



Extreme Light Infrastructure in Romania: progress

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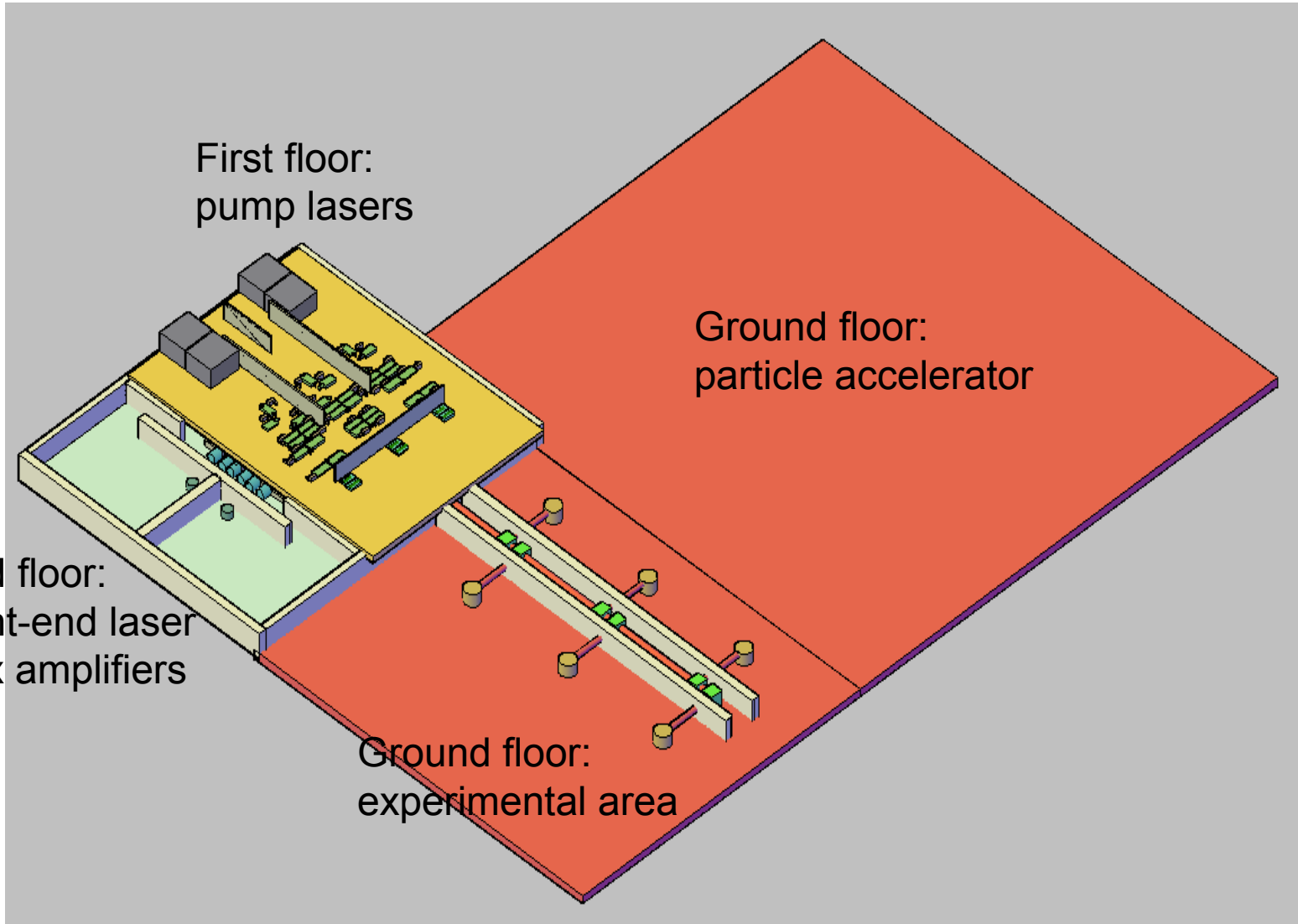
- **dual front-end (only one running at a time, 10-15 fs @100 mJ)**
- **3 arms (energy up to 300 J each, before compression)**
- **separate room for pump lasers (first floor)**
- **high rep. rate experimental area (1) and high energy experimental area (2)**
- **extendable experimental area**
- **parallel experiments operation**

