

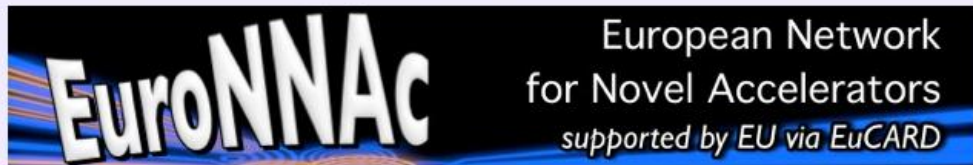


# EuroNNAc Status

*(European Network for Novel Accelerators)*

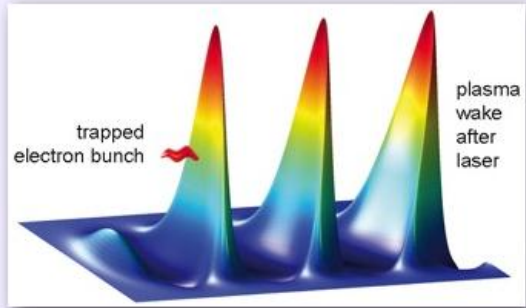


R. Assmann  
EuroNNAc 2012 Meeting  
May 2 – 4, 2012, CERN



http://www.cern.ch/euroinnac-web/Welcome.html

CL – UCLA – University of Düsseldorf – University of Hamburg – University of Oxford – Univer



### What is EuroNNAc?

The European Network for Novel Accelerators EuroNNAc brings together more than 50 institutes and aims at federating the significant European and international efforts in plasma-based accelerators. Goal is to prepare a roadmap for an efficient use of this novel technology in full-scale accelerators.

### News are listed here...

- 03/2012: [Subscribe to work packages!](#)
- 03/2012: EuroNNAc 2012 meeting is fixed to take place at CERN from May 2 - 5, 2012. [MORE INFO HERE.](#)
- 11/2011: EuCARD2 proposal is **sub-mitted to the EU**, including a request for additional funding of the EuroNNAc network.

### Towards a Pilot Facility

The field of novel, plasma-based accelerators has seen steep progress. At present, bunches of  $10^9$  electrons are generated and accelerated to 1 GeV with laser-driven plasma accelerators. The beams have a 1% energy spread, normalized emittances around 10 mm-mrad, a bunch length of 1.5 fs. In parallel, beam driver technologies (electrons or protons) for plasmas are being developed. e-beam driven plasma accelerators have demonstrated an absolute energy gain of 30 GeV for electrons. The EuroNNAc network aims at putting the different technologies together, transferring knowledge to industry, defining an optimal combination of technologies and describing a roadmap towards operational accelerators with first use cases. One or several European pilot facilities should be proposed.

### Reference Information

[EuroNNAc Meeting 2011](#)

[Article CERN Courier about EuroNNAc](#)

- Done:
  - **52 institutes are members of our network**
  - Part of EuCARD2 project. Clarified that network results will feed into TIARA.
  - Further ideas about first plasma acceleration facility for HEP (discussed in ICFA/ICUIL task force):
    - Electron injector for LHeC and other future projects (~10 GeV)
    - In addition, follow-up on plasma linac as compact test beam for HEP
    - Combine both into one proposal for 2013
  - Activities for synchrotron radiation facilities picking up speed:
    - LUNEX5 (F)
    - ARD (DE)
- Ongoing:
  - Started review of general status and outlook: EuroNNAc 2011 talks are a great resource...
  - Discussions on various topics.

