

DE LA RECHERCHE À L'INDUSTRIE



ADELE

A long pulse RF linac for multi-purpose applications

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Single shot high peak power systems

- FEL induction LINAC
- Flash X-Ray radiography
- High power microwaves
- Marx Generators + Diodes

High repetition rate systems

- Electrostatic Accelerators (Tandem / Van de Graff)
- ELSA (RF LINAC for FEL)
 - 144 MHz
 - 19 MeV
 - 50 mA
 - 140 μ s / 10 Hz
 - Photo-Cathode RF gun
 - Charge/bunch 1-5 nC

WHY A NEW RF MACHINE AT CEA/DAM ?

Applications

- Irradiation (studies of materials)
- Diagnostic development and calibration

Main parameters

- Long macro-pulse $> 100 \mu\text{s}$
- High current (1 - 10 A)
- Moderate energy (10 – 50 MeV)
- Rep Rate (1 – 10 Hz)

Operation criteria

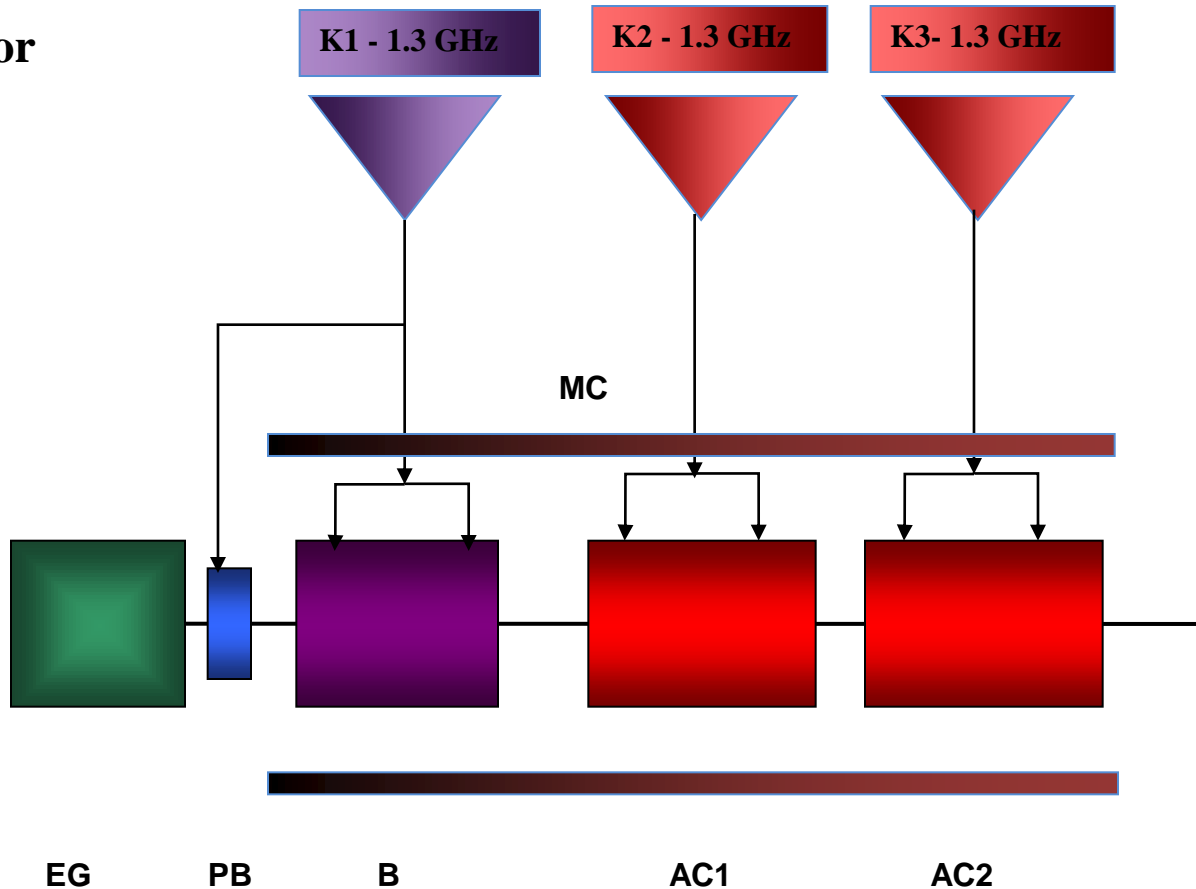
- Industry-like operation
- Low cost operation
- Robustness
- Flexibility

