Review of the industry session at the Advanced Low Emittance Rings Technology (ALERT) workshop

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EuCARD²

Advanced Low Emittance Rings Technology

ALERT 2016

Advanced Low Emittance Rings Technology (ALERT) 2016 Workshop

14-16 September 2016
Trieste, Italy
Europe/Rome timezone

- Overview
- Scientific Programme
- Timetable
- Contribution List
- Registration
- Participant List
- Venue
- Accommodation

Trieste | 14-16 September 2016

A workshop on Advanced Low Emittance Rings Technology (ALERT 2016) is organized by ELETTRA on the 14th and 16th of September 2016, as a series of the Low Emittance Rings (LOWεRING) Workshops, supported by the EUCARD2 project.

This will be the 2nd workshop on Low Emittance Rings technology after the one organized in the 2014 in Valencia.

The state of the art in the design of accelerator systems in light source storage rings has today many challenges and issues in common with those of linear collider damping rings and future e+/e- circular collider projects. A series of workshops were made since 2010 aiming at strengthening the collaborations within the low emittance rings' community, including the LOWεRING collaboration network and the USR workshops community.

The goal of the ALERT2016 workshop is to bring together scientists but also industrial partners who are designing and building hardware for low emittance rings, with an emphasis on studies and experimental programs in existing rings and facilities. The impact of targeting and reaching ultra-low emittances to the design of technical systems will be addressed, including operational issues, manufacturing tolerances, calibration and stability/repeatability problems, in an environment dominated by synchrotron radiation.

With MAX IV in commissioning and ESRF II and Sirius in construction, this workshop will benefit from the technological solutions already tested at these labs and important lessons could be learned.

Workshop sessions will include:

- Insertion devices (including also superconducting devices)
- Magnets and alignment
- Injection systems (kickers, multipoles etc)
- RF systems, choices and design
- Vacuum systems and vacuum chambers
- Feedback systems
- Instrumentation

Proposals for contributions to the workshop should be addressed to one of the Scientific Committee members

The goal of the workshop was to bring together Research Institutes – Industries

There were 67 registered participants from Asia, Europe and America including 15 from the industry

In total with locals about 75 people

https://indico.cern.ch/event/518497/

Courtesy of E. Karantzoulis

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Motives

- Universities and Research Institutes do not have appropriate **resources** and sufficient **competences** and even **culture** to exploit an opportunity from the commercial point of view
  - Better accelerators
    - ✓ Better science and technology
- For enterprises it is almost impossible to cover all the different disciplines and relevant knowledge that are often necessary to conceive and set up a new technology and/or a new product
  - Access to new technology
    - ✓ Possible Competitive advantage

Aims

The main object of the workshop was to explore and identify the areas of collaboration between Research Institutes and Industry focusing on:

R&D: needs, opportunities and capabilities

How can we fill the gaps?
How to improve the interaction / communication?

Initiate and encourage communication, discussion and interactions

Potential

Low Emittance Rings ~2018-2028
(beyond MAX IV – ESRF-EBS – SIRIUS)

APS-U, ALS-U, ELETTRA 2.0, SLS II, PETRA IV, HEPS, DLS II, SOLEIL, ANKA, …
(Iran, Mexico, Thailand, African LS, …)
CepC, FCCee

100-200 Meuros (acc only) each → ~1 B€
200-500 Meuros (inc. beamlines) each → ~2 B€

Technical challenges and R&D needed

General Session Chair. Y. Papaphilipou (CERN)

- Highlights from MAX IV commissioning and operation, Pedro Tavares (MAX IV)
- ESRF II, Dieter Einfeld (ESRF)
- Sirius and Sirius magnets, James Citadini (LNLS)
- BESSY-VSR-Project, Martin Ruprecht (BESSY)

Insertion devices Chair: D. Einfeld (ESRF)

- Super-conducting Undulators at ANL, Joel Fuerst (ANL)
- Planar superconducting undulator with neutral pole: test results of the prototype, Nikolay Mezentsev (BINP)
- Fixed gap undulators and performance, Bruno Diviacco (Elettra)

Magnets (static and pulsed) Chair: P. Tavares (MAX IV)

- MAX IV 3 GeV ring magnet, Martin Johansson (MAX IV)
- Magnets for DDBA and lessons learned for Diamond-II, Abolfazl Shahveh (Diamond)
- Magnets for Elettra 2.0, Davide Castronovo (Elettra)

