The physics of nanosecond pulsed microdischarges with high repetition rate

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Keywords: microdischarges, pulse repetition rate, high energy electrons, non-local effect.

In this presentation, we will discuss the effects of pulse repetition rate on two kinds of nanosecond pulsed microdischarges with noble gases at atmospheric pressure, as well as a fast ionization wave discharge at a pressure of a few tens of mbar. Diagnostics used in the experiment include current and voltage measurement, optical emission spectroscopy and a capacitive probe. Using these diagnostics, a fluid model and a collisional radiative model, we are able to obtain both time and spatial resolved information on electrons with different energies. It is found that they are strongly correlated with the evolution of the local electric field, which is significantly influenced by the pulse repetition rate. We will discuss the physical mechanisms on how the pulsed repetition rate affect the generation of high energy electrons in different phase of the discharge. We will also the evidence of non-local effect for high energy electrons in such a high pressure discharge.