



## WP4 – Laser Design and Optimization.



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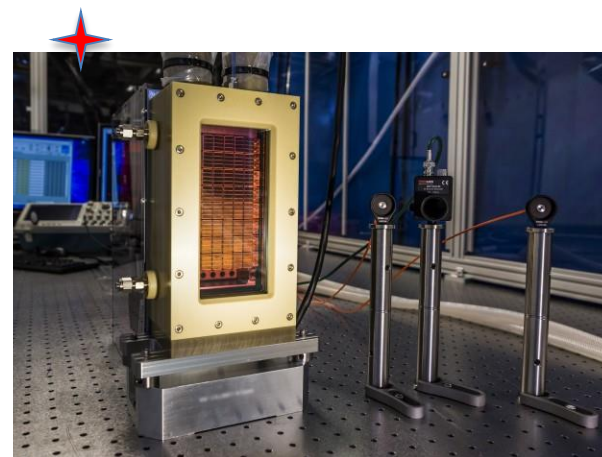
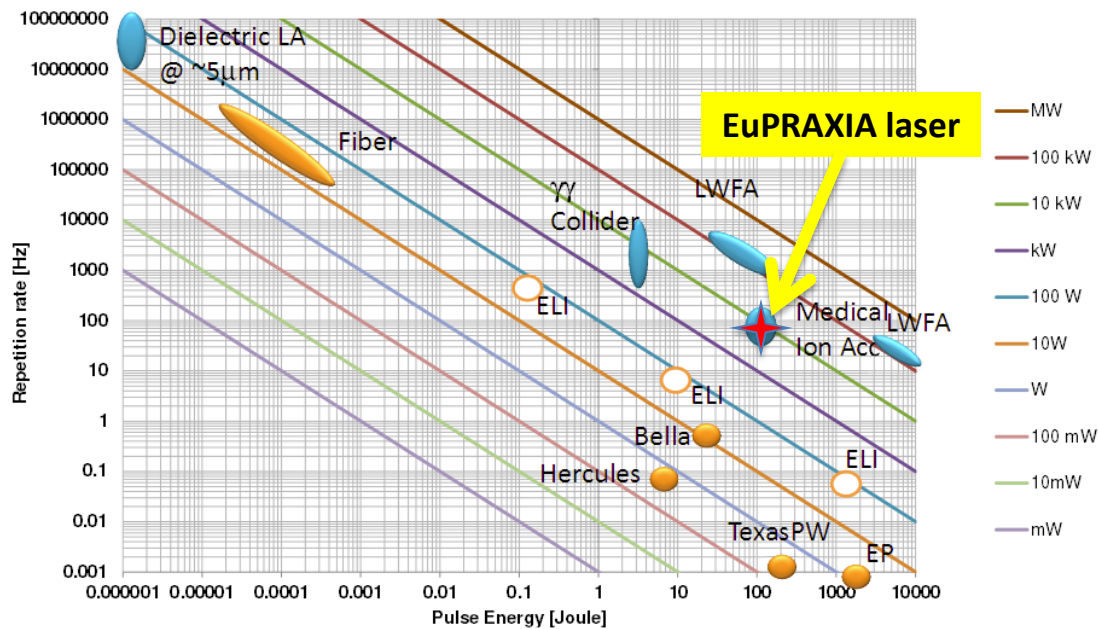
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# WP4 to explore existing frontier lasers

- **Leading edge** high average power systems is *currently (HALPS)* at 10 Hz, 30J, 30fs, with potential to reach 20 Hz;
- **Higher peak** power 10 PW is coming online (ELI, APOLLON ...), at reduced rep rate (<1Hz).
- High repetition rate is mandatory for credible user applications.

Project specifications call for PW-class system, with demanding high average power – **flagship is 100 Hz, 100 J (10 kW).**



**HALPS system, LLNL for ELI Beamlines**  
1PW/10 Hz

# WP4 to foster science and technology development ...

... to fill the gap between **existing** and **required** laser technology

## Bottlenecks for scalability of current systems include:

- Wall-plug efficiency: switch to diode (direct or indirect) pumping;
- Amplifier architecture: may limit system reliability;
- Gain media: new materials (e.g. ceramics) should be scalable in size and capable of supporting large bandwidth and efficient cooling;
- Grating technology to improve
- damage threshold;
- ...

**Development of an “industrial” system in the 5-years time frame?**

