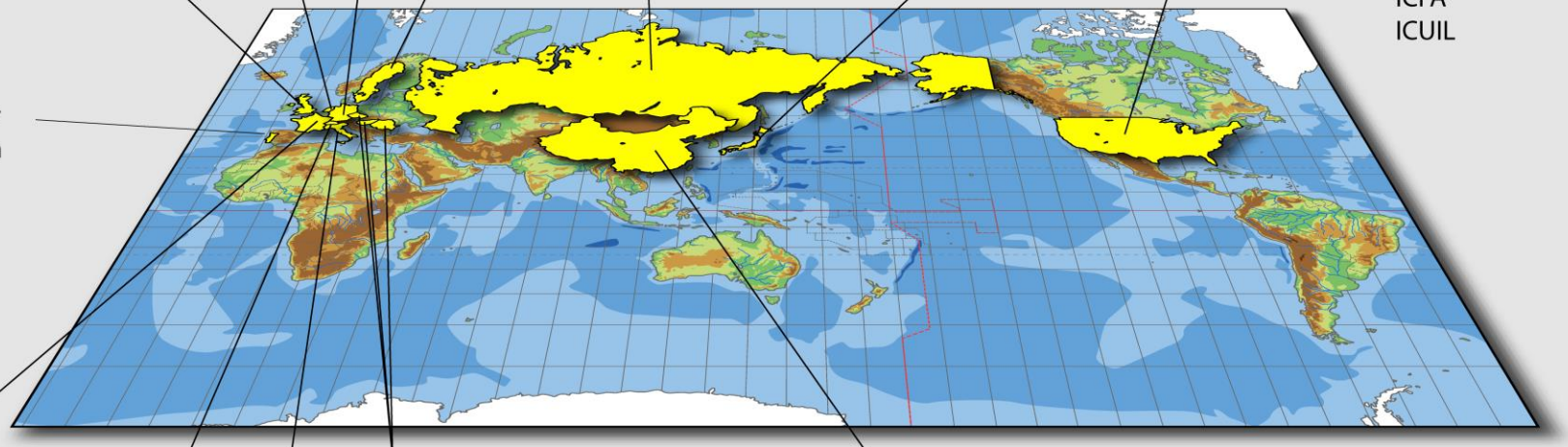
Lund University

Budker INP
Institute of Applied Physics RAS

KEK

Fermilab
SLAC
UCLA
LBNL
BNL

ICFA
ICUIL



Extreme Light Infrastructures (ELI)

INFN-LNF
Pisa University and INFN
Consiglio Nazionale Delle Ricerche, INO
University of Rome LA SAPIENZA

Inst. of Physics, Chinese Academy of Sciences
Tsinghua University, Beijing
Shanghai Jiao Tong University

