EuroFEL
FREE ELECTRON LASERS OF EUROPE

The EuroFEL consortium of free electron lasers in Europe

Josef Feldhaus, DESY

FLASH at DESY, Hamburg

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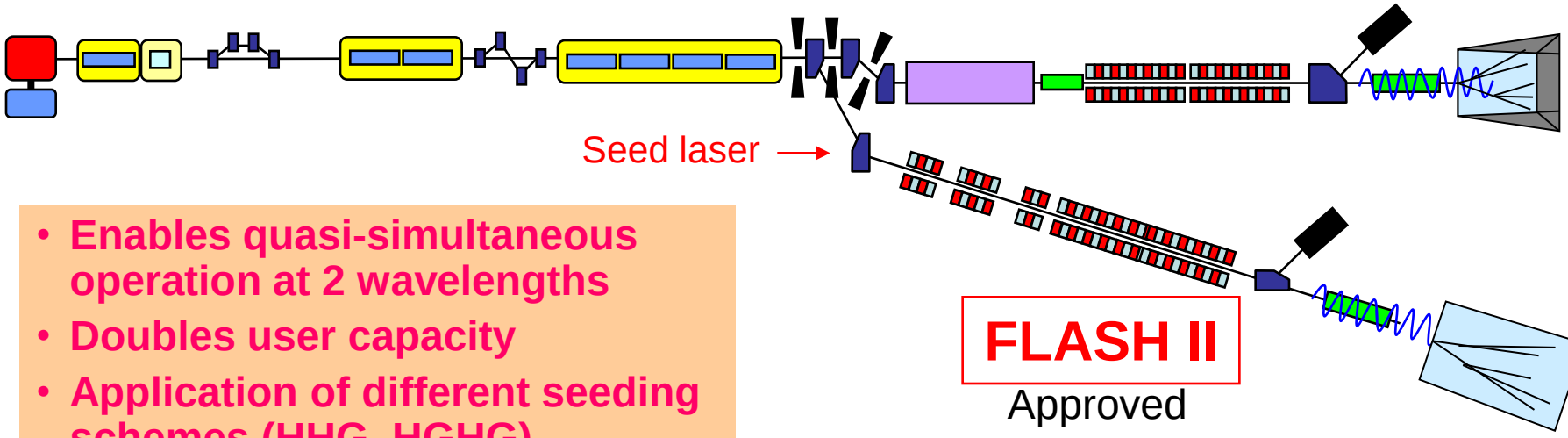
• Jan 2005	first lasing at 32 nm
• Aug 2005	start of user expts.
• Energy range	~0.3 – 1.2 GeV
→	~60 – 4.5 nm
	~20 – 280 eV
• Pulse energy	>200 µJ
• Pulse duration	~10 - 50 fs
• Peak power	1 - 10 GW
• Bandwidth $\Delta\lambda/\lambda$	~0.7 - 1 %



- Enables quasi-simultaneous operation at 2 wavelengths
- Doubles user capacity
- Application of different seeding schemes (HHG, HGHG)