First floor:
pump lasers

Ground floor:
particle accelerator

Ground floor:
2 x front-end laser
and 3 x amplifiers

Ground floor:
experimental area



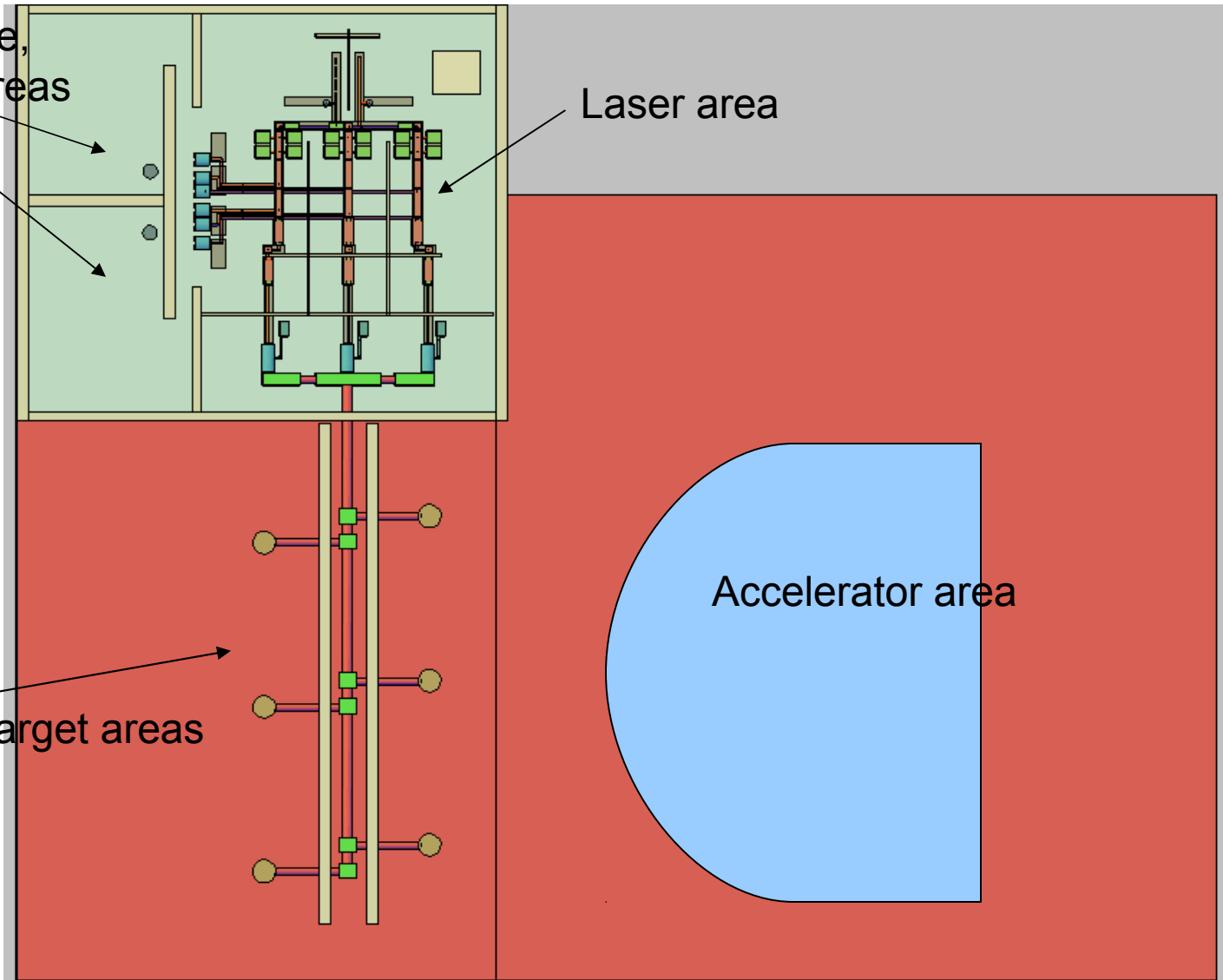
Preliminary: ELI Nuclear Building: Ground floor

