



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under GA No 101004730.

# WP6 - Task 6.2:

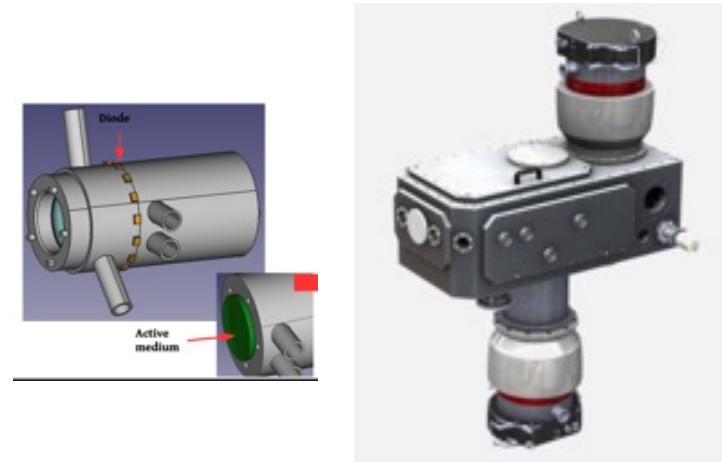
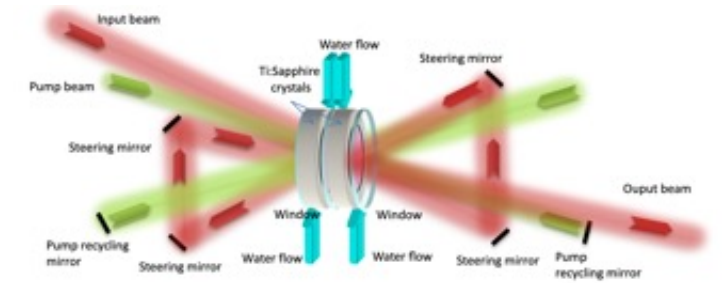
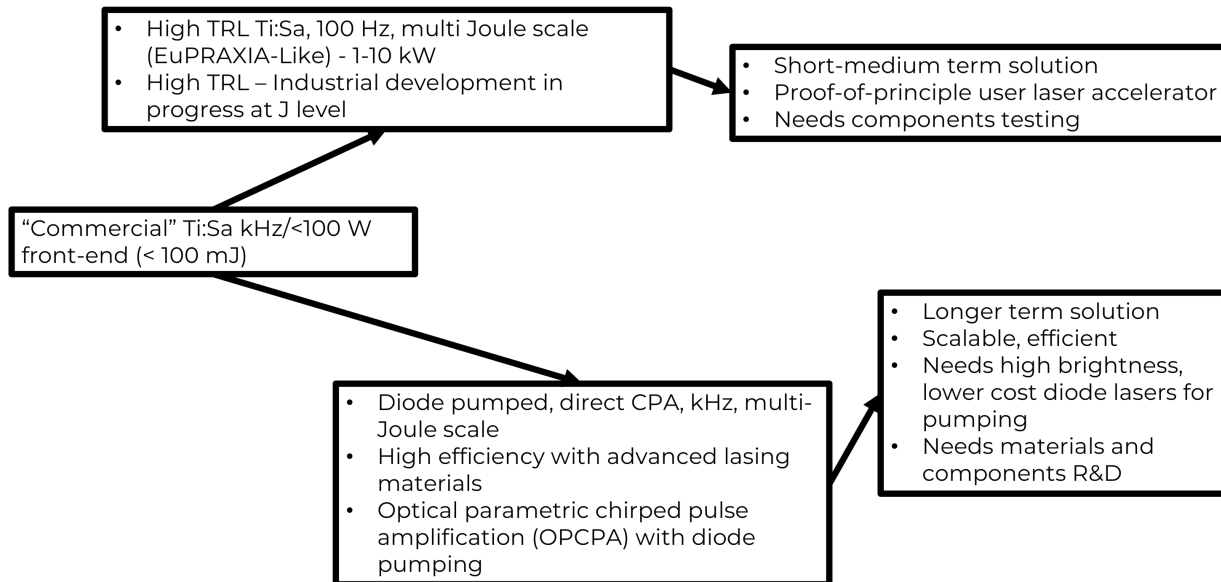
## *LASers for PLAsma accelerators (LASPLA)*

**Task Leader: Leonida A. GIZZI – CNR-INO**



# Task 6.2 (LASPLA): Objectives

- Establish a roadmap to foster delivery of **advanced industrial laser drivers** with high-repetition rate and higher efficiency, for the first user laser-plasma based accelerators.
- Establish a **coordination activity with networking** and training of **main laser labs and industrial partners**, focused on laser-driver R&D.