FLASH II

Approved

Construction: 2011-14

FERMI@Elettra

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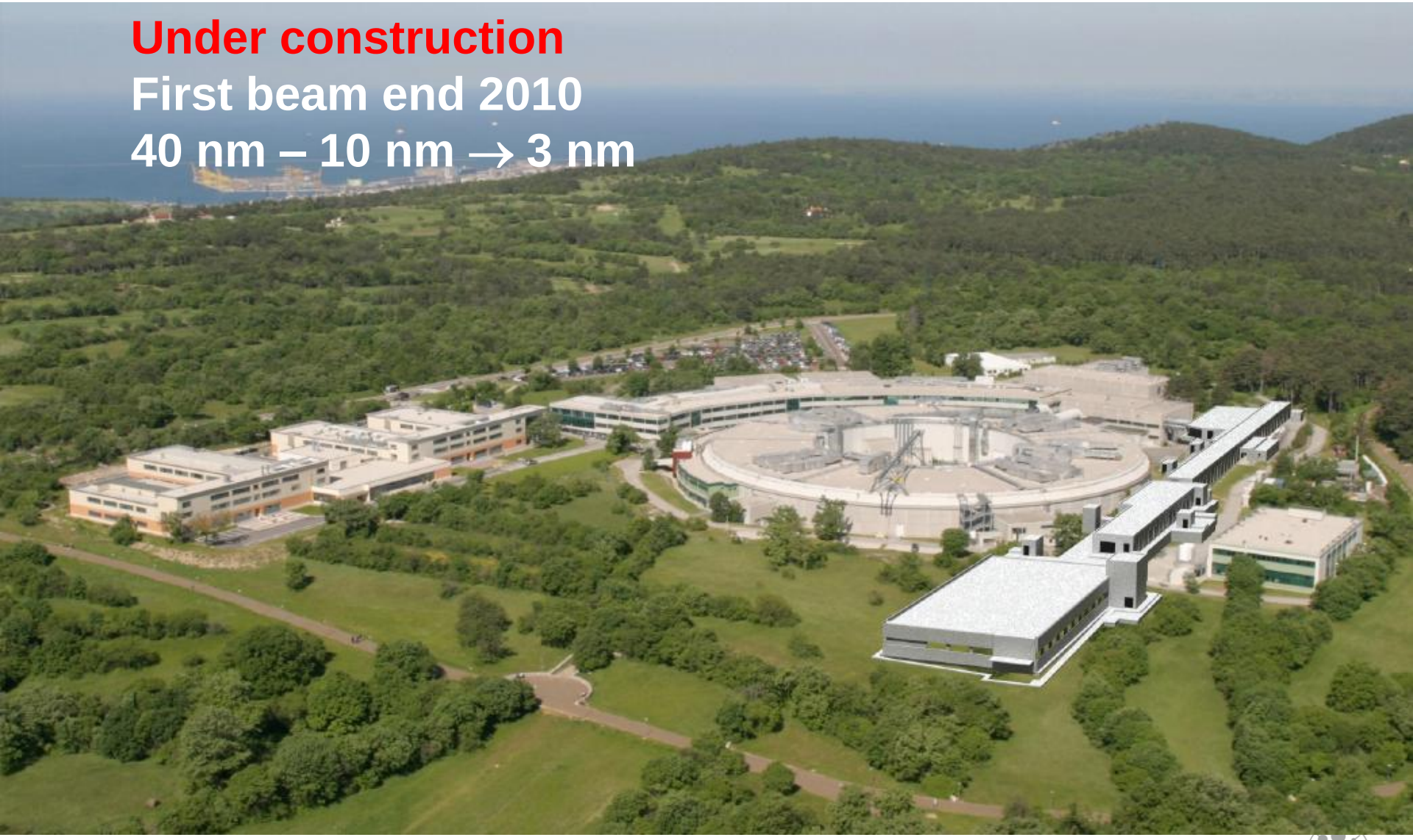
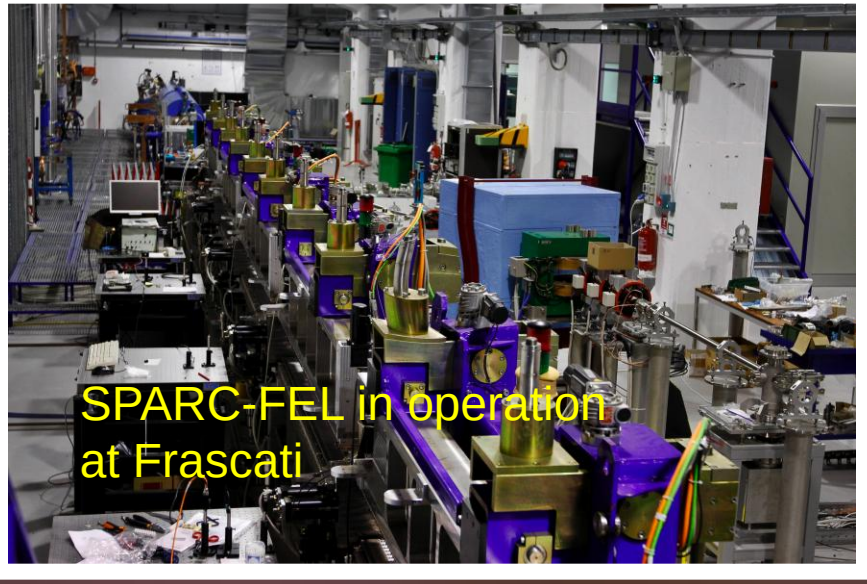


