Electron Acceleration by Wave Turbulence in a Magnetized Plasma

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Lower-hybrid waves occur in a variety of laboratory and space environments. They are thought to be one of the main mechanisms of electron heating in the presence of a magnetic field through their ability to be in simultaneous Cerenkov resonance with both magnetised electrons traveling along the field lines and ions traveling transverse to the field. This property allows the lower-hybrid waves to accelerate electrons well above the thermal pool. Here, we present laboratory results and numerical simulations from a recent experiment at the LULI laser facility at Ecole Polytechnique (France). A laser driven plasma flow was impacted upon magnetised and non-magnetised obstacles, generating a shock. A variety of diagnostics were used to characterized the plasma, shock formation and accelerated electrons. We show that the excess X-ray emission in the presence of an external magnetic field can be attributed to electrons accelerated by lower-hybrid waves.