

R008-20

Zoom meeting D : 11/4 PM1 (13:45-15:30)

13:45-14:00

磁化プラズマ衝撃波の大型レーザー実験と数値実験

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九大・総理工

Gekko XII experiment and numerical simulation on magnetized collisionless shock

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Shock reformation is a phenomenon unique to a collisionless system, which is a periodic collapse and formation process of the shock front occurring even when the upstream plasma is completely uniform and steady, and contributes to the generation of large amplitude waves and to produce particle acceleration as well. Related with the gyro motion of the ions reflected at a shock, the structures so-called foot, ramp, and overshoot are cyclically formed and destroyed. It was theoretically predicted in the 1980s by using computer simulation, but has not been proven yet. In this research we aim at the demonstration of shock reformation, which is not realized by the in-situ observation in space, by using the Gekko XII high power laser experiment at Institute of Laser Engineering (ILE), Osaka University. In the experiment in 2019 we could successfully apply 3.8T ambient magnetic field in the experimental system for the first time. The observed shock clearly contains inner structures not seen in our previous experiments without ambient magnetic field. We identified the so-called overshoot and foot in the shock transition region. In addition, a precursor of a shock modified by the ambient magnetic field is also identified in the early stage after the main laser shot. The results are compared with one-dimensional PIC simulation customized for the experiment.