Laser VUV - X from 0.5 nm to 40 nm
Length 500 meters
Cost phase 1 : 70 M€
Cost phase 2 : 50 M€

Ministero dell'Università e della Ricerca

REGIONE LAZIO

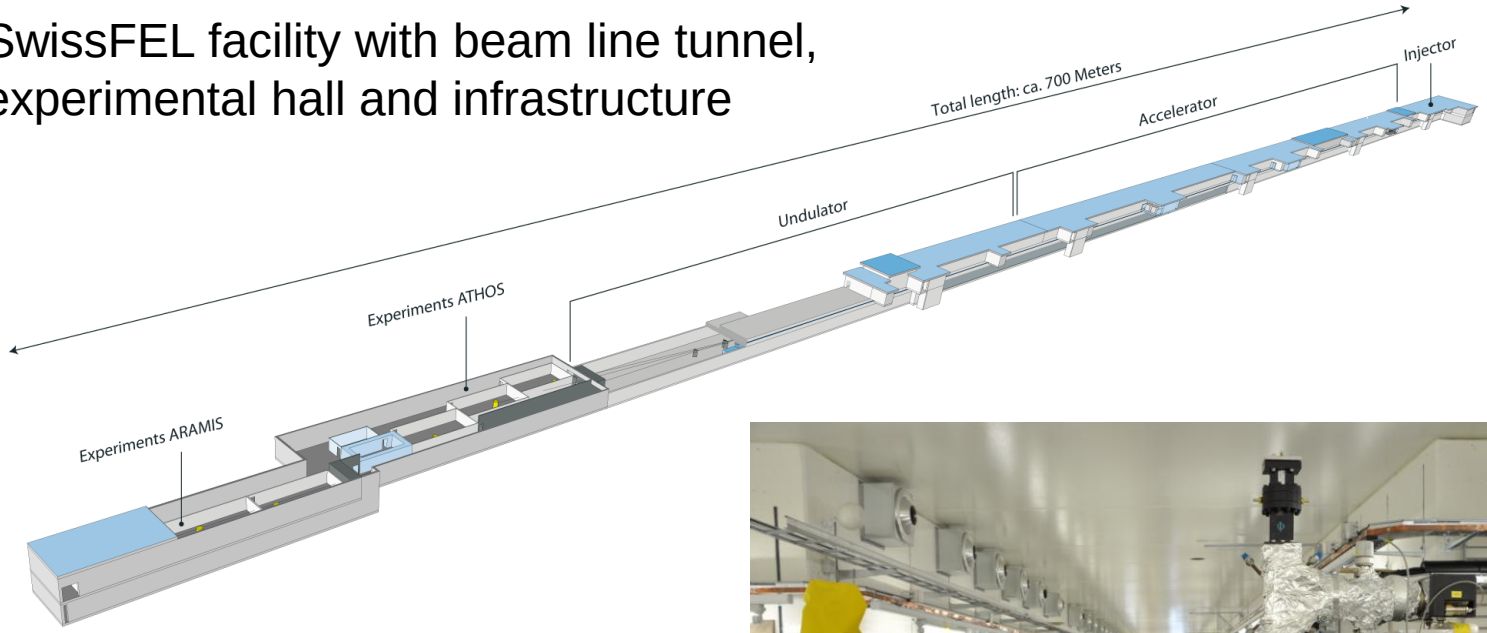


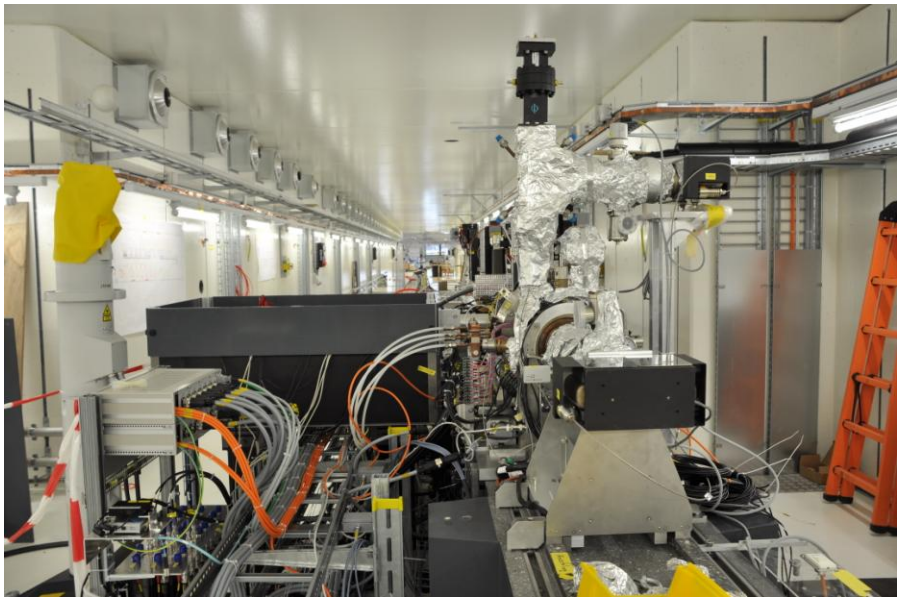
Site: Università of Roma Tor Vergata
Costruction: 2010 - 2014

