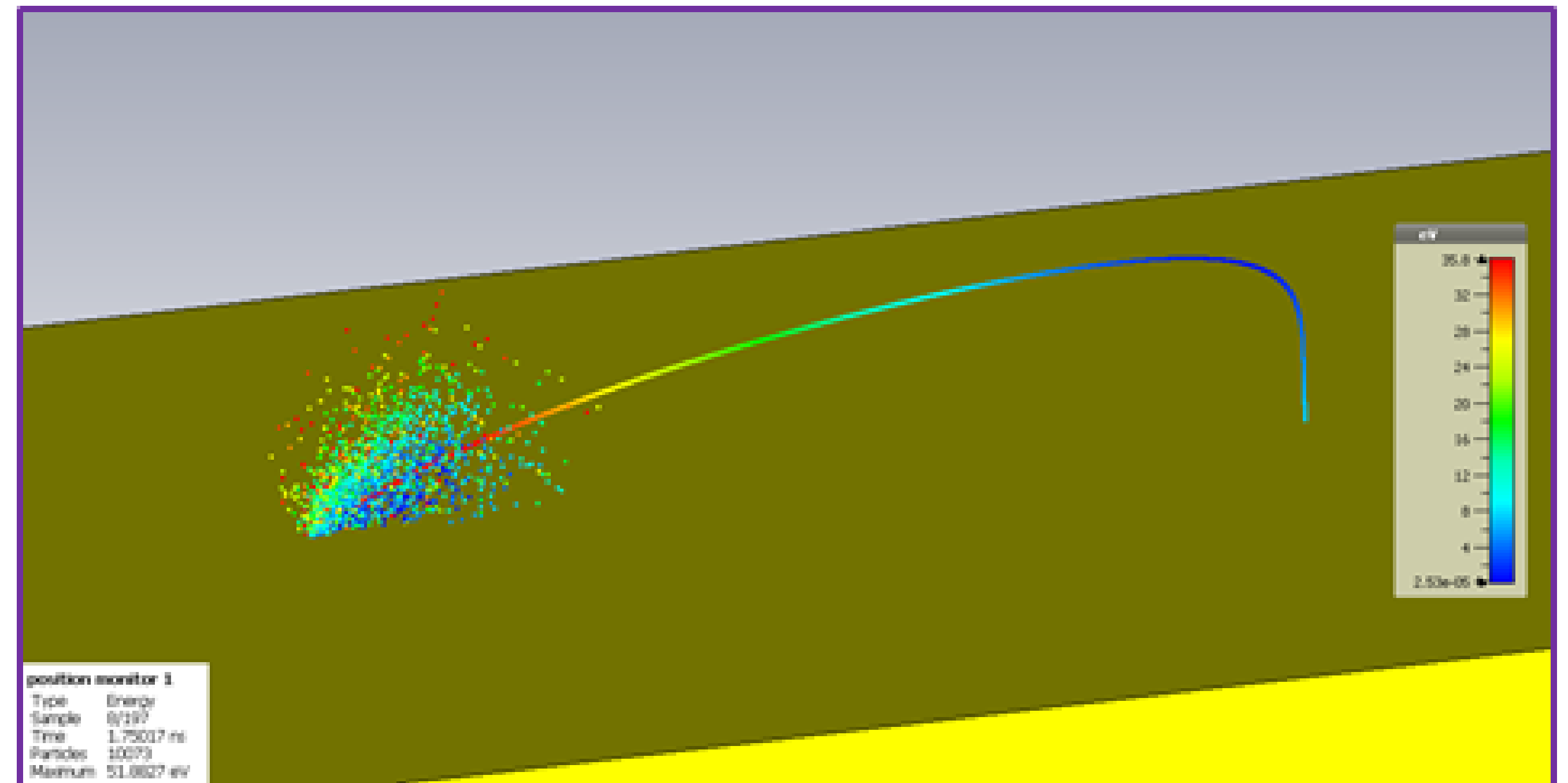


Dynamics of One-Side Multipactor on Dielectric

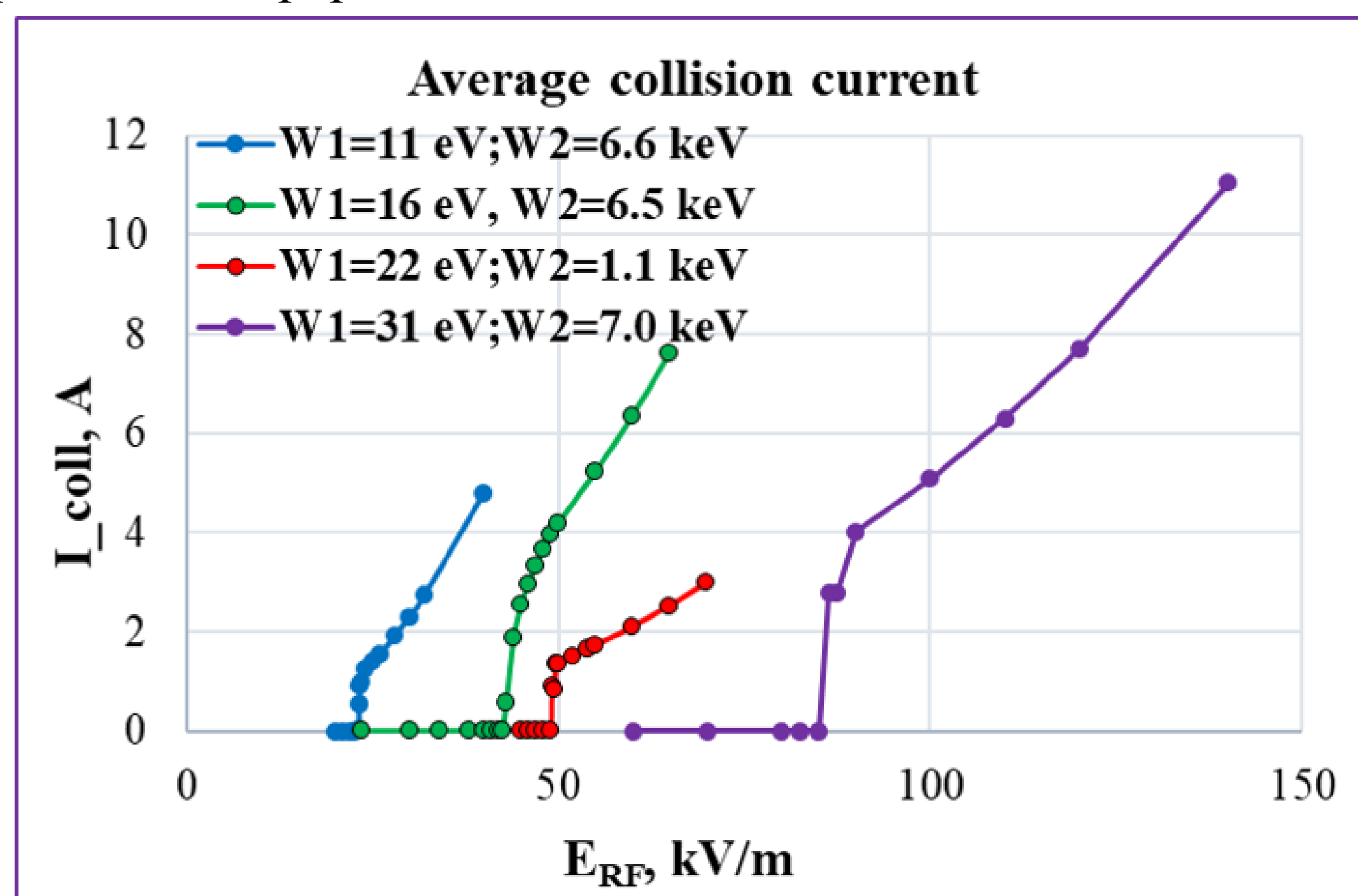
Gennady Romanov, Fermilab, USA

Abstract

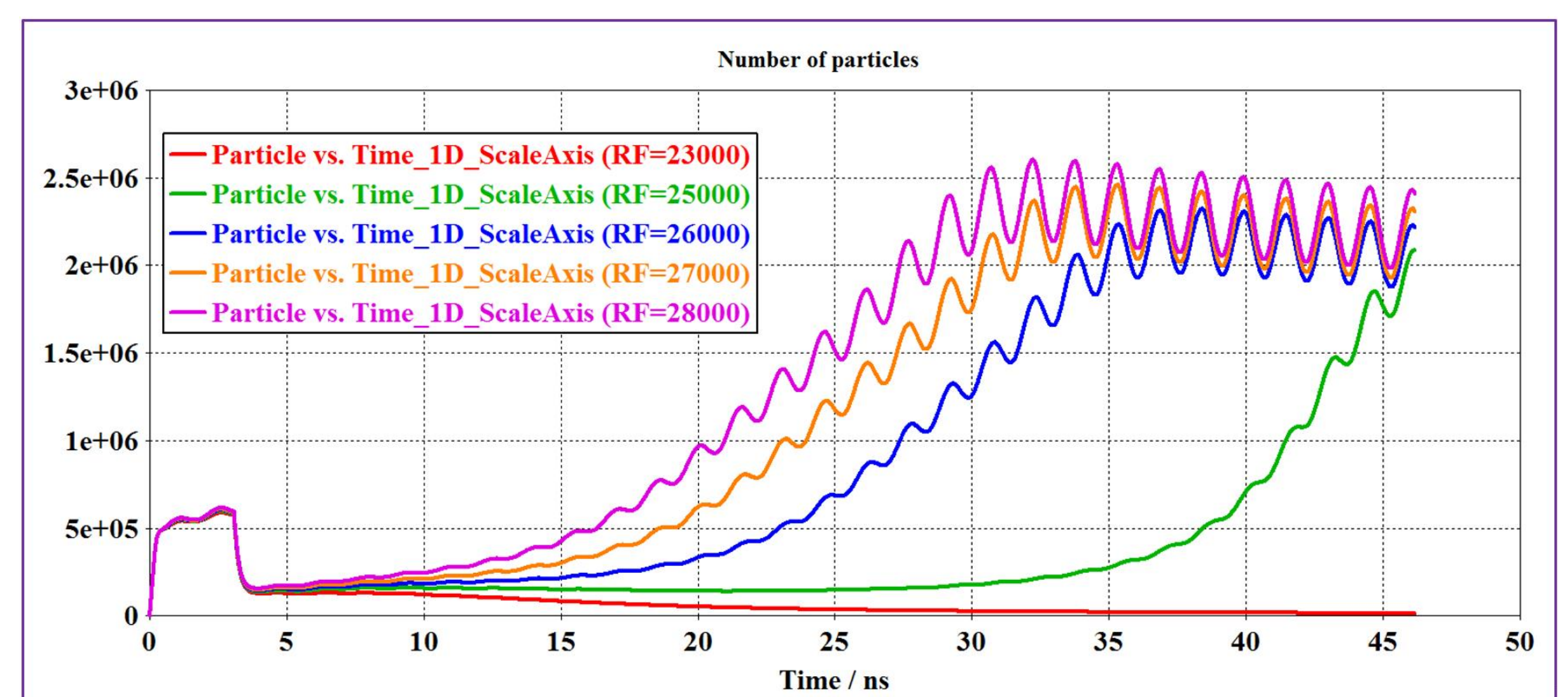
Breakdown of dielectric RF windows is an important issue for particle accelerators and high-power RF sources. One of the generally considered reasons for the RF windows failure is the multipactor on dielectric surface. The multipactor may be responsible for excessive heating of dielectric and discharge of charges that accumulated in ceramic due to secondary emission. In this study the comprehensive self-consistent PIC simulations with space charge effect were performed in order to better understand the dynamic of one-side multipactor development and floating potential on dielectric induced by the emission. The important correlations between the multipactor parameters at saturation and the secondary emission properties of dielectric and the applied RF field parameters were found and are reported in the paper.



