



IAEA FEC 2016

Contribution ID: 44

Type: **Oral**

Overview of the Laser Megajoule First Experiments

Thursday, 20 October 2016 14:00 (20 minutes)

Since the operational commissioning of the Laser Megajoule (LMJ) in October 2014, several experimental campaigns have been achieved, with the first eight beams, and demonstrated LMJ's aptitudes for the Simulation Program.

The Simulation Program of the Commissariat à l'Énergie Atomique et aux Énergies Alternatives (CEA) combines improvement of physics models, high performance numerical simulation, and experimental validation. The LMJ, designed to provide the experimental capabilities to study High Energy Density Physics (HEDP), is a keystone of this Program.

The 176 beams of the facility will deliver a total energy of 1.4 MJ of 0.35 μm (3λ) light and a maximum power of 400 TW. Using a variety of pulse shapes, it will be possible to bring material to extreme conditions with temperature of 100's MK and pressures of 100's Gbar. One of the LMJ's goals is to obtain ignition and burn of DT with the indirect drive approach.

The experiments performed since the commissioning were dedicated to radiative transport, implosion hydrodynamics and hydrodynamic instabilities in order to validate radiative hydrodynamics simulations and prepare ignition.

LMJ will increase its capacities in the following years with the completion of other beams and a set of 25 diagnostics.

A PW beam, the PETAL* project, has been added to the LMJ. It is a short-pulse (ps) ultra-high-power, high-energy beam (kJ). The first high energy test shots of PETAL have demonstrated the PW capabilities of PETAL with a record of 1.2 PW. Experiments combining LMJ and PETAL will then start in 2017, giving the possibility to address a new physics.

LMJ-PETAL is open to the academic communities. The academic access to LMJ-PETAL and the selection of the proposals for experiments is 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>.

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

Paper Number

IFE/1-1

Country or International Organization

France

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Session Classification: Inertial Fusion Experiments & Theory

Track Classification: IFE - Inertial Fusion Experiments and Theory