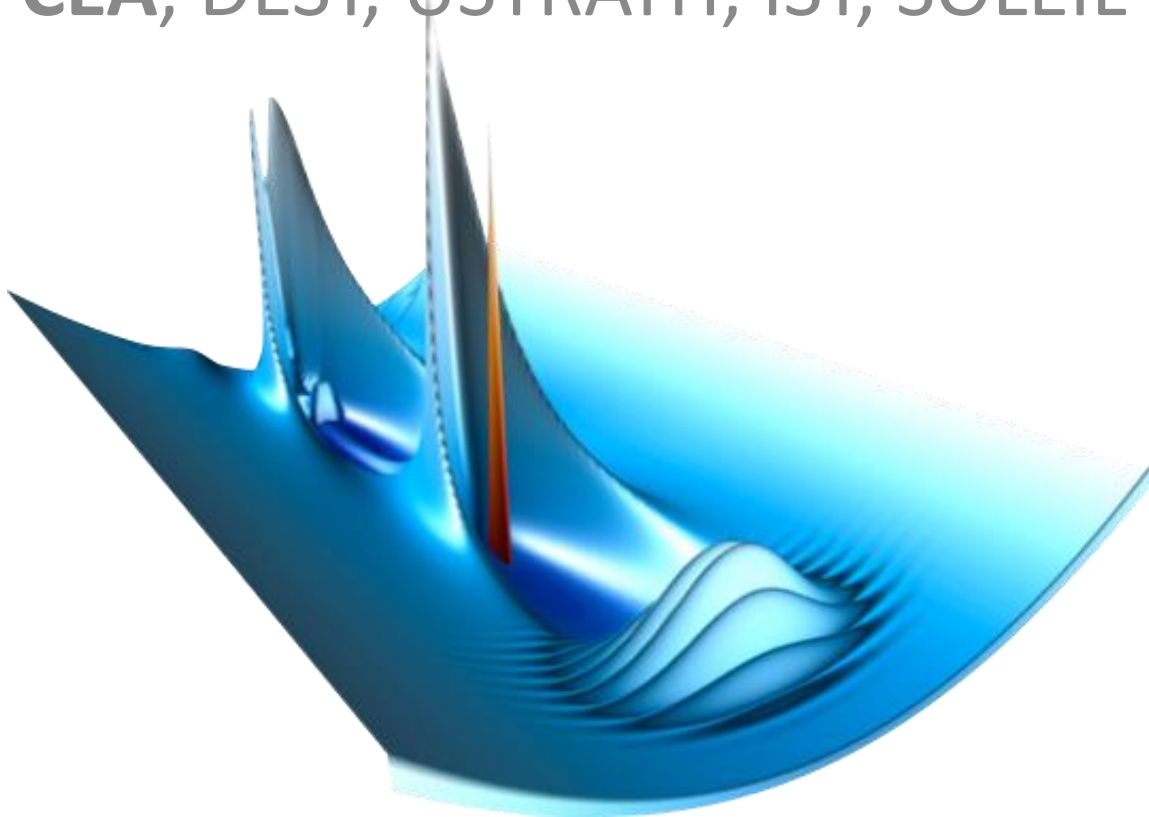


# WP2: Physics and Simulation

CEA, DESY, USTRATH, IST, SOLEIL



- ❑ Physics considerations and extensive simulations with PIC codes in order to optimize parameters of plasma, laser and electron beams for both plasma injector and plasma accelerating modules
- ❑ Tasks
  - Task 2.1. Coordination and Communication
  - Task 2.2. Machine model
  - Task 2.3. Start-to-end simulations and optimization
  - Task 2.4. Tolerance budget
  - Task 2.5. Final performance

Milestone number	Milestone title	Lead beneficiary	Due Date (months)	Means of verification
MS6	M2.1 WP2 personnel in place	12 - CEA	12	Organisation and information available on Intranet
MS12	M2.2 Report defining tolerance	12 - CEA	18	published on intranet
MS13	M2.3 Simulation tools and theory set up	12 - CEA	18	Activity report
MS18	M2.4 Preliminary simulations set up	12 - CEA	24	Activity report
MS30	M2.5 Start to end Simulations	12 - CEA	36	Activity report

discuss and agree on injection and acceleration methods prior to start computations (WP3, WP5, ...)

## Plasma injector

- *self-injection in strong non-linear regime, optical injection, density gradient (steep or smooth), ionisation (gas mixture) ... ?*
- *Low divergence at exit (density/ $a_0$  gradient) ?*

## Plasma acceleration

- *non-linear regime with self-focusing and/or quasi-linear with external guiding ?*
- *Low divergence at ends (density/ $a_0$  gradient) ?*

## □ Transfer lines

- **From RF injector to plasma structure**

design: responsibility of WP5

WP3 provides beam parameters at plasma entrance

- **From the plasma structure to pilot users**

design: responsibility of WP5

WP3 provides beam parameters at plasma exit

- **From plasma injector to plasma acceleration**

discuss and agree on interstage principle

*injection/extraction system for laser beam (WP4?)*

*beam optical properties: matching, quasi-isochronous, non-dispersive and achromatic*

## WP2 - Role of Institutes

Institute	contact	Personnel list	Status	Activity description	Contribution to Tasks
CEA	Alban Mosnier	Alban Mosnier Phi Nghiem PhD student Post-doc	permanent staff permanent staff to be hired to be hired	optimization of laser and plasma parameters based upon PIC simulations (code = WARP) start-to-end simulation including transfer lines (codes = TraceWin, Astra)	2.1 through 2.5
IST	Luis Silva	Luís Silva Jorge Vieira Researcher (Joana Martins) Post-doc (Ujjwal Sinha)	permanent staff research staff  to be hired to be hired	optimization of laser and plasma parameters based upon PIC simulations (code = OSIRIS)	2.1 - 2.3 - 2.4 - 2.5
USTRATH	Zeng-Ming Sheng			optimization of laser and plasma parameters based upon PIC simulations, including controlled electron injection, laser propagation, wakefield evolution, electron acceleration and dephasing, etc (code = ?)	
SOLEIL	Marie-Emmanuelle Couprie				
DESY	Jens Osterhoff			beam-driven option: use of PIC and particle simulations (codes = ?)	2.2 and 2.3 (alternate beam-driven option)
CNRS-LPGP	Brigitte Cros				2.2 - 2.3
INFN	Massimo Ferrario			optimization of laser and plasma parameters based upon PIC simulations (code = AlaDyn) start-to-end simulation including transfer lines (code = ?)	2.3