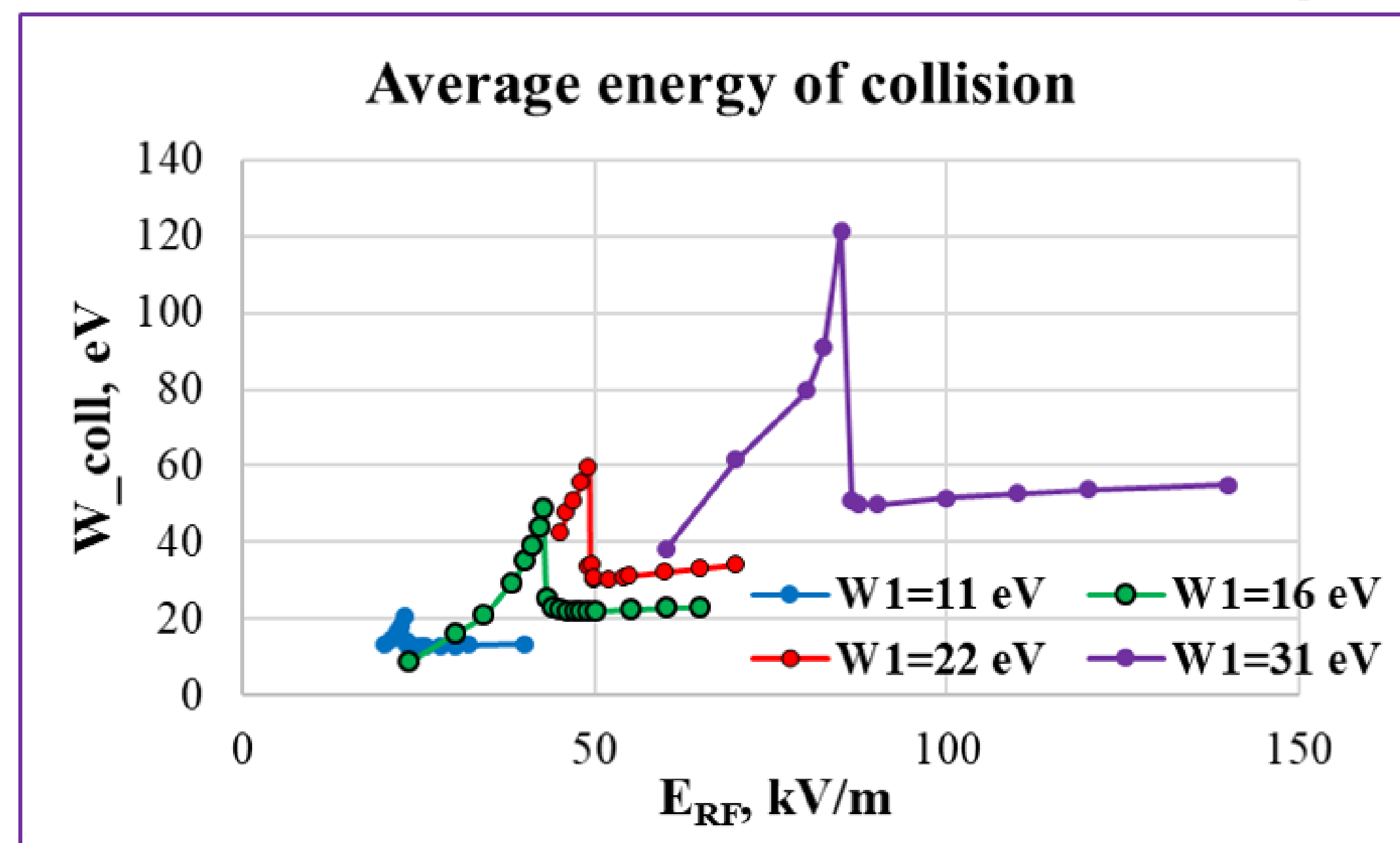
Particle distribution at 1.75 ns after start of emission from single particle source. The curve before collision is not a particle trajectory, but a continuous chain of particles. After the collision there is a cloud of the secondary electrons with random initial energies and directions.