EuCARD²

Activities – Example

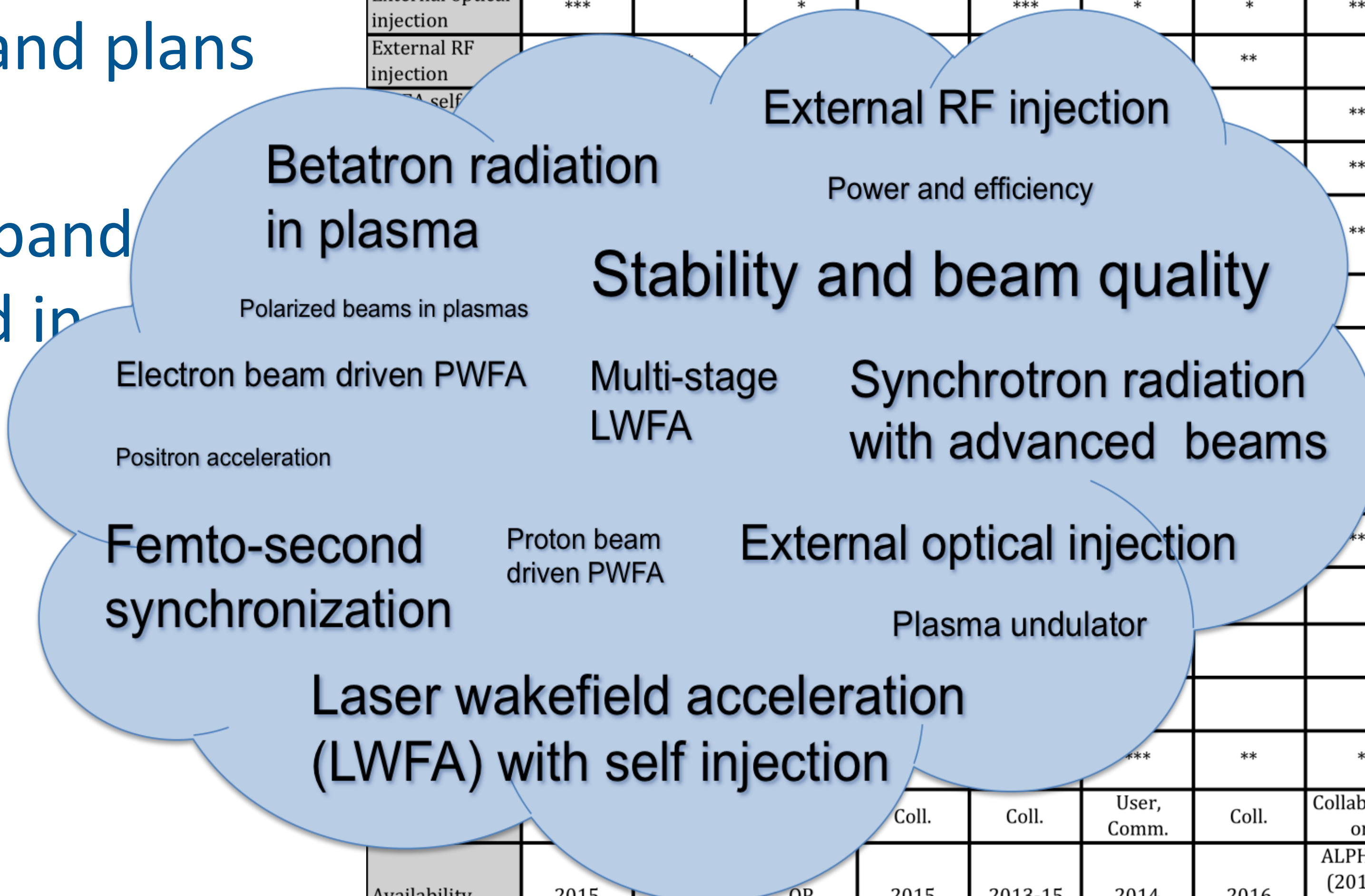
- **Analysis**: Novel accelerator research activities and plans (*May 2012)*
- Will be expanded and completed in EuCARD2.

Research Topics	CILEX Paris, France	LUNEX5 Paris, France	LUND Lund, Sweden	IZEST/ PETAL/ ICAN Paris & Bordeaux, France	LAOLA Hamburg, Germany	SPARC LAB Frascati, Italy	PDPWA Geneva, Switzerland	ALPHA-X / SCAPA Glasgow, UK
External optical injection	***		*		***	*	*	***
External RF injection	**	*			***	***	**	
LWFA self injection	***		***	*** 100GeV		***		***
Multi-stage LWFA	***				**			***
Synchr. radiation with adv. beams	**	**			***	***		***
electron beam driven PWFA					**	***		
proton beam driven PWFA							**	
Betatron radiation in plasma	***		***		**	***		***
Plasma undulator	*					*		***
Stability and beam quality	***	**	***		***	***	**	***
Polarized beams in plasmas								
Positron acceleration								
Power and efficiency				***				
femto-second synchronization	***	**			***	***	**	*
Condition of access	User, Comm.	Coll.	Coll., Laser Lab	Coll.	Coll.	User, Comm.	Coll.	Collaboration
Availability	2015	?	OP	2015	2013-15	2014	2016	ALPHA-X (2012) - SCAPA (2014)

