



LUNEX5

Beam Position Monitors for the LUNEX5 Project

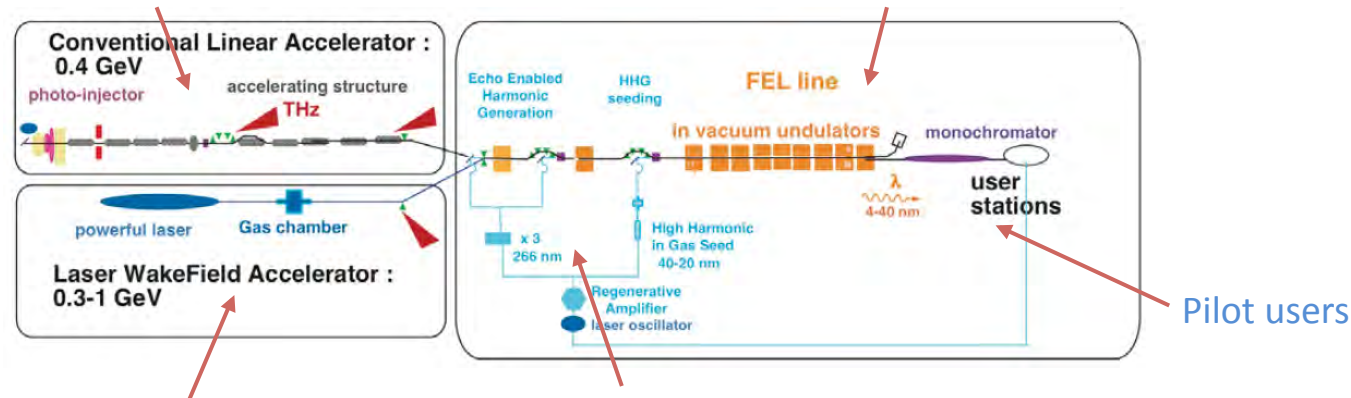
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on behalf of the LUNEX5 diagnostic group

- **LUNEX5** (free electron Laser Using a New accelerator for the Exploitation of X-ray radiation of 5th generation):
 - Build a prototype to **demonstrate 4th advance generation** using a **Conventional Linear Accelerator (CLA)**
 - Use the CLA in **low charge mode (10 pC max.)** to approach LWFA beam conditions
 - **Demonstrate FEL on LWFA** at short wavelength

Conventional Linear Accelerator CLA → 4G+

FEL “variable” line



Laser WakeField Accelerator LWFA → 5G Seeding facilities

- 2012: Conceptual Design Report published, very good feedback from review comity
- 2013: ERC founding to demonstrate FEL on LWFA -> COXINEL project

- **COXINEL (COherent X-ray source INferred from Electrons accelerated by Lasers):**
 - Demonstrate beam transport from the source to the undulator
 - Demonstrate FEL amplification at 200 nm and then at shorter wavelength
 - Investigate and control FEL on LWFA performances

COXINEL layout

- Among other diagnostics, **2 BPMs** are needed upstream and downstream the undulator

- BPM specifications:

	COXINEL/ LUNEX5 (LWFA)	Lunex5 (cold CLA)
Bunch charge	10 pC	0.5 nC
Repetition rate	~ 1 Hz	50 Hz
Bunch size(X/Y)	300 μm RMS	50 μm RMS
Bunch length	1-10 μm RMS	50 μm RMS
Range	± 1 mm	± 1 mm
Resolution ($< \text{Sigma}/10$)	< 30 μm	< 5 μm
Pipe diameter	20 mm	20 mm