Geophysical Research Abstracts
Vol. 21, EGU2019-7140, 2019
EGU General Assembly 2019

Solar radio emissions: from simulations to laser experiment

Carine Briand (1), Sylvie Depierreux (2), Pierre Henri (3), Jean-Raphael Marques (4), Livia Lancia (4), Caterina Riconda (5), Andrea Sgattoni (1), and François Amiranoff (4)

(1) Observatoire de Paris, LESIA, Meudon, France (carine.briand@obspm.fr,andrea.sgattoni@obspm.fr), (2) CEA/DAM, Arpajon, France (sylvie.depierreux@polytechnique.edu), (3) LPC2E, CNRS, Orléans, France (pierre.henri@cnrs-orleans.fr), (4) LULI, Ecole Polytechnique, Sorbonne Université, Sacaly, France (jean-raphael.marques@polytechnique.edu, livia.lancia@polytechnique.edu,francois.amiranoff@polytechnique.edu), (5) LULI, Ecole Polytechnique, Sorbonne Université, Paris, France (caterina.riconda@upmc.fr)

Solar flares generate intense electromagnetic radiation in the radio domain (1-100 MHz), part of which corresponds to emission at the electron plasma frequency ω_p or its second harmonic $2\omega_p$. These waves are the signature of electron beams propagating in the interplanetary medium. Detected by space and ground-based radio telescopes, these electromagnetic waves can be used to remotely infer the characteristics of the electron beams. If the main steps of the process from electron beam to Electron Plasma Waves and mode conversion to electromagnetic radiations are known, several questions are still unresolved, in particular: (i) the efficiency of the conversion, (ii) the directionality of the process. To tackle these questions first PIC simulations, then laboratory laser-plasma experiment have been performed. If the parameters of the interplanetary plasma and laser-generated plasmas are very different in absolute values, they happen to be very similar in relative numbers (such as kλ_{De} and T_e/T_i), which makes these laser experiments suitable for astrophysical purposes. The experiment was designed for the LULI 2000 facility (Ecole Polytechnique, France) operated at $2\omega_0$ in the nanosecond regime. The results of PIC simulations and of the first experiment that hold in September 2018 will be presented.