Technical challenges and R&D needed

Magnets & alignment Chair: P. Kuske (HZB)

- Dipoles with longitudinally variable field for CLIC damping rings, Manuel Dominguez (CIEMAT)
- NbTi wiggler tests at ANKA, Axel Bernhard (ANKA)
- Vibrating wire method and hall probe measurements for combined function magnets (DQ) alignment, Alexander Temnykh (Cornell)

Beam transfer systems Chair: R. Bartolini (JAI - DIAMOND)

- Production of round beams, Peter Kuske (HZB - BESSY)
- Development of Multipole Injection Kicker for SOLEIL and MAX IV, Pierre Lebasque (Soleil)
- Stripline kicker development at ALS, Cristoph Steier (LBL)
- Transient studies of the stripline kicker for beam extraction from the CLIC damping rings, Carolina Belver Aguilar (CERN)
- Inductive adders ultra-stable kicker pulse generation, Janne Holma (CERN)

RF systems and power Chair: R. Nagaoka (SOLEIL)

- MAX IV RF Systems, Lars Malmgren (MAX IV)
- Conceptual Design of a 2 GHz RF System for the CLIC DRs, Alexej Grudiev (CERN)
- State-of-the-art RF solid state amplifiers, Massamba Diop (SOLEIL)
- Experience and future trends of Harmonic RF systems, John Byrd (LBNL)

Technical challenges and R&D needed

Feedback systems and Engineering Chair: S. Guiducci (INFN-LNF)

- Fast orbit Feedback for ESRF-EBS, Benoit Roche (ESRF)
- Application of wide-band feedback systems for low emittance rings, John Fox (SLAC)
- Engineering for DDBA and lessons learned for Diamond-II, Nigel Hammond (Diamond)
- Risk assessment for the ESRF II, Dieter Einfeld (ESRF)

Diagnostics, Instrumentation and coating Chair: Å. Andersson (MAX IV)

- Ultra-low vertical emittance measurements in the Australian Light Source, Mark Boland (Australian Synchrotron)
- Conceptual design of X-ray interferometer for extremely apparent small beam size in FCC-ee and beam halo measurement with coronagraph for HL LHC, Toshiyuki Mitsuhash (KEK)
- Ultra-short bunch length diagnostics, Axel Bernhard (KIT-ANKA)
- Laser engineered surfaces, Amin Abdolvand (Dundee University)
- Experience with coating of low gap chambers, Roberto Kersevan (CERN)

Vacuum, coating and other Key technologies and engineering Chair: A. Bernhard (KIT-ANKA)

- MAX IV 3 GeV ring vacuum system, Marek Grabski (MAX IV)
- Vacuum systems for DDBA and lessons learned for Diamond-II, Matthew Cox (Diamond)
- Transverse and horizontal beam size diagnostics with visible SR, Åke Andersson (MAX IV)
- Particle Accelerator Components' Metrology and Alignment to the Nanometre scale (PACMAN), Michele Modena (CERN)

Interaction Institutes-Industries

Collaboration with Industry

The main objective of the industry session was to expose to the industrial partners a number of **key technologies** driven by the design of ultra-low emittance rings. Particular emphasis were given on the **prototyping aspects** of several low emittance rings technologies, including Insertion Devices, Magnets and alignment, kicker systems, RF technology, vacuum systems and instrumentation.

Laboratory procurement rules and **Knowledge Technology Transfer (KTT)** aspects were also discussed together with various aspects of industry/laboratory/university partnerships.

Technical challenges

The SAES Group

saes getters

making innovation happen, together

SAES Group activity in accelerator technology

STRUMENTI SCIENTIFICI CINEL S.r.l.