high rep. rate,
two target areas

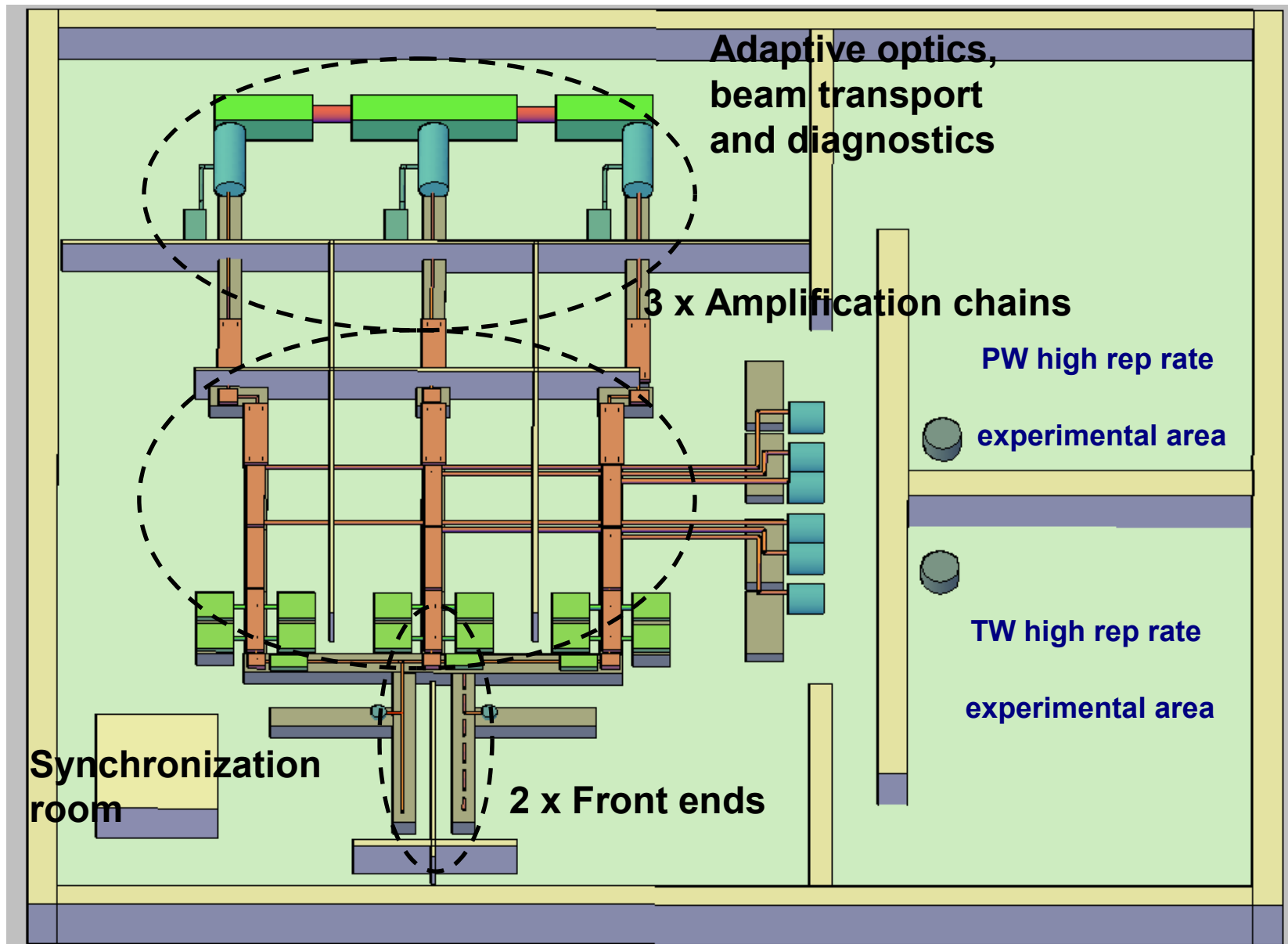
Laser area

Accelerator area

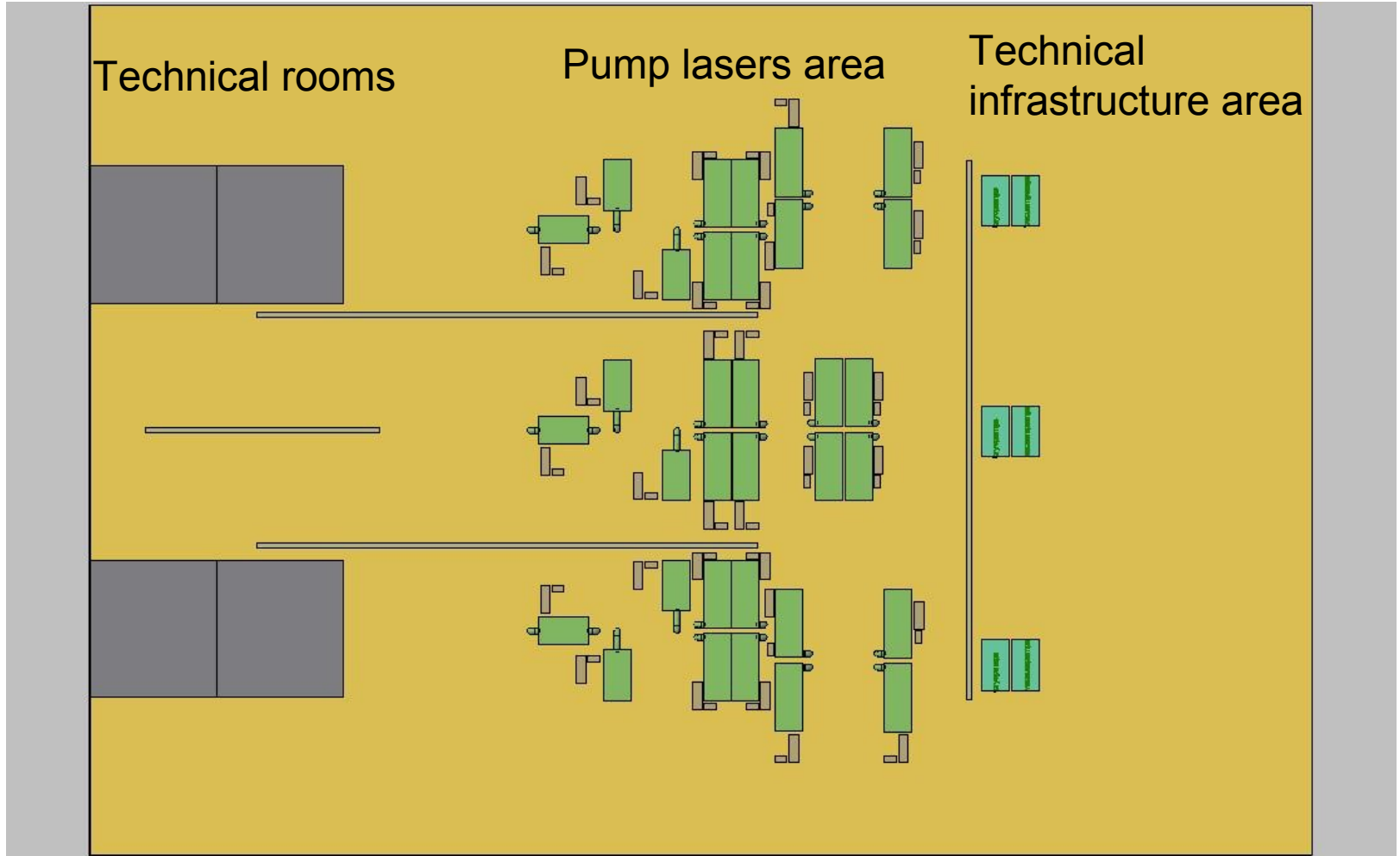
High energy target areas

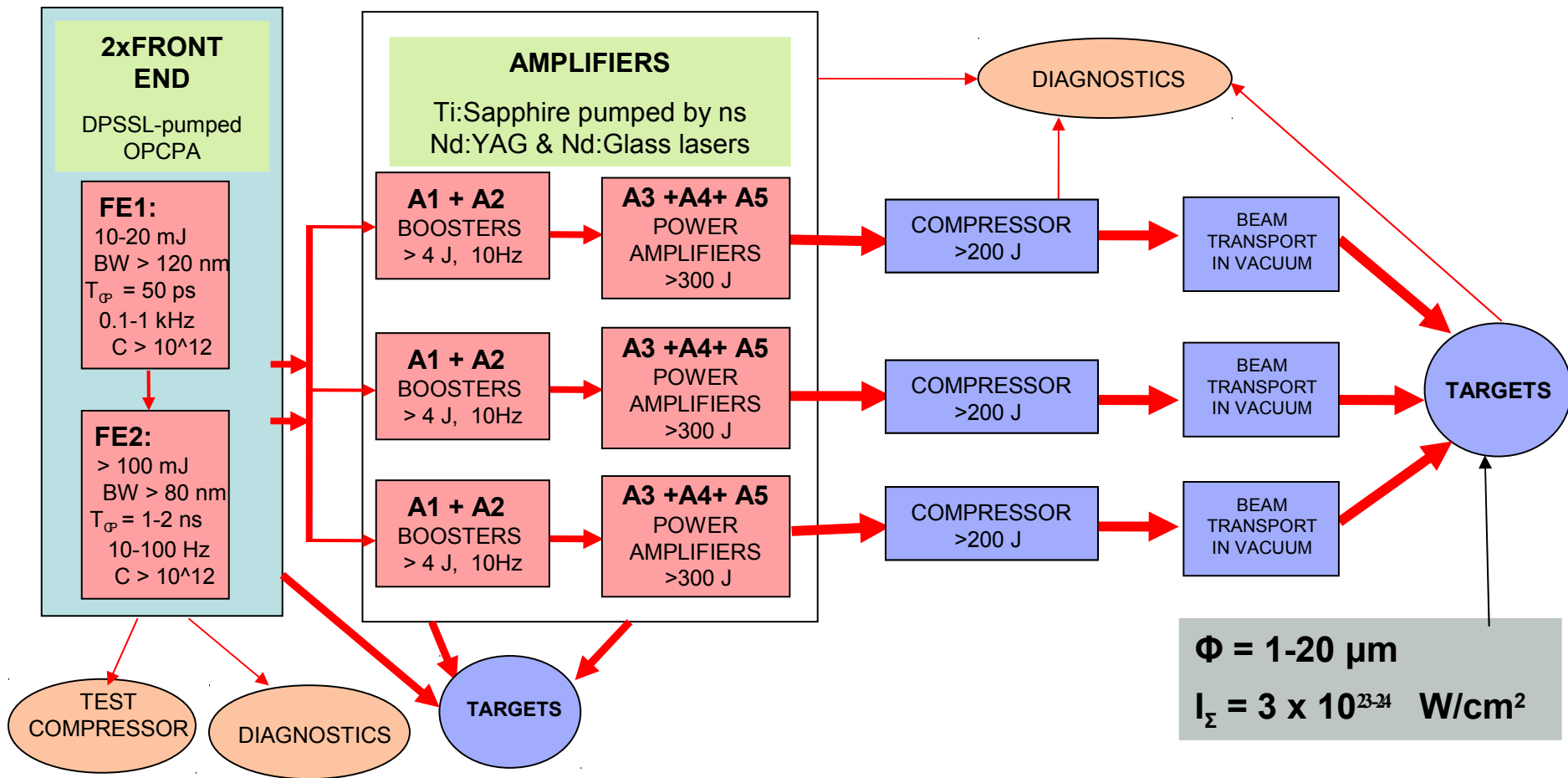


Preliminary: ELI Nuclear Building: laser+high rep rate experimental areas



First floor description





BW – Spectral bandwidth, C – intensity contrast, T_{CP} - chirped pulse duration, T_C – re-compressed pulse duration, Φ – focused laser beam diameter, I_z – intensity on target

- final pulse duration ($>15\text{fs}$)
- Spatial and temporal contrast
- coherent beam combination