PARAMETERS

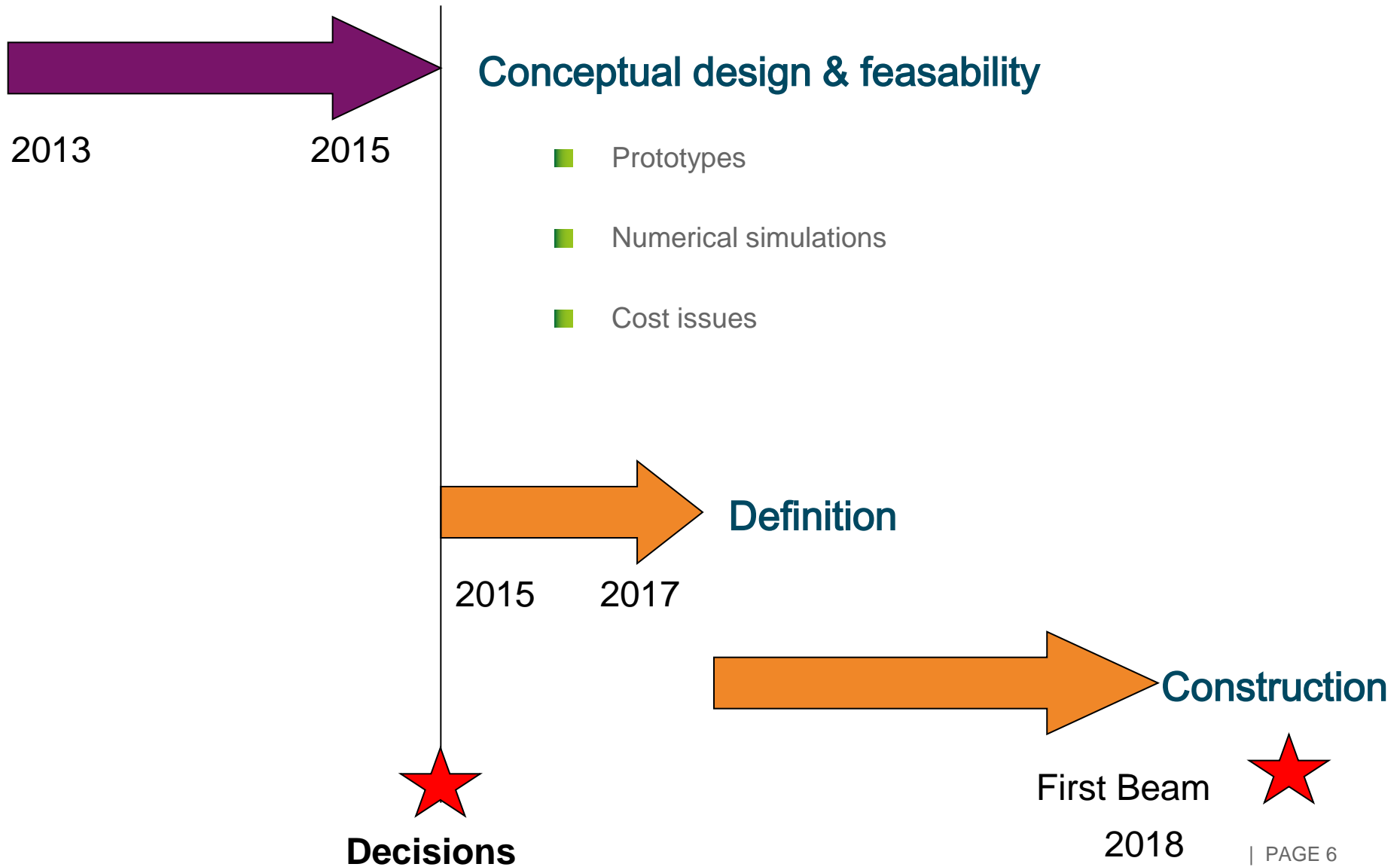
| Macro-Pulse | | |
|-----------------------------------|------------|--------|
| | Acceptable | Target |
| Kinetic energy (MeV) | 20 | 50 |
| Mean current (A) | 2 | 10 |
| Duration (μ s) | 100 | 150 |
| Charge (μ C) | 200 | |
| Repetition rate (Hz) | 1 | 10 |
| Micro-Pulse | | |
| Duration (ps) | 15 | 10 |
| Period (ns) | 0.70 | < 1 |
| Charge (nC) | 1.4 | |
| Charge variation (bunch to bunch) | 3% | 1 % |
| Norm. Rms emittance (mm.mrad) | 20 | 10 |
| Frequency (GHz) | 1.3 | > 1 |

Various options can be studied for each component.

- Electron gun
- Prebuncher
- Buncher
- Accelerator sections
- Magnetic coils



SCHEDULE & MILESTONES



R&D due to long pulses $> 100 \mu\text{s}$

=> Lifetime and stability of the electron gun

=> Reduction of the unstable modes in the accelerator cavities

=> Reproducibility of the beam conditioning (emission, prebuncher)

=> Diagnostics

R&D tied to high power $> 20 \text{ MW}$

=> Upgrade of existing klystrons

=> Development of more efficient technologies for modulators

=> Diagnostics

Topics of collaboration

- **Electron gun : modeling and test facility development**
- **Klystrons : upgrading of the operating points (>20 MW)**
- **Modulators : study and test of more efficient technologies**
- **Beam diagnostics**

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