



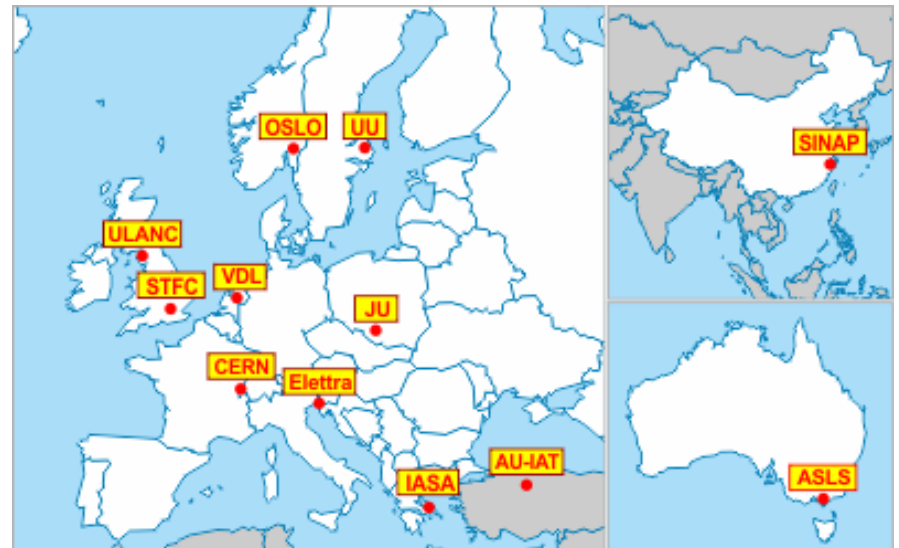
FEL working group and EU project planning: XbFEL Face-2-Face Meeting

A. Latina, J. Pfingstner for the FEL working group
(S. Stapnes, G. D'Auria, W. Wuensch, D. Schulte)



XbFEL before June 21st

- A consortium of 12 institutes submitted a proposal to the H2020-INFRADEV-1-2014-1 call:
 - Design of an RF module based on CLIC X-band technology for FEL applications
 - Deliver a whitepaper for Greenfield Soft X-ray and Hard X-ray FELs
- Not funded