# Members I

<b>Institute</b>	<b>Country</b>	<b>Member's board</b>
ASTeC	Great Britain	S. Smith
BNL	USA	V. Yakimenko
Budker INP	Russia	K. Lotov
CERN	International organization	R. Assmann
Cockcroft Institute	Great Britain	S. Chattopadhyay
CONSIGLIO NAZIONALE DELLE RICERCHE, INO	Italy	L. Gizzi
DESY	Germany	J. Osterhoff
EINDHOVEN University of Technology	Netherlands	S. Brussard
<i>ELI</i>	<i>European Project</i>	<i>G. Korn</i>
<i>ESRF</i>	<i>European Organization</i>	<i>J-L Revol</i>
Fermilab	USA	W. Chou
Helmholtz-Institute Jena	Germany	M. Kaluza
Helmholtz-Zentrum Dresden-Rossendorf	Germany	T. Cowan
ICUIL	International committee	T. Tajima
Imperial College	Great Britain	Z. Najamudin
INFN-LNF (Milan, ...)	Italy	M. Ferrario

# Members II

Inst. of Physics, Chinese Academy of Sciences	China	L. Chen, L. Yutong
Institute of Applied Physics RAS	Russia	I. Kostyukov
Instituto Superior Tecnico de Lisboa	Portugal	L. Silva
IRAMIS/CEA	France	P. Martin
IZEST	France	G. Mourou
John Adams Institute	Great Britain	A. Seryi
KEK	Japan	Mitsuaki Nozaki, Mitsuhiro Yoshida
KFKI-RMKI	Hungary	G. Vesztergombi
Laboratoire Leprince-Ringuet (Ecole polytechnique - CNRS/IN2P3)	France	A. Specka, H. Videau
LAL	France	A. Stocchi
Lancaster University	Great Britain	G. Burt
LBNL	USA	C. Schroeder
Liverpool University	Great Britain	C. Welsch
LMU Munich & MPIQ	Germany	S. Karsch
LOA	France	V. Malka
LPGP	France	B. Cros

# Members III

LULI	France	F. Amiranoff
Lund University	Sweden	C.G. Wahlstroem
Manchester University	Great Britain	R. Jones
Max Planck Institut für Physik	Germany	P. Muggli
Pisa University and INFN	Italy	D. Giulietti
PSI / EPFL	Switzerland	M. Seidel
Shanghai Jiao Tong University	China	X. Wang
SLAC	USA	M. Hogan
<i>Soleil</i>	<i>France</i>	<i>M.E. Couprie</i>
STFC Central Laser Facility	Great Britain	G. Hirst
STFC Daresbury Laboratory	Great Britain	J. Clarke
Tsinghua University, Beijing	China	W. Lu
TU Darmstadt	Germany	M. Roth
UCL	Great Britain	M. Wing
UCLA	USA	C. Joshi
University of Düsseldorf	Germany	A. Pukhov
University of Hamburg	Germany	F. Grüner
University of Oxford	Great Britain	S. Hooker
University of Rome LA SAPIENZA	Italy	M. Migliorati
University of Strathclyde	Great Britain	D. Jaroszynski

## 1. Management and Communication

*R. Assmann, CERN*

*J. Osterhoff, University Hamburg, DESY*

*H. Videau, ecole Polytechnique*

*Direct cost (M+P): 120k€ (3 coordinators → 3 times 40k€ to institutes)*

*Network activities: 280 k€ (administered centrally)*

## 2. Scientific goals and programme

*Task leader: ad interim R. Assmann, CERN*

*Direct cost included above*

## 3. Organization, strategy and funding

*Task leader: ad interim H. Videau, EPFL*

*Direct cost included above*

## 4. Communication, training and technology transfer

*Task leader: ad interim J. Osterhoff, DESY*

*Direct cost included above*

- **Task 1. EuroNNAc2 Coordination and Communication.**
  - Coordination and scheduling of the network tasks
  - Monitoring the work, informing the project management and participants within the network
  - Network budget follow-up
- **Task 2. Scientific goals and programme (WG 1)**
  - Define scientific goals for various possible applications of plasma acceleration
  - Define a coherent European research and test program
  - Define a distributed test facility and a first pilot facility. Feed input into TIARA.
  - Prepare common reference standards



- **Task 3. Organization, strategy and funding (WG 2)**
  - Develop an efficient organization
  - Define an optimal strategy towards operational advanced accelerators
  - Discuss funding schemes for long-term R&D efforts, feeding into TIARA
- **Task 4. Communication, training and technology transfer (WG 3)**
  - Organize conferences and workshop to help an optimal communication
  - Promote technology transfer and collaboration with industry
  - Help in training of experts

