

Abstract Submitted
for the GEC16 Meeting of
The American Physical Society

The correct kinetic Bohm criterion UWE CZARNETZKI, TSANKO VASKOV TSANKOV, Institute for Plasma and Atomic Physics, Ruhr University Bochum, 44780 Bochum, Germany — Space charge sheaths are characteristic for bounded plasmas and are a key element in plasma-surface interactions. Hence, one of the most fundamental concepts in plasma physics – the Bohm criterion – is related to the definition of a sheath edge. However, its kinetic formulation is stirring controversies for a long time – from questioning its validity at high collisionality to claiming a divergence in its formulation. Here, based on a solution of the Boltzmann equation for ions with charge-exchange collisions and ionization both of these disputes are resolved: 1) The obtained form of the kinetic Bohm criterion removes the divergence in the ionic part. 2) It also introduces a new equally important term that describes collisional and geometric effects. This new term reestablishes the validity of the criterion at high collisionality. 3) It also restores agreement with the fluid counterpart of the criterion. The developed theory is supported by non-invasive spatially resolved measurements and a numerical model.

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Date submitted: 08 Jun 2016

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