Consiglio Nazionale delle Ricerche
ENEA C.R. Frascati
INFN Istituto Nazionale di Fisica Nucleare
Università degli Studi di Roma TOR VERGATA

SwissFEL at PSI

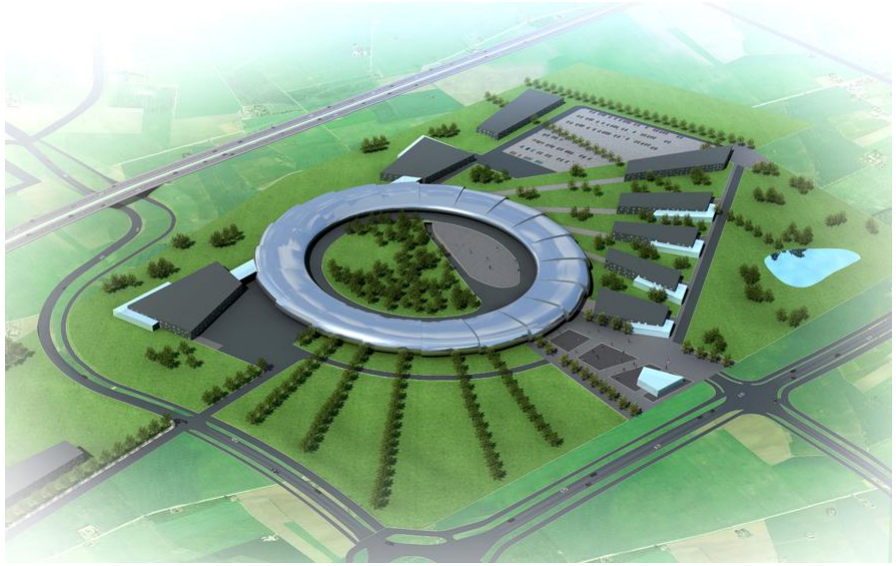
SwissFEL facility with beam line tunnel, experimental hall and infrastructure