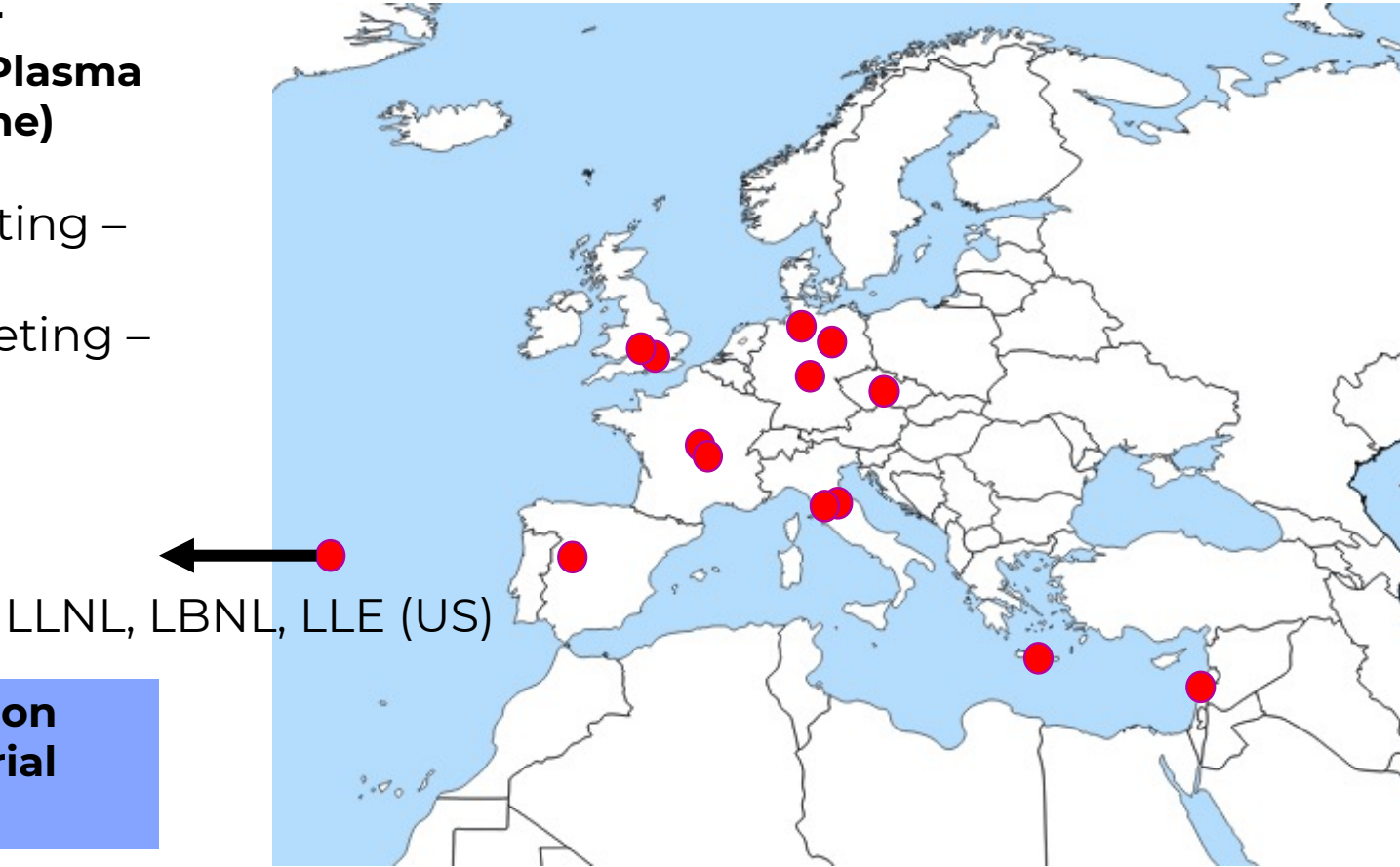


# TASK 6.2 (LASPLA): *warm up technical meetings*

**Warm up technical meetings on Laser Development for Plasma Acceleration (online)**

1<sup>st</sup> Technical Meeting –  
23<sup>rd</sup> June 2021

2<sup>nd</sup> Technical Meeting –  
7<sup>th</sup> October 2021



Up to 50 attendees to the 2<sup>nd</sup> technical meeting

**Strong participation from laser industrial partners**

**Very positive feedback from participants: informative and effective**



## TASK 6.2 (LASPLA): Laser Workshop (in presence), April 20-22, 2022, Palaiseau (FR)

Laser workshop is towards **milestone MS22 (M30)**

**I.FAST Workshop on  
“LASER DRIVERS FOR PLASMA ACCELERATORS”  
April 20-23, 2022**

**École Polytechnique, Palaiseau, Paris (FR)**

Jointly organized by **CNR**, **CNRS**, **Amplitude** and **THALES**

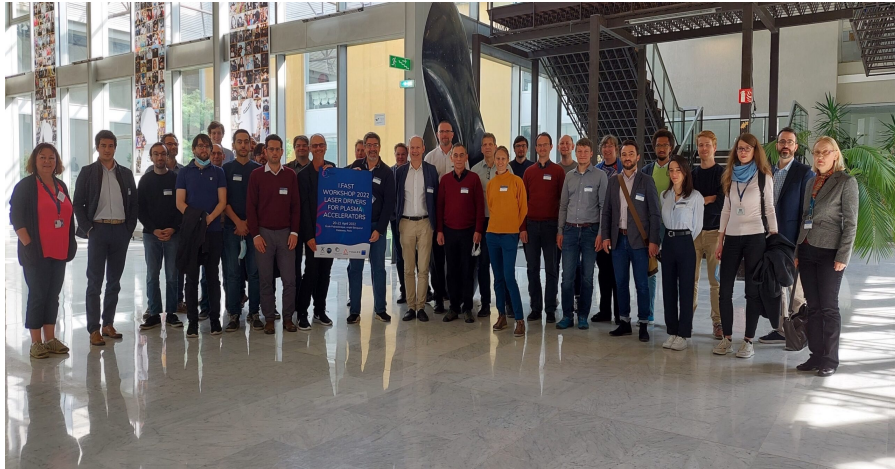
- **Establish a roadmap** to foster delivery of advanced industrial laser drivers with high-repetition rate and higher efficiency;
- **Highlight laser requirements** for user plasma-based accelerators and other key high power, high intensity laser applications:
- **Promote a coordination activity** with networking and training of **main laser labs and industry**, focused on laser-driver R&D.








**52 registered participants in presence**

- >100 participants online
- >300 connections per day

