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Experiments on exploring two-fluid plasma state produced by pure lithium ion and electron plasmas in the BX-U linear trap[1]
HARUHIKO HIMURA, SHINJI SOWA, KATSUSHIRO OKADA, TOSHIKAZU OKADA, AKIO SANPEI, Kyoto Institute of Technology, MEGHRAJ SENGUPTA, University of Saskatchewan — Since non-neutral plasmas can be relaxed into rotational thermal equilibria, we use the characteristic to explore two-fluid plasmas in laboratory plasmas. In the BX-U linear trap, a pure electron plasma has been produced in a negative potential well via a relaxation process of at most four independent electron filaments, while a pure lithium ion plasma is produced in a positive potential well by use of a beta-eucryptite. Those plasmas electrically non-neutral so that they inherently rotate in opposite directions perpendicular to B-field each other, owing to their different charge polarity. After they relax into each rotational thermal equilibrium, the ion plasma is translocated into the adjacent nested trap where the electron plasma has been trapped. At this moment, a two-fluid plasma state is thus created. Since the duration of the state can be varied, time evolutions of shapes of both ion and electron plasmas via the state can be observed in their images taken by an ICCD camera. Currently, we have accumulated data for cases where $n_i = n_e/10$. Actually, there seems to be some equilibria of both the lithium ion and electron plasmas even in the two-fluid plasma state, which may be related with the differential rotational equilibrium. In the meeting, we will show our latest data.

[1]JSPS Kakenhi

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