Vigonza (Padova) – Italia

DESIGN and MANUFACTURING of SCIENTIFIC

Power Matters.™

SiC MOSFET & Diode Roadmap

September 12, 2016
DPG-PDM

Advanced Low Emittance Rings Technology

ALERT

Babcock Noell GmbH

ANKA KIT Karlsruhe Institute of Technology

ALERT Workshop 14-16 September 2016, Trieste

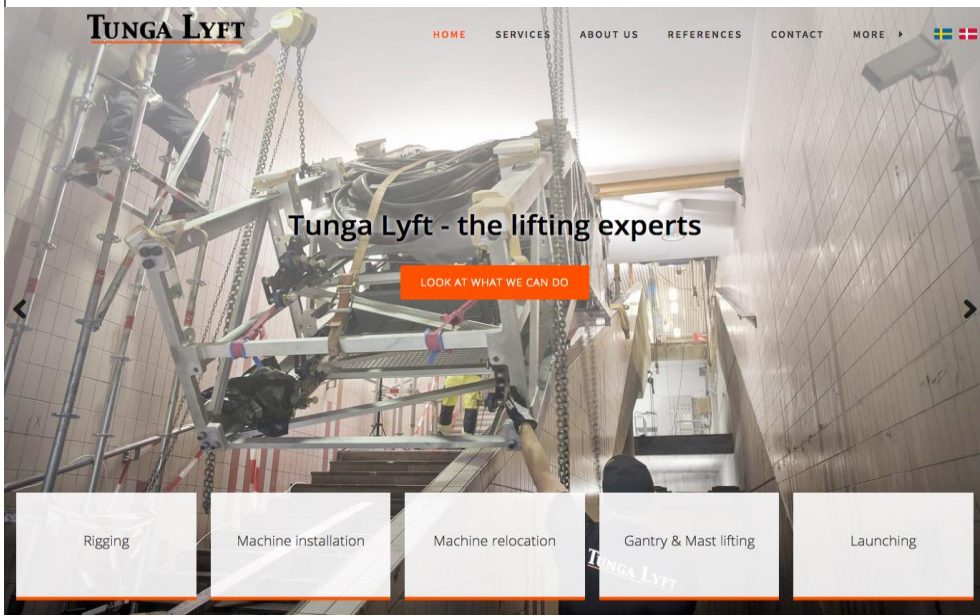
KYMA

Advanced Low Emittance Rings Technology - ALERT 2016
Trieste, September 14th - 16st, 2016

ALERT 2016

KYMA

… riding the wave



Interaction Research Institutes-Industries

Knowledge and Technology Transfer (KTT)

The technology and expertise generated in Research Institutes may have application beyond the immediate goals or intent and could have market value if further developed by the industrial community.

Technological progress is the principal driving force in long-term economic development and growth

- Need (also political) to KTT to industry
- Financial benefit for the institute

Industry view?

- Working with the laboratories could be difficult and time-consuming
- Access to new technology

Mechanisms and tools for KTT

EDUCATED-ORIENTED

- Didactic activities
- Scientific publications
- Mobility of researchers
- Outplacement of students
- Academic networks
- Participation to conferences, meetings, fairs
- Postdoc masters (also for workers)