June 21st : XbFEL Face-2-Face Meeting

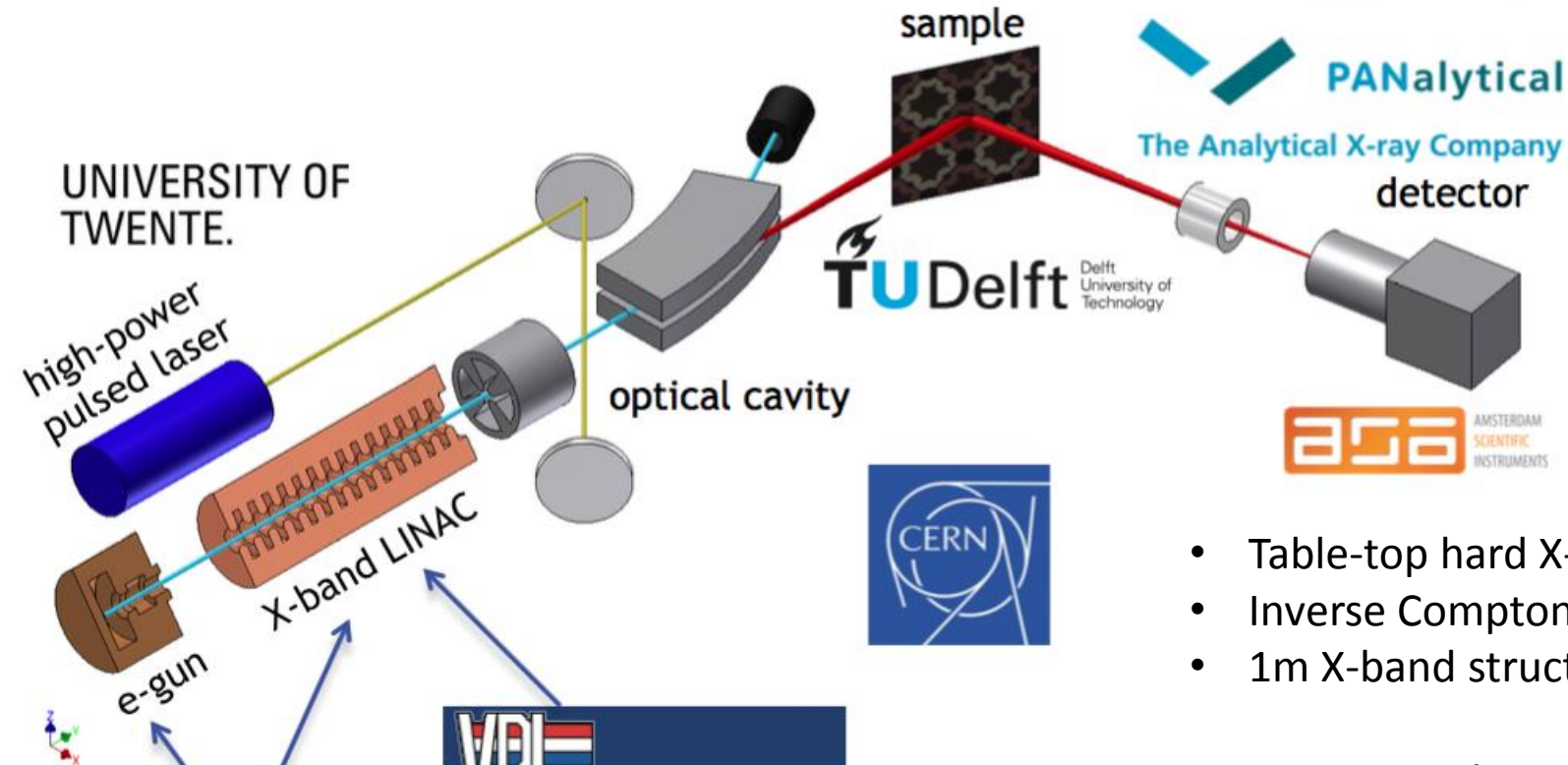
- Face-2-face Meeting to tackle the preparation of a new proposal to submit for a new H2020 call
- Nearly 25 participants, many newcomers
 - Research Institutes: CERN, ELETTRA, STFC, SINAP, ...
 - University: Ankara, Uppsala, Eindhoven, Groningen, Lancaster, Oslo, NTUA, ...
 - Industry: VDL, Kyma, Pulsar
 - CERN EU Office

XbFEL now

- We want to respond to a new H2020-INFRADEV-01-2017 call Design Studies with a substantially enhanced project
- Rationale:
 - Push toward the next generation of X-ray Light-Sources in a wider sense
 - Extend the scope of the previous proposal to benefit a larger number of institutes
- On the table:
 - Compact FELs : with an optimized start-to-end design (X-band gun, X-band linac, undulators of new generation)
 - Compact Compton-Scattering: table top X-ray sources
 - Compact THz radiation sources
- More ambition, wider objectives, more beneficiaries

