Discharges in liquids are an important method for biomedical applications in plasma medicine or to trigger the liquid chemistry for electrolysis among others. The complex nature of these pulsed plasmas inside a liquid is an ongoing topic in research. Especially, the ignition process of nanosecond pulsed plasmas in liquids is difficult to monitor. The exact ignition and electron generation mechanisms as well as the plasma propagation are still debated and many physical processes at the plasma-liquid-solid interface need to be considered. However, in-liquid plasmas are an important tool for surface treatments. They show a high mass transfer of reactive species inside the liquid without direct interaction with the surface.

In this talk, the ignition, discharge dynamics, and plasma-induced chemistry of nanosecond pulsed plasmas in water will be discussed. Optical emission spectroscopy with high temporal resolution and ICCD images have been performed. The time-resolved emission spectra give information on the electrode temperature, the degree of self-absorption and the electron density inside the plasma. A broad continuum can be linked to black body radiation from the electrode. Field effects at the electrode-water interface can describe the electron generation. Furthermore, the strongly broadened H-Balmer emission lines show contributions of self-reversal from self-absorption of H atoms and Stark broadening. The determined electron densities are in the range of \(10^{25} \text{ m}^{-3}\). In combination with different models and electrical measurements, a comprehensive study on the different mechanisms in the plasma-liquid-solid system will be presented.

Einführung: Prof. Dr. I. Eremin

Die Fakultät lädt alle Interessierten herzlich ein.