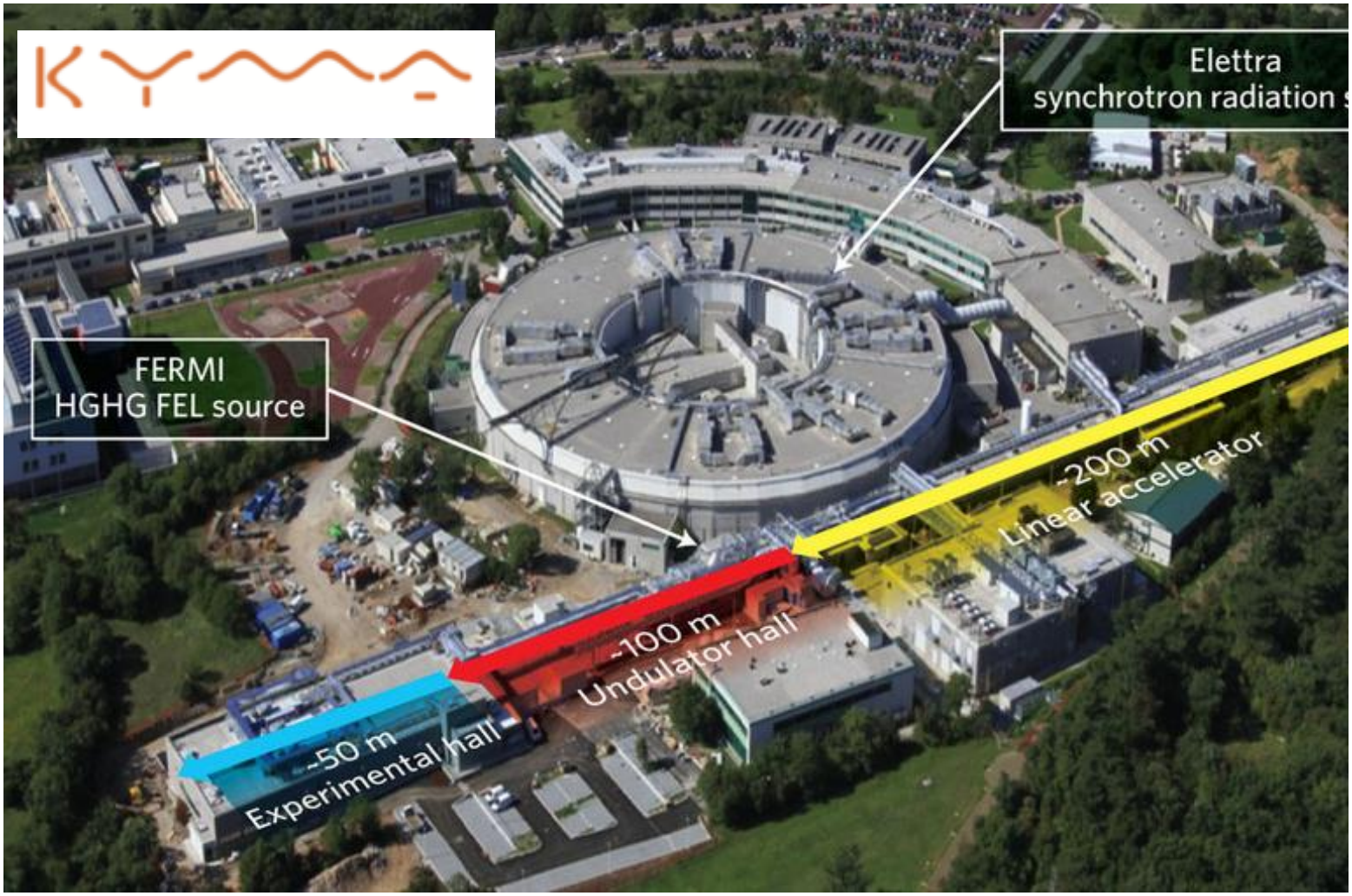
MARKET-ORIENTED

- Research contracts
- Co-operative research programs
- R&D consortia
- Shared laboratories
- Sell of intellectual property
- Spin-off creation
- Services for tests and analysis
- Technological consultancy
- Accreditation and certification activities

TOOLS

- Scientific parks
- Innovation districts
- Business incubators
- Industrial Liaison Offices (ILO)
- Patents

Interaction Research Institutes-Industries



Interaction Research Institutes-Industries

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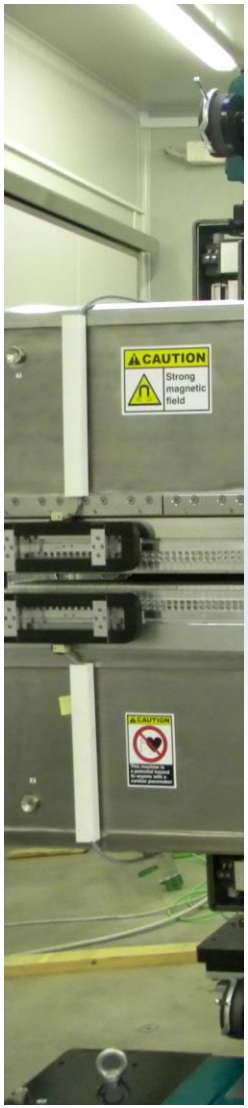