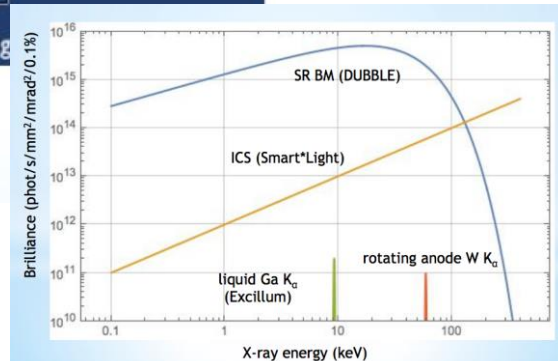
Presentations of newcomers

Eindhoven University of Technology: Smart*Light



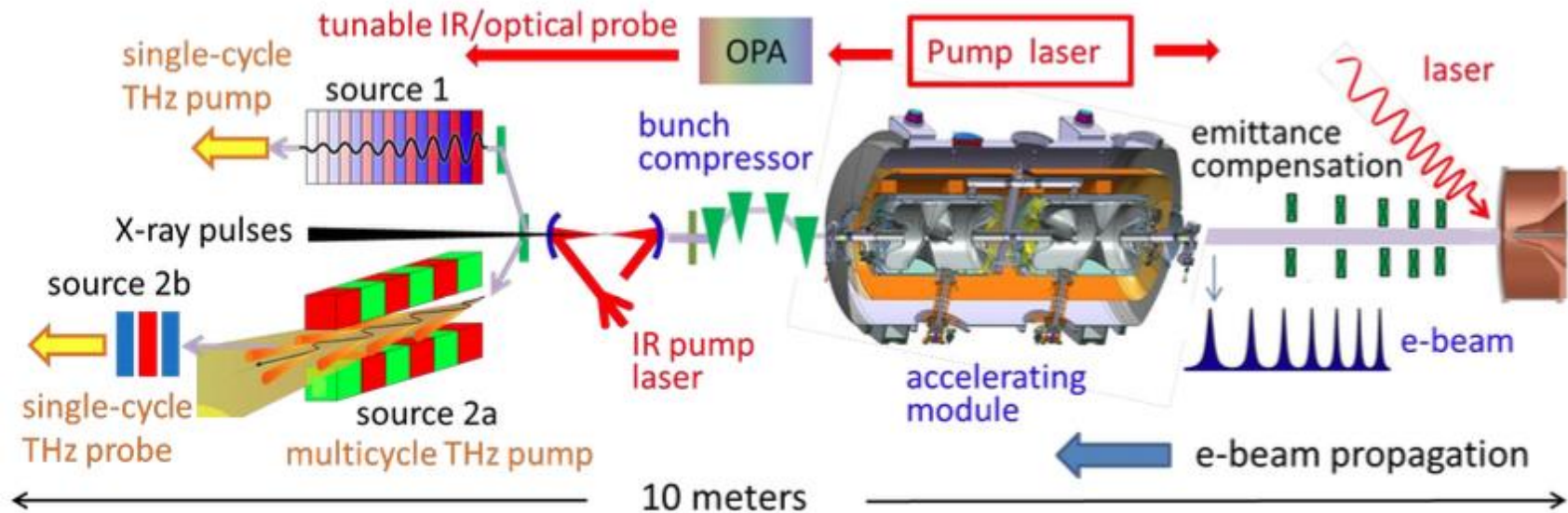
TU/e Technische Universiteit Eindhoven University of Technology