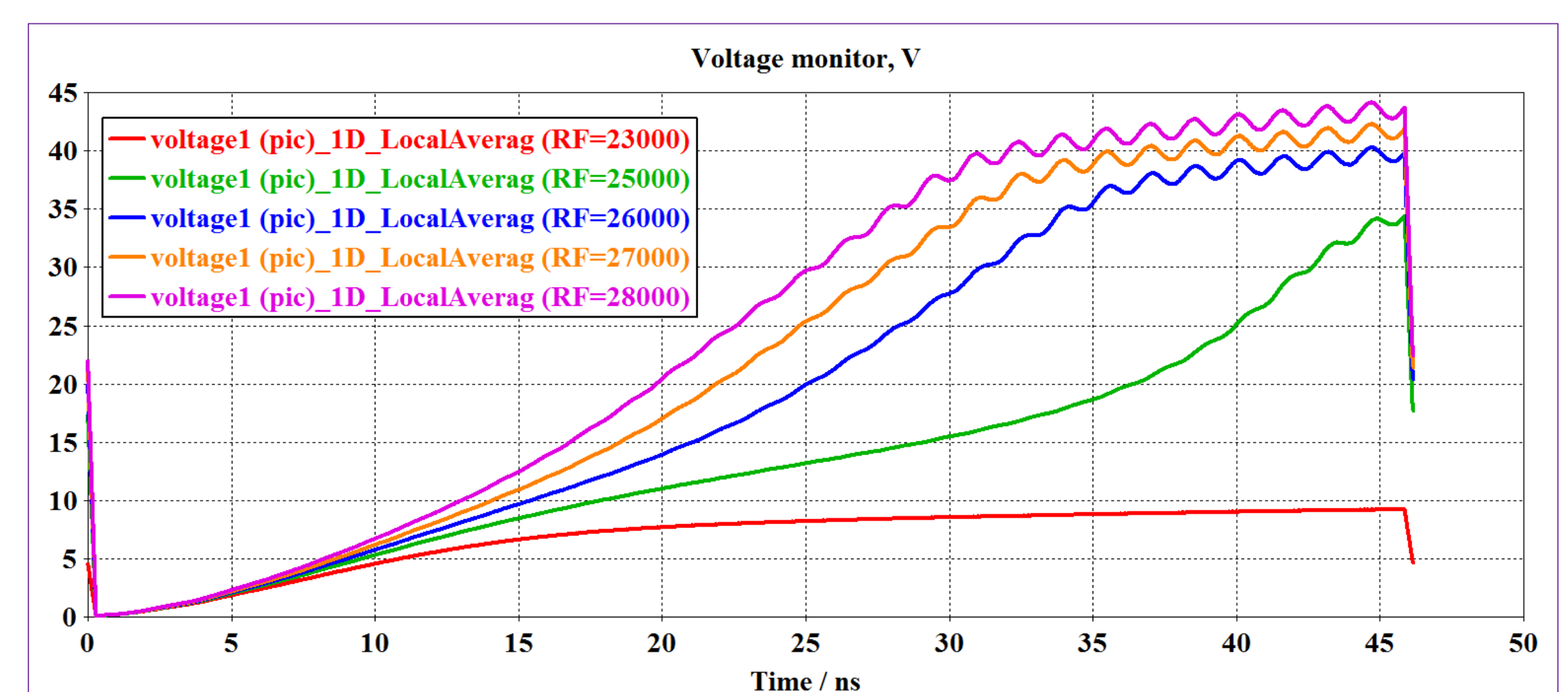
Collision currents vs RF field for different crossovers W_1 and W_2 .