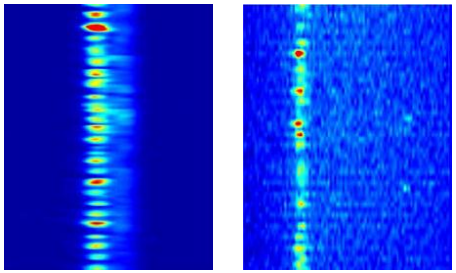
250 MeV injector test facility

MAX IV at Lund



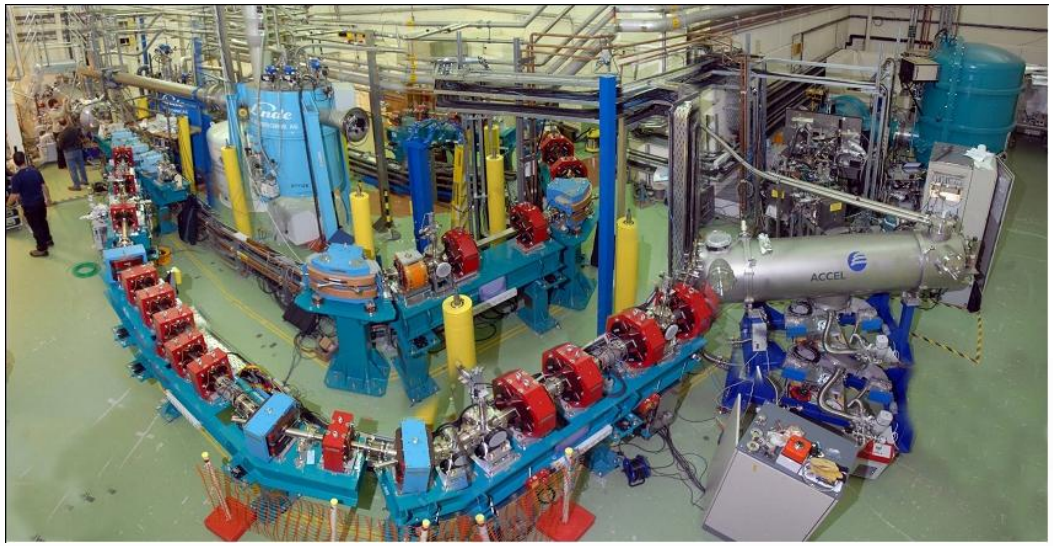
MAX IV storage ring
including SPPS
approved project