VDL VDL Enabling



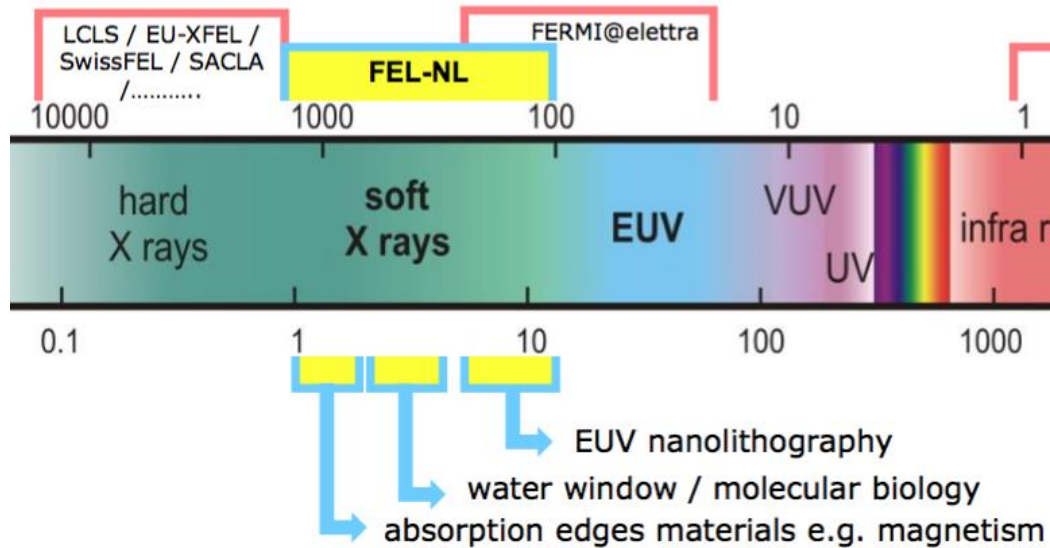
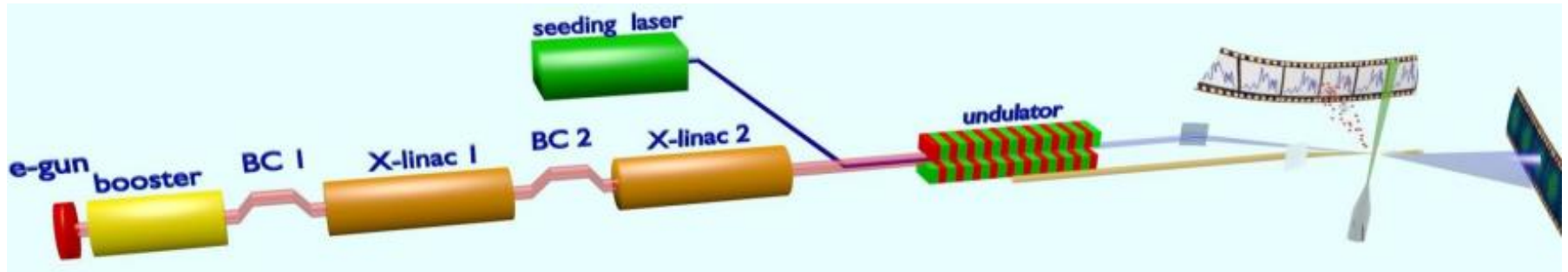
- Table-top hard X-ray source.
- Inverse Compton Scattering.
- 1m X-band structure.
- Large experience and competence in the area of e⁻ guns
- Wide range of applications: industry, health, environment

Stockholm/Uppsala FEL centre: THz radiation



- Compact light source at FREIA facility (Uppsala) combining:
 - X-rays
 - 2x single-cycle
 - 1x multi-cycle THz,
 - IR and optical.
- Special single cycle scheme based on tapered undulator to create mJ pulses, covers the spectral range from 5 to 15 THz
- Paper study

