

Abstract Submitted
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A new diagnostic method for measurement of local plasma density¹ MIN SUP HUR, SALIZHAN KYLYCHBEKOV, HYUNG SEON SONG, Ulsan National Institute of Science and Technology — In this paper, we present a new method to measure the local plasma density at any desired position in a generally non-uniform plasma, without any mathematical inversion process of the integrated probe data. The idea is colliding two, slightly detuned electromagnetic pulses as a desired position inside the plasma. The frequencies of the pulses are assumed to be much higher than the plasma frequency, so that the pulses can propagate through the plasma without much absorption. At the collision point of the pulses, the beat wave train traps the background electrons and displace the electron bunch. After the pulse collision, the displaced electron bunch commence the plasma dipole oscillation, emitting radiation at the local plasma frequency. By measuring the radiation frequency, the plasma density at the position where the radiation originates can be determined. Since the dimension of the plasma dipole can be arbitrarily made small by adjusting the collision angle and spot size of the driving pulses, this method enables pin-point of the local plasma density. We summarize the substantial amount of two-dimensional particle-in-cell simulations demonstrating the frequency matching between the radiation and the local plasma frequency.

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Min Sup Hur
Ulsan National Institute of Science and Technology

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