- **Sub-task 2.1. GOALS & REQUIREMENTS.** Develop goals from photon science and particle physics for advanced e-beam accelerators, including timeline. 5y, 10y, 20y goals and perspectives.
- **Sub-task 2.2 TECHNICAL R&D.** Describe coherent program for research on novel e-beam accelerators. What are the main components of this program?
- **Sub-task 2.3 ULTIMATE REACH.** Investigate the ultimate energy and intensity reach with advanced accelerators.
- **Sub-task 2.4 STANDARDS.** Define reference measurements to qualify facilities for photon science and/or particle physics, including definition of standards.
- **Sub-task 2.5 THEORY AND SIMULATIONS.** Foster inter-disciplinary work on theory and simulations, bringing together plasma, laser and beam models

- **Sub-task 3.1.** WHITE PAPER EUROPEAN STRATEGY. Produce a white paper that defines a coherent European strategy for advanced accelerator R&D, maximizing synergy between different labs and projects.
- **Sub-task 3.2.** DISTRIBUTED ACCELERATOR TEST FACILITY. Create framework for open facilities. EuroNNAc to describe and further develop coherent network of test facilities, document capabilities, review requests, discuss work share. “Distributed accelerator test facility for photon science and particle physics”. Feed results of studies into TIARA.
- **Sub-task 3.3.** PILOT FACILITY(IES). Vision on the time-scale of one or few centralized “big” facilities, beyond present projects. From “distributed test facility” to a “pilot e-beam facility”. Pilot facility runs 24h 7/7 to produce agreed e-beam. What does “big” mean? Beam parameters? How many? How to split beam time for synchrotron radiation, medical applications and High Energy Physics applications? Feed results of studies into TIARA.

- **Sub-task 3.4. EUROPEAN PROPOSALS AND CONTACT TO EU.** Ask FP7/8 support for a “distributed open test facility”, including support for beam/laser time for users. Use also LaserLab opportunities. Prepare FP8 proposal for one or several pilot facilities.
- **Sub-task 3.5. FUNDING MECHANISMS.** Propose adequate funding mechanisms to support university-based accelerator research with long-term scientific benefits.

- **Sub-task 4.1. TECHNOLOGY TRANSFER.** Foster transfer of technology between communities and with industry.
- **Sub-task 4.2. ADVANCED ACCELERATOR SCHOOL.** Creation of a “European School: From Conventional to Novel Accelerators”, linked to CAS or other series.
- **Sub-task 4.3. TRAINING.** Define training needs for students and specialists in advanced accelerator research. Propose training structures to address these needs.
- **Sub-task 4.4. ADVANCED ACCELERATOR CONFERENCE.** Evaluate the need for a European Advanced Accelerator Conference. Propose a scheme compatible with existing conferences.

- The network has a considerable strength due to the strength of its **52 participating institutes**.
  - The membership covers a broad range of accelerator applications: from basic R&D, to photon science, to medical, to particle physics.
  - The membership includes universities, national labs and an international organization.
  - The network is supported by the accelerator community (EuCARD) and by the EU.
- ➔ It is our job to exploit this opportunity and to use it to support and push this exciting field.

- This is a **small meeting**:
  - Invitation only went to members of the member's board (52 persons).
  - Decided not to send to full invitation list (~300 persons) nor to invite CERN persons.
  - As many of us are always busy: Participation in person or by remote connection.
- Goal:
  - **Start a real working process.**
  - Meeting as initial starting point of discussions.
  - Produce **first official EuroNNAc outcomes** until July...
  - Prepare further outcomes for the medium to long term

1. Statement from EuroNNAc to European Strategy Group for Particle Physics (deadline July 31)
  - a) Make sure the potential of plasma wakefield accelerators is correctly taken into account for the future.
  - b) Support from the European strategy group can result in funding priorities.
  - c) Our network can make a strong case, not easy to be ignored.
  - d) Other communities prepare similar statements.
  - e) Need to coordinate with ICFA/ICUIL task force report (W. Leemans).
2. EuroNNAc review on status of the field, Annalen der Physik (Sep 2012)
  - a) Helps to obtain a coherent view and to develop coherent strategy
  - b) Who wants to co-author?