# IFAST Laser Workshop (in presence), April 20-22, 2022, Palaiseau



    			
PROGRAMME of the I.FAST WORKSHOP 2022 "LASER DRIVERS FOR PLASMA ACCELERATORS"			
Time	Wednesday 20	Thursday 21	Friday 22
09:00 – 09:30	REGISTRATION	Mike CAMPBELL, LLE, University of Rochester (*)	Jonathan Tyler GREEN, ELI Beamlines
09:30 – 10:00	OPENING and IFAST overview	Laura CORNER*, University of Liverpool	Francois MATHIEU, LULI-CNRS
10:00 – 10:30	G�rard MOUROU – Jonathan WHEELER, IZEST	Bedrich RUS, ELI Beamlines	Sandrine RICAUD, Thales LAS
10:30 – 11:00	Coffee break	Franck FALCOZ/Stefane BRANLY, Amplitude	Paul MASON, CLF-STFC
11:00 – 11:30	Sydney GALES, UCLab & IFIN/ELI-NP	Coffee break	Coffee break
11:30 – 12:00	Andreas R. MAIER, DESY	Ralph ASSMANN, DESY and INFN (*)	Federico CANOVA, ELI-ERIC
12:00 – 12:30	Kevin CASSOU, CNRS/IN2P3/UCLab, U. Paris Saclay	Andrea KNIGGE, Ferdinand-Braun-Institut	Luca LABATE, INO-CNR (*)
12:30 – 13:00		Markus L�SER, Helmholtz-Zentrum Dresden	Cedric THAURY, LOA-CNRS
13:00 – 13:30	LUNCH	LUNCH	Closing
13:00 – 14:00			LUNCH
14:00 – 14:30			
14:30 – 15:00	Cameron G. R. GEDDES, LBNL	Karoly OSVAY, NLTU, University of Szeged	
15:00 – 15:30	Roman WALCZAK, University of Oxford	Leonida A. GIZZI, INO-CNR	
15:30 – 16:00	Tea Break	Tea Break	
16:00 – 16:30	J�r�me FAURE, LOA-CNRS	ROUND TABLE	
16:30 – 17:00	Francois SYLLA, SourceLAB	"High average power accelerators for nuclear and medical uses"	
17:00 – 17:30	Bjorn Manuel HEGELICH, University of Texas		(*) Remote

