

LMJ & PETAL STATUS AND FIRST EXPERIMENTS

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The laser Megajoule (LMJ) facility, developed by the Commissariat à l'Énergie Atomique et aux Énergies Alternatives (CEA), is designed to provide the experimental capabilities to study High Energy Density Physics (HEDP). The LMJ is a keystone of the Simulation Program, which combines improvement of physics models, high performance numerical simulation, and experimental validation. The 176 beams of the facility will deliver a total energy of 1.4 MJ of 0.35 μm (3ω) light and a maximum power of 400 TW.

The PETAL¹ project consists in the addition of one short-pulse (ps) ultra-high-power, high-energy beam (kJ) to the LMJ facility. PETAL will offer a combination of a very high intensity multi-petawatt beam, synchronized with the nanosecond beams of the LMJ. This combination will expand the LMJ experimental field in HEDP.

The operational commissioning of the LMJ, with the first bundle (eight beams), was declared in October 2014. Since this date, several experimental campaigns have been achieved, at first to qualify the LMJ experimental capabilities, and secondly to validate radiative hydrodynamics simulations. They have proven the good performances of LMJ and demonstrated its aptitudes to perform experiments for the Simulation Program. LMJ will increase its capacities in the following years with the completion of other bundles and a full set of diagnostics.

The first high energy test shots in the compressor stage of PETAL were performed in May 2015; they demonstrated the PW capabilities of PETAL with a shot which delivered an energy of 840 J, with a duration of 700 fs, corresponding to a power of 1.2 PW. The next step consists in bringing this PW power to the LMJ target chamber centre at the end of 2015. Experiments combining LMJ and PETAL will then start in 2016, giving the possibility to address a new physics.

LMJ-PETAL will be open to the academic communities. The academic access to LMJ-PETAL and the selection of the proposals for experiments will be done through the Institut Laser & Plasmas (ILP) with the help of the PETAL international Scientific Advisory Committee.

The LMJ-PETAL User guide provides the necessary technical references to researchers for the writing of Letter of Intent of experimental proposals to be performed on LMJ-PETAL. Regularly updated version of this LMJ-PETAL User guide is available on LMJ website at <http://www-lmj.cea.fr/en/ForUsers.htm>.

¹ The PETAL project is being accomplished under the auspices of the Conseil Régional d'Aquitaine, of the French Ministry of Research and of the European Union