MAX-lab FEL test facility, Lund

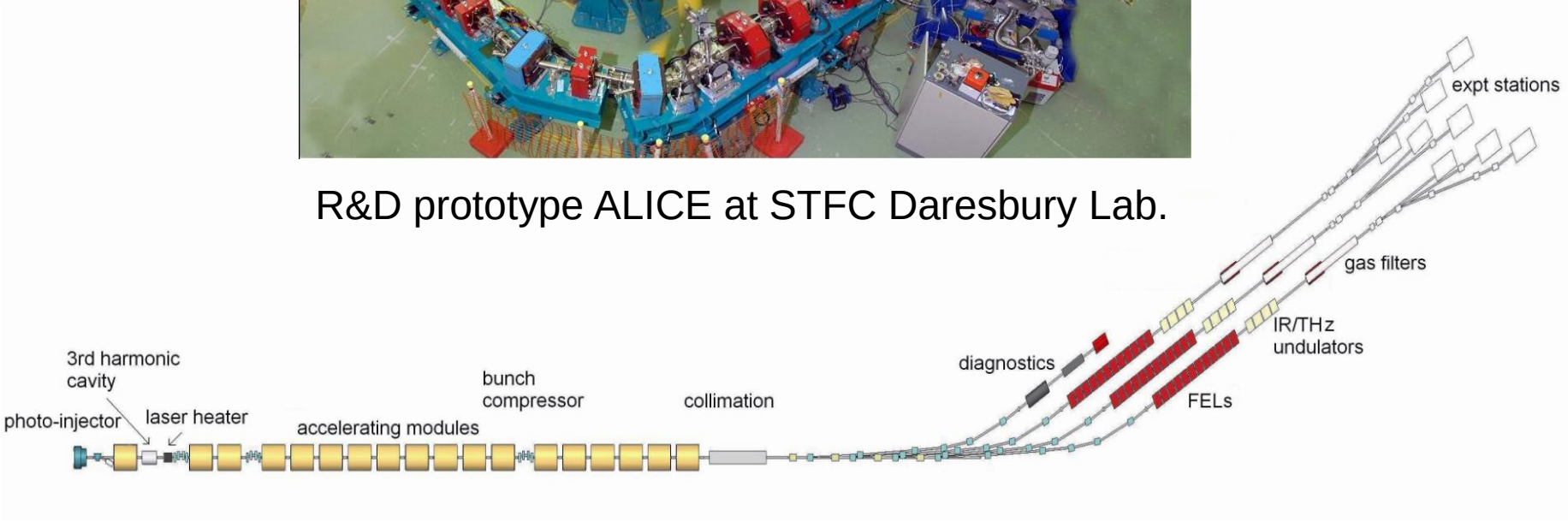


Seeding expt. Dec. 2009

New Light Source, UK



R&D prototype ALICE at STFC Daresbury Lab.



Layout of the future NLS in the UK

Helmholtz Zentrum Berlin

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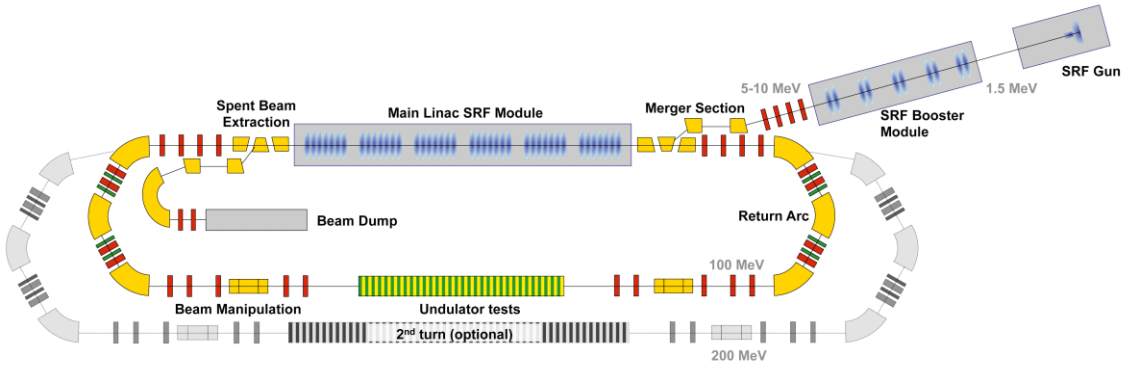
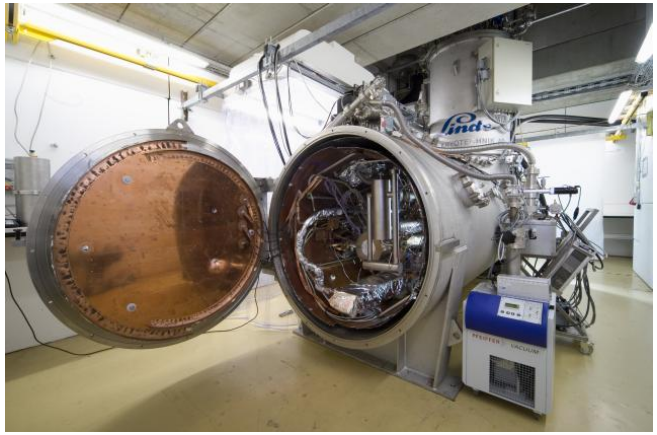
BERLinPro