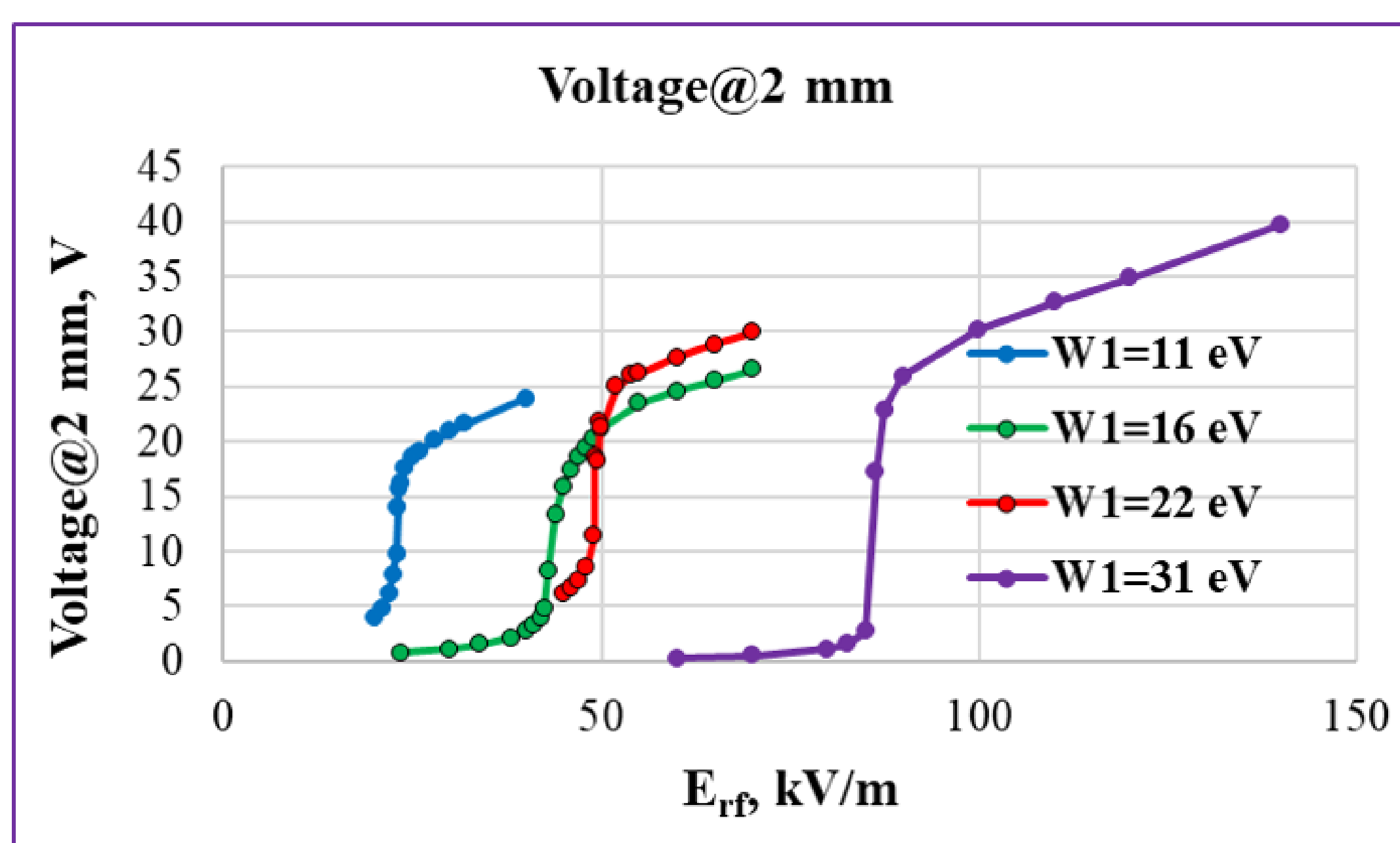
Number of particles vs time at different levels of RF field.



