S001-04
A 会場 ：11/4　PM1 （13:45-15:30）
14:40〜14:55

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Relativistic resonant particle acceleration by counter propagating Alfven waves

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Since high energy cosmic rays were discovered by Hess, its origin has been a much controversial issue in astrophysics [Hess 1912]. Coherent large amplitude electromagnetic waves in a plasma should play crucial roles in the acceleration of high energy cosmic rays. In a space plasma large amplitude Alfven waves are often generated. A number of models of large amplitude Alfven wave generation accompanying cosmic ray acceleration have been proposed so far. More than decades ago, Matsukiyo and Hada [Matsukiyo and Hada 2009] showed that a relativistic Alfven wave in a pair plasma is unstable to form the coherent standing wave form which consists of counter propagating Alfven waves. In our resent studies, we found that the phase transitions of the behavior of particles trapped in a trough of magnetic envelope occur when wave amplitudes exceed critical values. In a supercritical regime, numerical simulations show that any particles irreversibly gain relativistic energy within a short time regardless of their initial energy. In this presentation, the particle acceleration in large amplitude counter propagating Alfven waves is discussed by test particle and particle-in-cell (PIC) simulations.