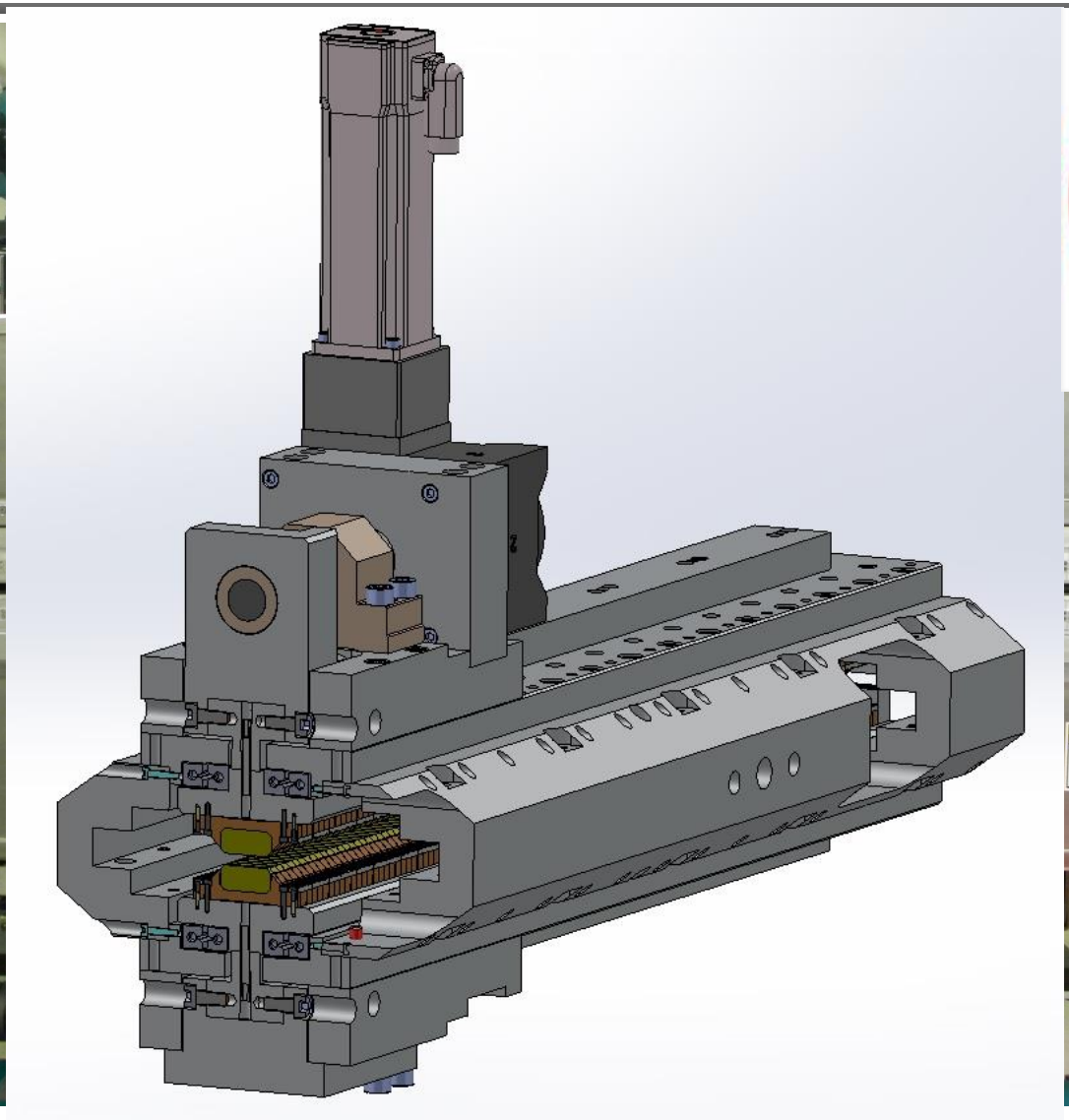

Different interaction depending on institutes

1. Customer-manufacturer
2. R&D collaboration
3. Engaging with local industries
4. …

Interaction Research Institutes-Industries

ISSUES

- Complaints from institutes
  - Delays…
- Suggestions from industries:
  - Procurement rules need revision
    - should not win always the cheapest
    - most appropriate procedure according to the kind of product
  - Feedbacks to companies when they are not awarded the contract - lessons learnt useful information for the supplier

IMPROVEMENTS

- Communications
  - Common design reviews
  - Monthly report (is there anything better?) – web conf?
  - Quality control / visit to the customer – open companies
  - Expeditors / Delay management / Project management for making sure there is no line stopping situation

Final considerations

First EXPLORATIVE meeting to foster discussion and reflect on how to improve the collaboration between research facilities and industries

Consider:

Technical challenges and required R&D

Industry interests and capabilities

Where technology transfer can happen

PACMAN = a study on **P**article **A**ccelerator **C**omponents' **M**etrology and **A**lignment to the **N**anometre scale, is an **Innovative Doctoral Program network** founded by the European Commission **FP7 Marie Curie Actions**, hosted by **CERN**, providing training to **10** Early Stage Researchers (**ESR**) all enrolled to **PhD** studentship programs.

How to foster this exchange?

special committees/individuals

(e.g. industry liaison officers)-> in some labs already exist (Electra, ESRF,..)

Actions:

Workshops/networks - bringing together systems users and industries

Seconded PhD with EU support (Marie Curie netw.)

Use the PACMAN example for univ + lab + company collaboration

THANK YOU

for

your attention

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