R008-15
C 会場 ：11/27　AM1 （9:00-10:15）
10:00〜10:15

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Electron Heating in Relativistic Collisionless Shocks

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High-energy electrons downstream of shocks are the source of bright emissions from various astrophysical objects, such as supernova remnants (SNRs)and gamma-ray bursts (GRBs). Although previous studies have discussed the physics of electron heating for some parameters, such as unmagnetized ultra-relativistic shocks relevant to GRBs, a general understanding of a wide range of parameters still needs to be provided.

Using the supercomputer Fugaku, we have run high-resolution, high electron-to-ion mass ratio particle-in-cell (PIC) simulations of different shock Lorentz factors and magnetizations. We show that electrons are heated very efficiently in strongly magnetized ultra-relativistic and unmagnetized shocks. However, electrons can still be heated to ˜10% of ion energy in other parameters.

We also discuss applications to highly magnetized mildly relativistic shocks, a parameter relevant to persistent radio emissions of fast radio burst (FRB) but have yet to be investigated in detail.