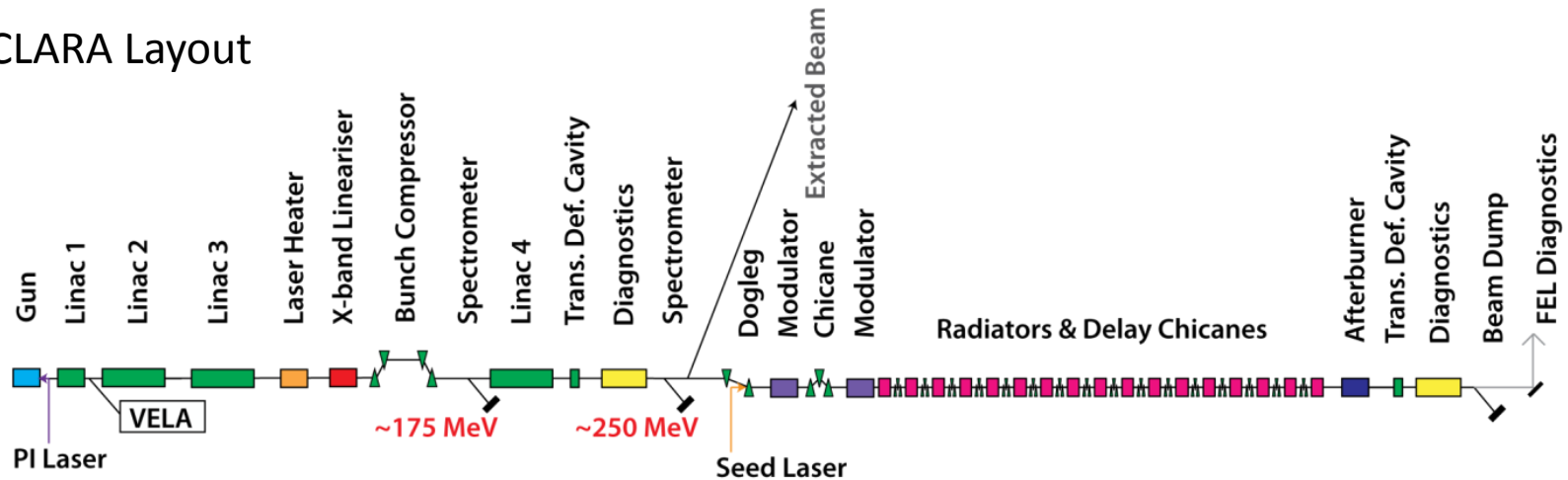
University of Groningen: FEL-NL



- Initiative for a soft XFEL in NL.
- Use coherent imaging and action spectroscopy
- team up with SMART*Light
- Start Dutch X-band research cluster
- Study feasibility and limits of a X-band accelerator driven soft X-ray FEL

UK-FEL initiative

CLARA Layout



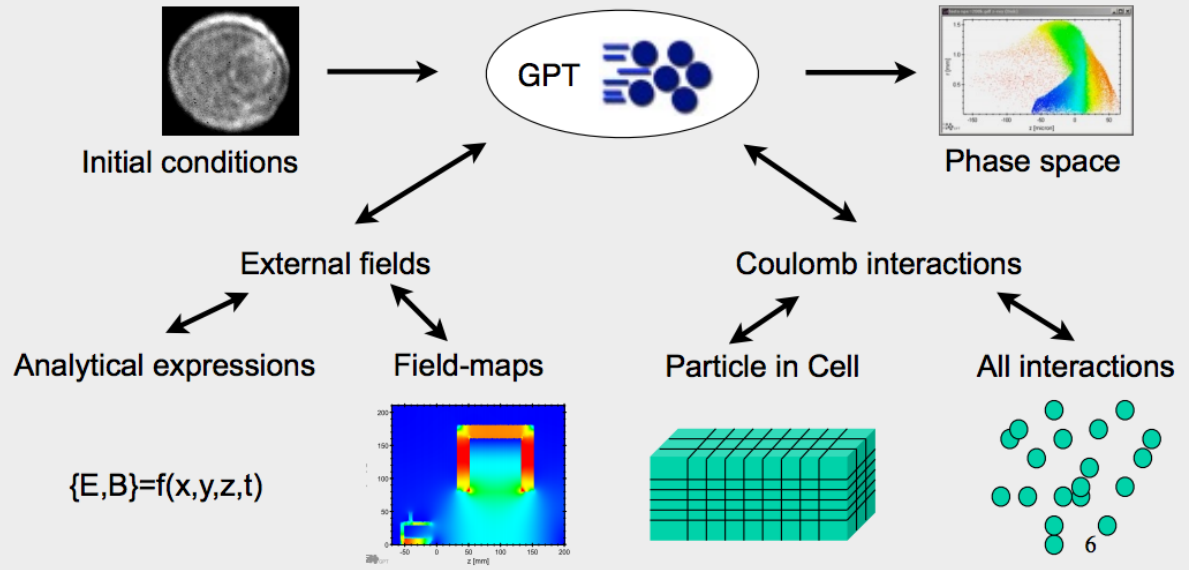
- STFC is carrying out a review to determine a strategy for the UK's Provision of Free Electron Laser (FEL) facilities.
- The purpose of the FEL strategic review is to develop:
 - a 15 – 20 year vision for UK FEL science;
 - a 7 year strategy for FEL access, UK FEL facility provision, community development, and underpinning technology/skills.
- The accelerator and FEL community has agreed a number of FEL R&D goals:
Gun development ; RF Issues ; Electron Beam Transport Simulation and Optimization ; FEL Output Simulation and Optimization ; Electron & Photon Diagnostics ; Synchronisation