Activities – Example

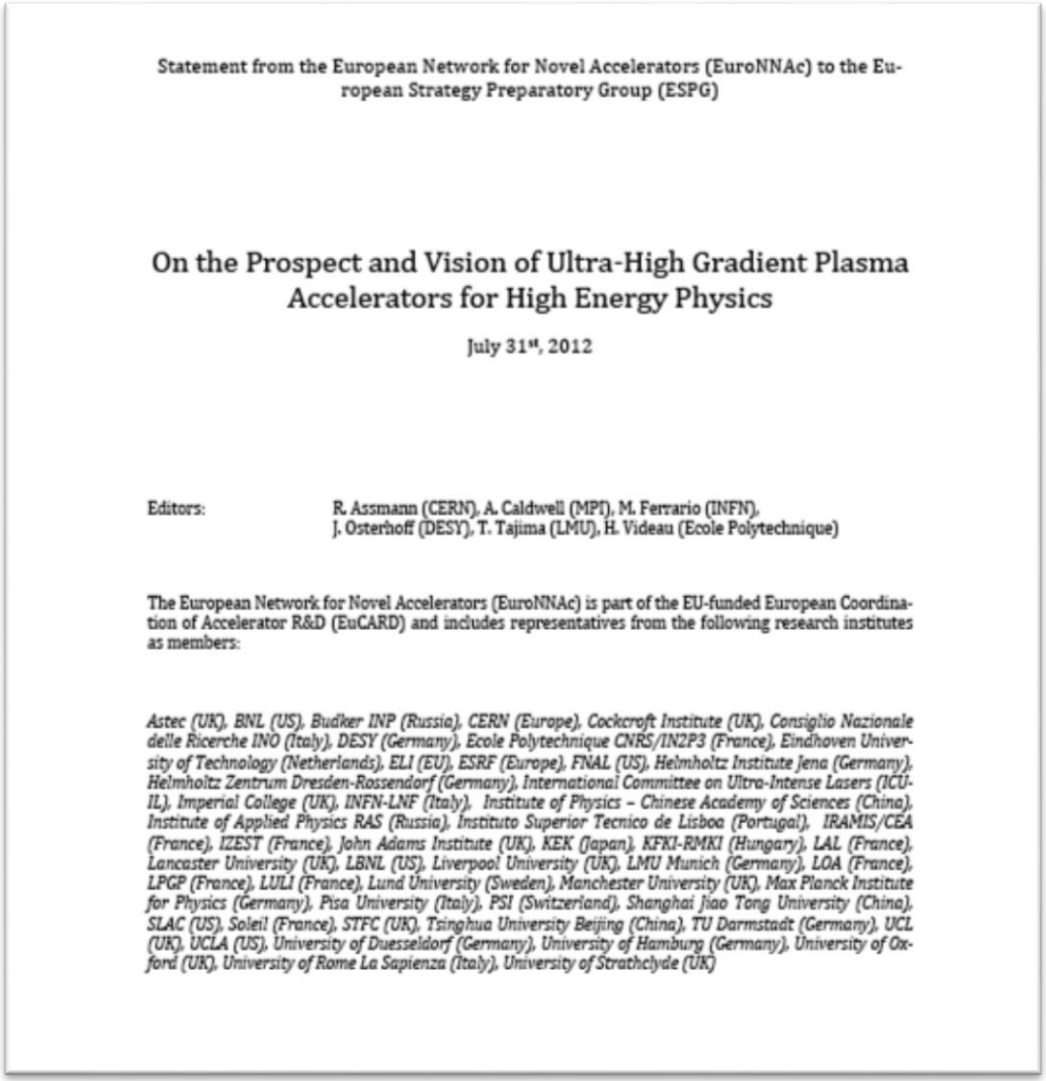
- **Analysis**: Novel accelerator research activities and plans (*May 2012)*
- Will be expand[illegible] completed in EuCARD2.

Research Topics	CILEX	LUNEX5	LUND	IZEST/ PETAL/ ICAN	LAOLA	SPARC LAB	PDPWA	ALPHA-X / SCAPA
	Paris, France	Paris, France	Lund, Sweden	Paris & Bordeaux, France	Hamburg, Germany	Frascati, Italy	Geneva, Switzerland	Glasgow, UK
External optical injection	***		*		***	*	*	***
External RF injection							**	
[illegible] self[illegible]								***
								***
								***
								***
						***	**	*
				Coll.	Coll.	User, Comm.	Coll.	Collaboration
Availability	2015	[illegible]	OP	2015	2013-15	2014	2016	ALPHA-X (2012) - SCAPA (2014)



Activities – Example

- **Lobbying**: Input to the update of the European Strategy for Particle Physics
- 15 page report *(July 31st, 2012)*



Statement from the European Network for Novel Accelerators (EuroNNAc) to the European Strategy Preparatory Group (ESPG)

On the Prospect and Vision of Ultra-High Gradient Plasma Accelerators for High Energy Physics

July 31st, 2012

Editors: R. Assmann (CERN), A. Caldwell (MPI), M. Ferrario (INFN), J. Osterhoff (DESY), T. Tajima (LMU), H. Videau (Ecole Polytechnique)

The European Network for Novel Accelerators (EuroNNAc) is part of the EU-funded European Coordination of Accelerator R&D (EuCARD) and includes representatives from the following research institutes as members:

Astec (UK), BNL (US), Budker INP (Russia), CERN (Europe), Cockcroft Institute (UK), Consiglio Nazionale delle Ricerche INO (Italy), DESY (Germany), Ecole Polytechnique CNRS/IN2P3 (France), Eindhoven University of Technology (Netherlands), ELI (EU), ESRF (Europe), FNAL (US), Helmholtz Institute Jena (Germany), Helmholtz Zentrum Dresden-Rossendorf (Germany), International Committee on Ultra-Intense Lasers (ICUIL), Imperial College (UK), INFN-LNF (Italy), Institute of Physics – Chinese Academy of Sciences (China), Institute of Applied Physics RAS (Russia), Instituto Superior Tecnico de Lisboa (Portugal), IRAMIS/CEA (France), IZEST (France), John Adams Institute (UK), KEK (Japan), KFKI-RMKI (Hungary), LAL (France), Lancaster University (UK), LBNL (US), Liverpool University (UK), LMU Munich (Germany), LOA (France), LPGP (France), LULI (France), Lund University (Sweden), Manchester University (UK), Max Planck Institute for Physics (Germany), Pisa University (Italy), PSI (Switzerland), Shanghai Jiao Tong University (China), SLAC (US), Soleil (France), STFC (UK), Tsinghua University Beijing (China), TU Darmstadt (Germany), UCL (UK), UCLA (US), University of Duesseldorf (Germany), University of Hamburg (Germany), University of Oxford (UK), University of Rome La Sapienza (Italy), University of Strathclyde (UK)