## Update of the European Strategy for Particle Physics

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### **European Strategy Group**

[Mandate](#)

[Composition](#)

[Meetings \(Indico\)](#)

[Archives](#)

### **European Strategy Preparatory Group**

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[Composition](#)

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[Minutes of past meetings](#)

[Call for submissions](#)

### **Other**

[European Strategy for Particle Physics](#)

[Related links](#)

## The European Strategy for Particle Physics

At appropriate intervals, at most every 5 years, the European Strategy Session of Council will re-enact the process aimed at updating the medium and long-term European Strategy for Particle Physics, by setting up a Working Group, the [European Strategy Group \(ESG\)](#), similar to the Strategy Group in 2005/2006. The ESG will be a Working Group of Council which will cease to exist each time Council has adopted the new medium and long-term Strategy. The remit of the ESG will be to establish a proposal for the European Strategy Session of Council to update the medium and long-term European Strategy for Particle Physics.

Council, September 2007

For the purposes of the Strategy Update, the ESG will be assisted by an ad hoc [Preparatory Group](#).

## The European Strategy Preparatory Group (ESPG) Members

### Strategy Secretariat Members

Prof. T. Nakada	Scientific Secretary (Chair)
Prof. F. Zwirner	SPC Chair
Dr M. Krammer	ECFA Chair
Dr Ph. Chomaz	Repres. EU Lab. Directors

### SPC

Prof. R. Aleksan (FR)  
Prof. P. Braun-Munzinger (DE)  
Prof. M. Diemoz (IT)  
Prof. D. Wark (UK)

### ECFA

Prof. K. Desch (DE)  
Prof. K. Huitu (FI)  
Prof. A. P. Zarnecki (PL)  
Prof. C. De Clercq (BE)

### CERN

Dr P. Jenni

### ASIA/AMERICAS

Prof. Y. Kuno (Asia)  
Prof. P. McBride (Americas)

Prof. E. Tsesmelis                      Scientific Assistant

## The European Strategy Preparatory Group (ESPG)

The remit of the ESG is to establish a proposal for an Update of the medium and long-term European Strategy for Particle Physics, for approval by the Council. It is proposed that the proposal will take the following elements into account:

The Update of the European Strategy for Particle Physics shall in particular aim at:

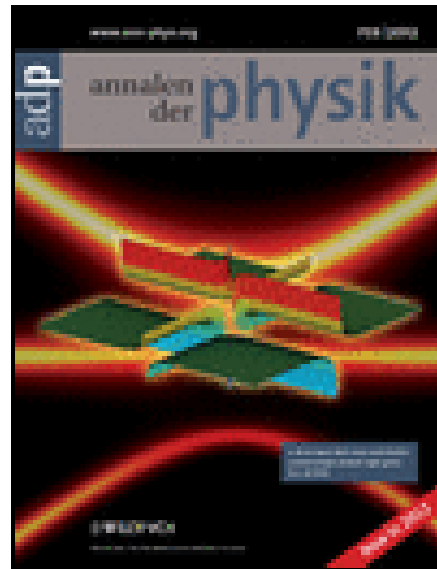
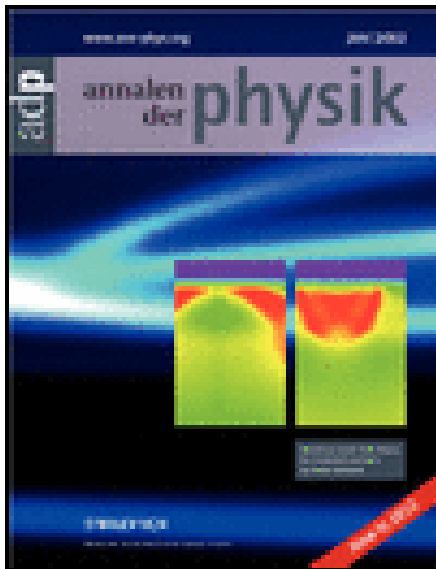
- enhancing the visibility of existing European particle physics programmes;
- increasing collaboration among Europe's particle physics laboratories, institutes and universities;
- promoting a coordinated European participation in global projects and in regional projects outside Europe;
- encouraging knowledge transfer to other disciplines, industry, and society.