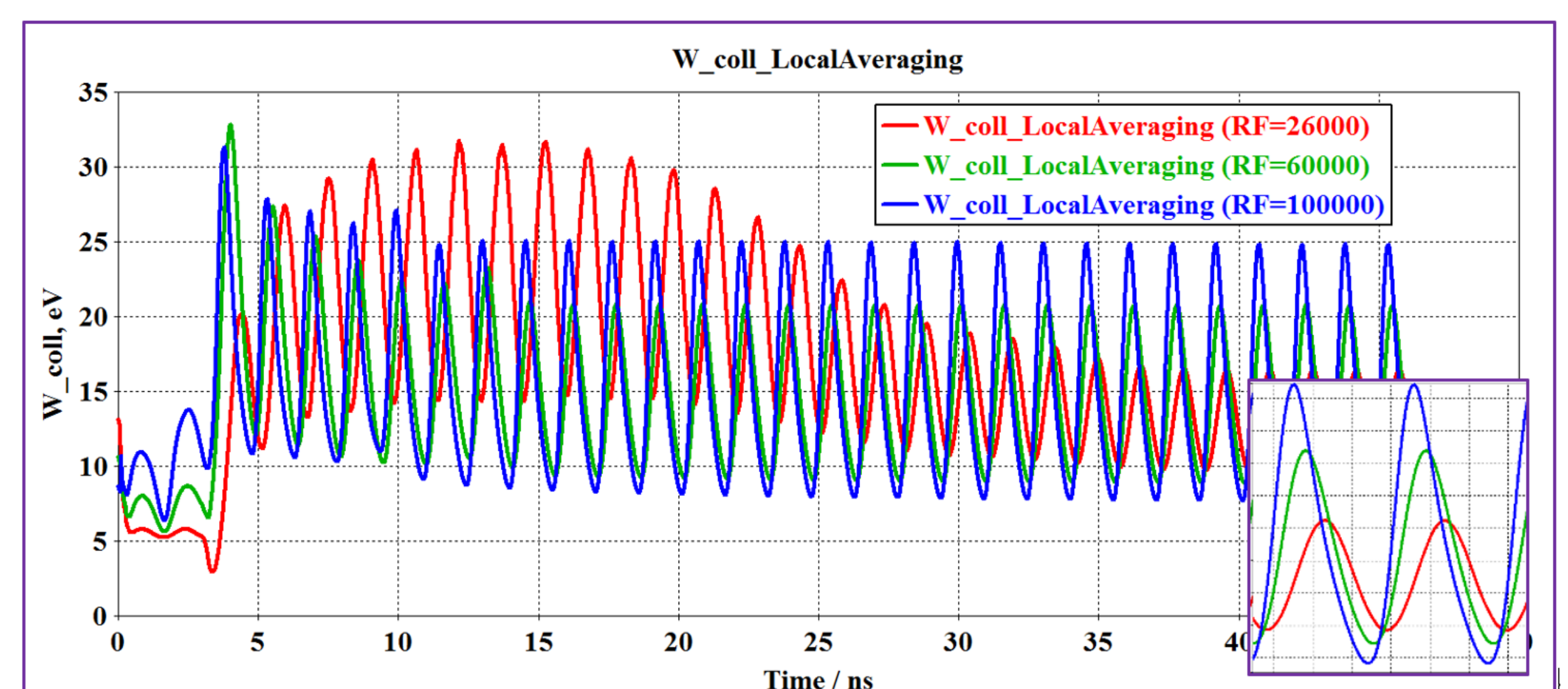
Collision energies vs RF field amplitude for different first crossovers W_1



Voltage monitor readings for different RF field levels..



Voltage monitor readings vs RF field at different first crossovers



Collision energy vs time for different RF field levels.

At any DC field there always synchronous secondary electrons with time-of-flight half of RF period. There are two stage of MP development: 1) dominantly polyphase regime in the beginning of MP and 2) dominantly resonant regime at saturation.