Activities – Example

- **1st European Advanced Accelerator Workshop**


EAAG2013
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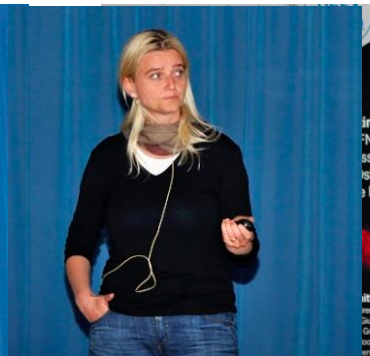
EAAG2013
1st EUROPEAN ADVANCED ACCELERATOR CONCEPTS WORKSHOP
SUPPORTED BY EU via EuCARD-2, GA 312453
LA BIODOLA - ISOLA d'ELBA - FROM 2 TO 7 JUNE 2013

EAAC2013 Statistics

number of participants	**145**	
number of countries	**15**	
number of institutes	**69**	
number of student stipendships	**13**	
inside EU	**128**	
outside EU	**17**	US, CHINA, JAPAN, RUSSIA, UKRAINE, ISRAEL
number invited plenary talks	**25**	
number WG's	**6**	
number contributed WG talks	**77**	
number of discussion rounds	**4**	
number of posters	**19**	



1st EuroNNAc2 Meeting

EuroNNAc member's board, June 2013

Outcome: Europ. Distributed Plasma Accelerator Project

- Agreed on principle to support all activities of EuroNNAc members to the outside, discuss priorities internally.
- Agreed to start a **European Design Study for Plasma Accelerators**.
  - Pro and contra for all different concepts to be compared. All drivers and particle types.
  - Develop a design for one or few plasma accelerators of next generation.
  - Concentrate on accelerator issues and outline applications.
  - A team of volunteers will be formed → R. Assmann. Conceptual design report 2016.
  - Relation to ELI must be clearly described.
- Location will be discussed on basis of the outcome of the design study. It was agreed that **budget and work load will be distributed**, no matter if one or several locations will be adopted (example: particle physics experiment).
- Agreed that **dielectric structures** will be fully included into our scope. Several European actors are emerging and were present at EAAC.

Outcome: European Advanced Accelerator Concepts WS

- Given the success, we agreed that **next EAAC will be held in 2015, again in the island of Elba**. A date will be identified → M. Ferrario.
- Preparation time for the 2nd EAAC should be around 2 years, about twice as long as for 2013 event.
- Organization of **working groups** should be optimized, in order to strengthen wok character and to avoid too many talks. Dedicated time for discussion into the program.
- WG1 (plasma acceleration) could be split into **electron generation** and **radiation generation**.
- Length of EAAC should be extended to 5 days.
- The EAAC concept should be coordinated with the Laser Plasma Accelerator Workshop (LPAW) that happens in the same years → P. Muggli.
- Proceedings of the 1st EAAC will be pursued as planned in journal NIM → J. Osterhoff. **Future proceedings will be as open publication plus journal**.

Outcome: Lobbying, Training…

- Agreed that **EuroNNAc input to the US strategy for photon science facilities** is prepared → A. Seryi et al. Copy will be sent to **European laboratory leaders**.
- Agreed to initiate an **accelerator school covering conventional and advanced topics**, including lasers and plasmas. B. Holzer → CAS. Academic material from A. Seryi, Oxford, J. Osterhoff, University Hamburg, … to be included.
- Agreed to ask for an **EU initial training network** → C. Welsch et al. If successful, fellows could work for the European Design Study on Plasma Accelerators, covering work topics beyond several EuroNNAc partners.
- It was agreed to **update the facilities table**. The latest version should be sent to all partners for completion → R. Assmann.

Conclusion

- EuroNNAc is an endeavor that remains open for new participants.
- We are celebrating our 2nd birthday. The network is going strong with about 50 institutes as members.
  - Several network activities have been successfully realized. Comments and suggestions are welcome.
  - We have discussed future plans, goals, review structure, …
- Final goal during EuCARD2 program: Prepare a **coherent plan and funding scheme on developing together novel accelerators for users and society**. Distributed European test facility.

Thank You

Mixing of conventional and advanced accelerator experts!
(EAAC2013 social banquet)