The proposal shall include a review of the implementation of the 2006 Strategy, as well as of the structures and procedures currently in place with regard to the Strategy.

The proposal shall outline priorities following a thematic approach, with special emphasis on future large infrastructures/projects, including preparatory steps for a next project at CERN after LHC in a global context, and consider time scales and resources. It shall also consider possible future participation by CERN in experiments outside the Geneva Laboratory as part of the Strategy implementation.

The proposal shall comprise a series of ordered and concise statements of 1-2 lines each, or 1-2 pages in total followed by more detailed presentations that shall not exceed 25 pages.

- Invitation: A review article (15-25 pages, full overview article) or feature article (8-10 pages, focused topic) in the field of “Novel Particle Accelerator Technologies” → in English of course.



3. Description of a Distributed Advanced Test Facility in Europe (Nov 2012)
  - a) Idea is to describe all approved & proposed tests in various countries in a coherent way, as part of an European strategy
  - b) Maintain full competitive spirit while avoiding needless duplication.
  - c) Being part of a distributed advanced test facility will demonstrate the international scope of the research and will allow asking for additional European funds to strengthen the collaborative work.
  - d) Discussions start this meeting → see agenda.
4. Filling the Working Groups with life (Nov 2012):
  - a) We need proposals for WG leaders, deputy leaders (to be approved by member's board).
  - b) We need fixed plans for work and deliverables.
  - c) Discussions start this meeting.

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## 3. Organization, strategy and funding

*Task leader: **WHO?***

*Direct cost included above*

## 4. Communication, training and technology transfer

*Task leader: **WHO?***

*Direct cost included above*

5. Organization of the 1<sup>st</sup> European Advanced Accelerator Conference EAAC (must start now for Summer 2013 date):
- a) Volunteers for the organization committee.
  - b) Volunteers for the advisory and program committee (or do we take just the member's board plus WP leaders plus ...).
  - c) Where?
  - d) Dates?
  - e) Scope?

**We will come back to the homework in the discussion sessions!  
And maybe we also identify additional homework?**

- To promote our field we need a **clear vision of how scientific and practical applications could develop from our work.**
- This needs to be presented and submitted to various places.
- The **technical achievements around the globe demonstrate that such a vision is achievable.**
- Presenting one vision from the field will make a strong impact and will help us to achieve the vision's goals.
- I present my present "best guess" vision here, for discussion and tuning...
- Maybe we arrive at a first common vision by Friday morning?



Year	R&D	Application and Science
2012 – 20	Laser driver – electron driver – proton driver – positrons acc.? – plasma – e-/p+/ion beam quality – beam radiation tests	<b>Test facilities in various countries targeted to photon science and medical applications</b> (Distributed Test Facility?)
		Low luminosity paradigm: selected high energy events
2020 – 30	efficiency, cost, scalability, reliability, e-/e+/p+/ion beam quality	<b>Operational compact photon science facility (e- beams)</b>
		Compact medical test accelerators
		Compact high energy physics test facility (low luminosity Z production, e+e- beams)
		<b>Advanced beams for multi-GeV injection</b>
2030 – 40	efficiency, cost, scalability, reliability, e-/e+/p+/ion beam quality	<b>Operational compact medical accelerators</b> <b>Operational high luminosity Z factory</b> Test low luminosity Higgs factory?
2040 – 50		<b>Operational high energy frontier collider</b>

- The field of advanced accelerators is developing fast.
- Is this the time right for defining a road map towards applications across multiple fields of applications? I think yes.
- A **common vision** will strengthen our work considerably and will bundle resources from various communities.
- **EuroNNAc is a tool** that we can use to make our point and to lobby for support. The support from 52 participating institutes makes it strong.
- To achieve something we have to do first **agree on our homework and then to do it.**
- Plenty of opportunities are ahead (see my list).