Demonstration and test facility for ERL technology



BESSY II storage ring



HoBiCaT test facility

Collaboration on FLASH II

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FEL projects in Europe

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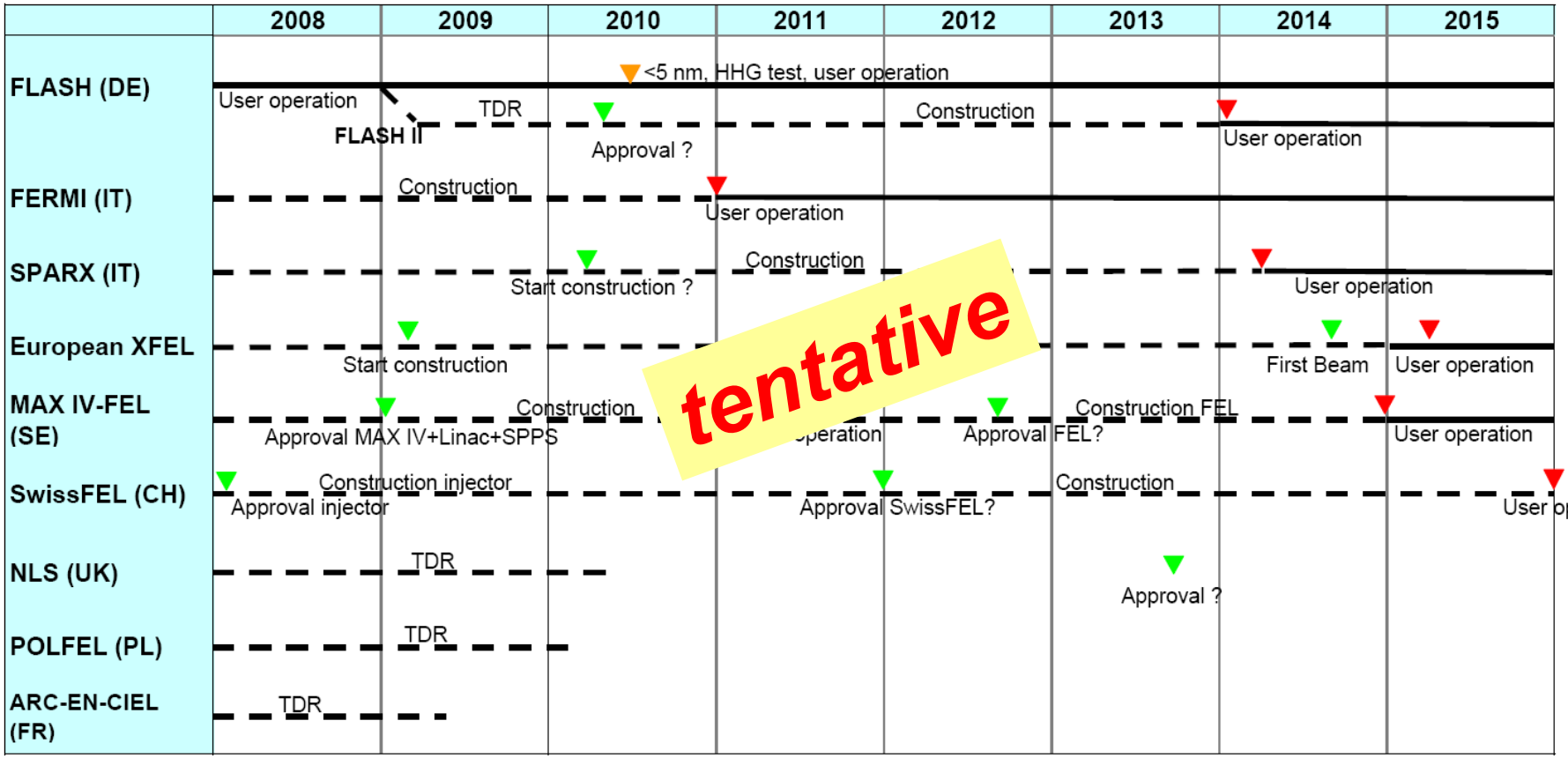
Two projects are on the ESFRI roadmap