## OUTCOME

- New and major laser-based facilities progressing fast and going online
- Key Labs delivering repetitive operation of LPA with quality and stability
- Laser developments addressing high repetition rate and high efficiency
- Major cases for medical and industrial applications being established



EURONNAC Special Topics

18–24 Sep 2022, Hotel Hermitage, La Biodola Bay, Isola d'Elba, Italy

# SUMMARY of Special Topic S-ST3: *Laser Technology and LPA Results (e<sup>-</sup>, p<sup>+</sup>, ion)*

Conveners:

Leonida Antonio GIZZI (CNR-INO *also at INFN, Pisa*)

Stefan KARSCH (LMU, München)



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# Part 1 – Laser Challenges

- Progress on industrial scientific laser development towards  $\approx$  kW regime of Ti:Sa systems for prototype development and EuPRAXIA baseline **(F. Falcoz, C. Simon-Boisson)**
- Robust industrial multi kW, thin disk laser technology entering rapidly the contest for LPA laser-driver, via NL compression or plasma-modulation resonant wakefield **(T. Metzger, R. Walczak)**.
- Fiber coherent combination aiming at few cycle, 100 Hz, with self-phase modulation and J-scale pulses with multi-core fibers. Highlight on efficiency (30%) **(J. Limpert)**.
- OPCPA efficient and "cold". Relies on robust and high beam quality pump lasers. 100 TW scale in progress **(T. Green)**
- **Pump lasers also a key issue, along with other major blocks (compressor gratings, kW amplifiers) for Ti:Sa systems for user LPA (EuPRAXIA, Kaldera, EPAC ...)**
- Direct diode-pumping of new materials (sesquioxides) now in development phase and needs coordinated effort across labs for materials and architecture **(L. Labate)**

# EAAC 2023 – WG2: Laser technology (WP6 - Task2)

Monday, 18 September 2023, H. 16.20 – 19.00

16:20	[413] Introduction to WG2	CHERIAUX, Gilles GIZZI, Leonida Antonio
16:25	[185] The ZEUS laser user facility	WILLINGALE, Louise
16:45	[272] ELI Beamlines L1 ALLEGRA laser: experience with operation of high energy, 1 kHz, 15 fs OPCPA based system for user experiments	BAKULE, Pavel
17:05	[275] Amplitude Roadmap for high average power ultraintense laser for plasma acceleration	FALCOZ, Franck
17:25	[280] “Bivoj / DiPOLE” as a pump source for high repetition rate laser particle accelerators	PILAR, Jan
17:45	[301] Design of direct diode pumped amplification stages based on Tm ceramics for kHz rep-rate, kW average power lasers: Design issues and material characterization	LABATE, Luca
18:05	[356] Diode Laser Pumps for Advanced Accelerators	KNIGGE, Andrea
18:25	[427] discussion	



# EAAC 2023 – WG2: Laser technology (WP6 - Task2)

Tuesday, 19 September 2023, H. 16.20 – 19.00

16:20	[414] Introduction to WG2	SIMON-BOISSON, Christophe
16:25	[310] Pulse characterisation technique for multi-pulse laser plasma wakefield accelerators	WANG, Wei-Ting
16:45	[367] EuPRAXIA laser requirements and current conceptual design issues	GIZZI, Leonida Antonio
17:05	[331] High-power laser development in Jena	KALUZA, Malte
17:25	[342] Diode-pumped Laser-drivers for plasma accelerators	DE VIDO, Mariastefania PATTATHIL, Rajeev
17:45	[349] Joule-class Yb:YAG lasers for driving plasma-modulated plasma accelerators	KRÜGER, Mathias
18:05	[372] Robust high-average-power lasers and scaling to high pulse energy	WEITENBERG, Johannes

# EAAC 2023 – WG2: Laser technology (WP6 - Task2)

Thursday, 21 September 2023, H. 16.20 – 19.00

16:20	[415] Introduction to WG2	GIZZI, Leonida Antonio
16:25	[365] Laser development for LWFA and future plans	CORNER, Laura
16:45	[383] Precision high average power ultrashort pulse lasers	GEDDES, Cameron
17:05	[305] High peak power and high average power Ti :Sa lasers for high performance particle acceleration	CHALUS, Olivier
17:25	[361] A 100 Hz laser system with with few-cycle and TW Pulses	OSVAY, Karoly
17:45	[325] Industrial Compact Free Electron Lasers and Laser-driven Accelerators	HEGELICH, B.M.
18:05	[212] The X-lites Network	WILLINGALE, Louise
18:25	[401] The HORIZON project : towards face-cooled kiloWatt-class Yb:YAG laser systems	BALCOU, Philippe
18:45	[431] discussion	