- Ti:Sa front end and OPCPA with long pump pulses and electronic synchronization available on the market (reduced spectral bandwidth)
- OPCPA with short pulses under development in several places in Europe (cost & performance evaluation ?)

- Ti:Sa available on the market (reduced spectral bandwidth: 30-50 fs pulses)
- Up to 200 TW at 10 Hz, up to 1 PW at 1 Hz or 0.1 Hz

- Ti:Sa under development (Apolon)
- Pump lasers (200J green) under development on the market: one shot every few minutes
- Ti:Sa crystals up to 175 mm diameter were produced (200 mm needed?)

Technology prospects: compression, focusing, combination

- Large area broadband diffractive gratings exist (damage threshold)
- Adaptive mirrors available
- Coherent combination with pulses below 200 fs under development

- final pulse duration ($>15\text{fs}$)
- Spatial and temporal contrast
- coherent beam combination

Project staging proposal

- First front-end: Ti:Sa or OPCPA with long pulses (comercial)
- 200 TW/10 Hz +1 PW/1Hz @ 30 fs (comercial)
- coherent beam combination 3x200 TW and 3x1 PW
- 10 PW amp development (Apolon)
- 2nd Front end OPCPA with optical synchronized pump (15 fs) (Apolon/MBI/MPQ/...)
- coherent beam combination 3x 5 PW

Preliminary: ELI Nuclear Building: Ground floor dimensions