Pulsar physics – GPT Code

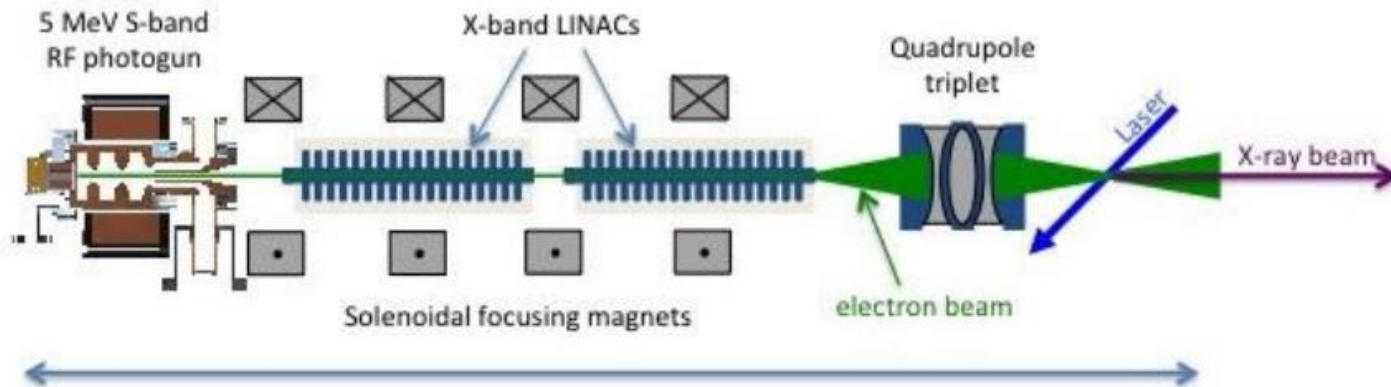
General Particle Tracer:

Tracks sample particles in **time-domain** based on **EM fields**

- Relativistic equations of motion
- Fully 3D, including all non-linear effects



Used, e.g. to optimize the Dutch SMAR*Light ICS



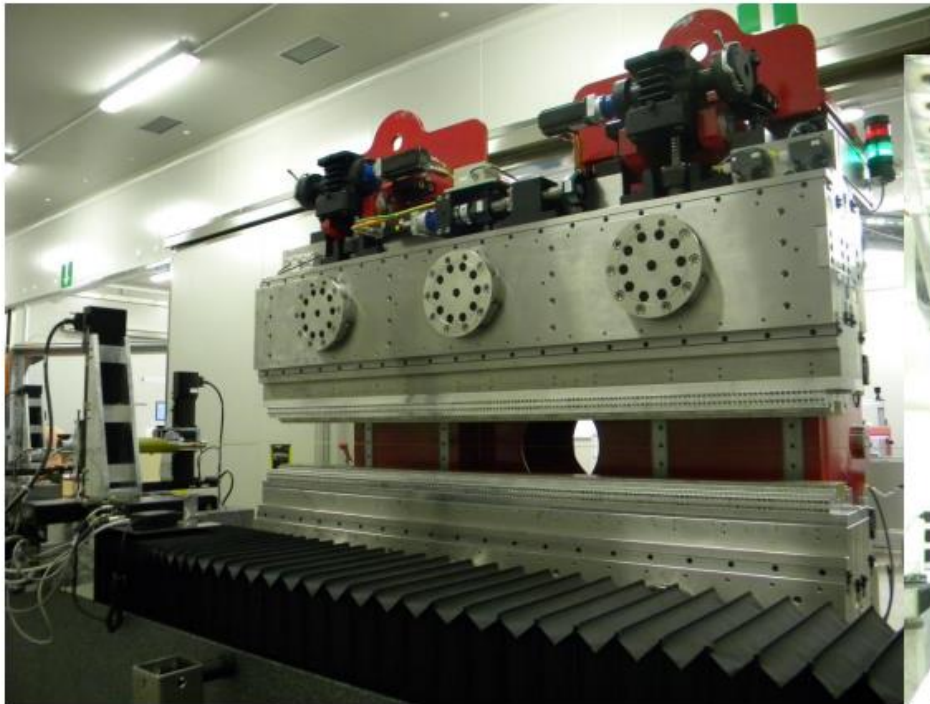
Kyma undulators



XbFEL Face-to-face Meeting
June 20th - 21st, 2016



EPUs @ NSLS-II – Brookhaven National Lab.



They already built about 50 undulators of different type and 60 phase shifters.

Proposal and work package preparation

Build from the old H2020 proposal

The evaluation process was completed at the end of January 2015 and the three sections of our proposal were evaluated as follow:

- Excellence → 4 (very good)
- Impact → 4 (very good)
- Implementation → 5 (excellent) (Score range 0-5)

Despite the remarkable evaluation, given the limited budgetary resource available under the call, our proposal was not allowed to be funded.

<i>Call numbers:</i>	Proposals submitted	Eligible	Requested EC Contribution	Available EC Budget
	39	37	€ 91.656.002	€ 15.000.000

Only 5 proposals funded!!!

Workpackage Matrix

	Management/Technical coord. (WP1)	Integration office and facility design (WP2)	Gun and injector (WP3)	Linac RF (WP4)	Undulator and light (WP5)	Special components (WP6)	Beam dynamics and integration (WP7)	Key deliverable
Hard X-ray FEL	X	X	X	X	Undulators	X	X	CDR
Option 1: Soft X-ray FEL	X	X	X	X	Undulators	X	X	CDR-option
Option 2: Compton back scattering/Tera Hz ?	X	X	X		Laser scattering	(X)	X	CDR-option
Activities/Deliverables /Comments	<p>1) Admin, reporting, management</p> <p>2) Dissemination, Applications User-community</p> <p>3) or 2) continued: Political issues/relations</p> <p>(earlier in two work-packages: split?)</p>	<p>1) Project Office (parameters, drawings, cost and power)</p> <p>2) Industry relations and involvement</p> <p>(earlier in two work-packages; split?)</p>	<p>State of art gun, development of novel (X-band) gun, prototyping and test</p>	<p>AS design, prototype(s) in XBOX and beam (use TWA in AERES? for XBOX tests)</p> <p>LLRF, timing</p> <p>Add RF system studies</p> <p>WP6 can be task in this WP</p>	<p>Comparative studies of "ambitious" undulators on the timescale of 4-5 years, matched to overall design (mostly paper studies).</p> <p>Similar for CBS: state of art, future capabilities</p>	<p>RF deflectors, linearizers, 36 GHz klystron, etc</p> <p>Go to X-band: (transv. cavity, linearizers) ... include in our design</p>	<p>Modelling, start to end simulations</p> <p>Delivery: consistent tools, parameters for all there machines</p> <p>... but need pre-estimate of cost and power for application</p>	

x: relevant

Towards the new proposal

- Receive educative inputs from CERN EU Office, that is currently reading the old proposal and preparing constructive criticism
- Crystallize / organize / structure our ideas on the workpackages and find workpackage leaders
- Engage the new, extended, collaboration with periodic video-meetings
- Promote XbFEL in its new incarnation across EU (e.g. TIARA) and move forward with establishing and reinforcing networking within the community

Conclusions

- Successful Face-2-face Meeting:
 - Scope of XbFEL project extended: Compton Back Scattering, THz
 - Several new collaborators have been welcomed (from academia and industry)
 - Preparation of proposal has started and some workpackages have been defined
- Actions:
 - Follow up the proposal preparation