- European XFEL
- EuroFEL consortium



From IRUVX to EuroFEL

Basic idea:
join forces to construct a set of complementary FEL sources in Europe

- 2002: ESFRI working groups on FELs:
  (1) R&D requirements and (2) science case (IR-UV-X)
- 2005-7: EUROFEL Design Study project, funded by the EC FP6
  - Development of critical technology for FELs
  - Build trust, positive experience with coordinated R&D on a European level
- 2006: IRUVX-FEL part of ESFRI Roadmap
- 2008-11: IRUVX-PP: Preparatory Phase for EuroFEL

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Why do we need EuroFEL?

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- FELs are expensive and in competition with other large-scale facilities
- FEL development, construction and operation are very demanding, there is a lack of experts
- FELs are single-user machines while the user community is large and multidisciplinary

- Strong, well-coordinated FEL consortium
- Involvement of all stakeholders

- Enhance visibility and speak with one voice
- Construct a world-class infrastructure for ERA

DESY

IRUVX-PP – the Preparatory Phase of EuroFEL

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Objectives of the Preparatory Phase project

- Define the mission and scope of the future EuroFEL consortium
- Define the organisational structure of EuroFEL
- Draft a consortium agreement and agree on a legal form
- Development of critical FEL technology

Facts and figures

- Funded under FP7 – Capacities as a preparatory phase project
- Funding: 5,700.000.- Euro (almost 50% for R&D)
- Duration: 3 years (04/2008 – 03/2011)
- Beneficiaries: DESY, Elettra, HZB, INFN, MAX-Lab, STFC, PSI
  potential beneficiaries: Soleil, IPJ
- Coordinator: DESY

SEVENTH FRAMEWORK PROGRAMME

DESY elettra HELMHOLTZ ZENTRUM BERLIN für Materialien und Energie INFN Istituto Nazionale di Fisica Nucleare MAX-lab PAUL SCHERRER INSTITUT PSI Science & Technology Facilities Council SOLEIL SYNCHROTRON

Core activities of EuroFEL

- **Ensure efficient construction and operation of complementary, world-class FEL facilities for multidisciplinary research with pan-European access**
- **Coordinate technical developments**
- **Promote and coordinate training and education**
- **Ensure efficient communication, external and internal**
- **Represent European FEL science and technology encompassed by the consortium**

Examples under IRUVX-PP

- WP7, WP8: R&D related to photon and electron beam
- WP3: structure technical collaboration, e.g. initiated expert groups, e.g. optics metrology
- Schools and workshops
  - Better coordination on European level
  - Marie Curie Initial Training Network MC-FEL
    if no EC funding, use EuroFEL budget
  - Workshop on Photon Beamlines & Diagnostics, June 2010, DESY
    idea: bi-annual series
  - Industry workshop, March 1, 2010, Döllnsee
- EuroFEL Newsletter

IRUVX-PP timeline

- Apr 2008 — PP start
- Mar 2010 — agreement on main issues:

  mission and scope, core activities, management structure, financing
- Nov 2010 — sign MoU, agree on EuroFEL structure and strategy for the first 3-4 years
- Mar-Sep 2011 — PP extension, draft consortium agreement
- Summer 2011 — Start EuroFEL