S5-O-019101

THE HISTORY AND STATE OF THE ART IN THE RESEARCH OF THE DC NEGATIVE CORONA

YU.S. AKISHEV

[1]SRC RF TRINITI, 108840, Moscow, Troitsk, Pushkovykh Str., 12, Russia
[2]NRNU MEPhI, 115409, Moscow, Kashirskoe shosse, 31, Russia

The subject of our talk is the unipolar negative corona in the air at atmospheric pressure. DC corona happens between the high voltage (HV) cathode of small size and the grounded anode of large size (see Fig.1).

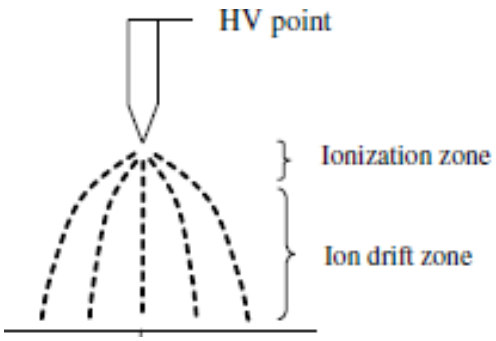

Fig.1. Sketch of corona structure.

Fig. 2. St. Elmo's fire.

Leonard Benedict Loeb (1891–1978)

The corona irradiance around sharp or pointed objects was known long before serious scientific research of this phenomenon. One of the well-known examples of the ancient observations of the corona is so-called St. Elmo's fire which appeared on ships at sea during thunderstorms (see Fig.2). A great contribution to systematic study and development of the physics of corona discharges was done by L. Loeb and his colleagues (see photo). They showed that the shape and size of corona glow depends on the cathode tip size (see Fig.3).

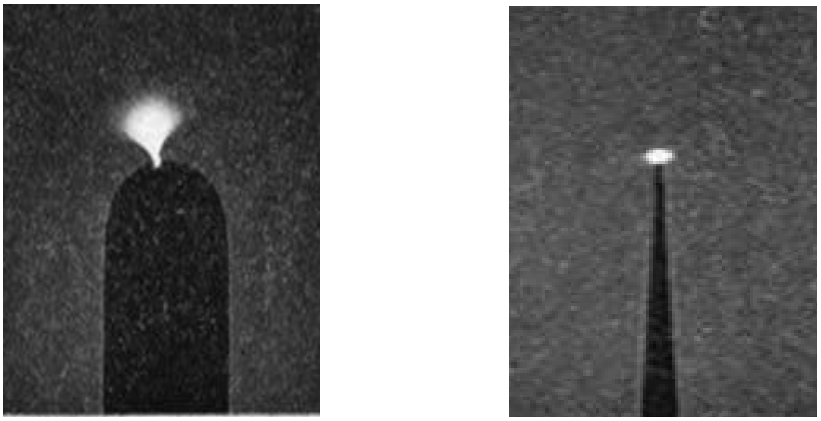

Fig.3. Typical images of corona glow on the cathodes of different diameters.
L. B. Loeb, Electrical Coronas, Univ. of California Press, Berkley, USA (1965)

The goal of this talk is to give a short review of the achievements and open questions in modern physics of a negative corona. Among the questions under review are the corona volt-ampere characteristics, the cathode processes, the ionic wind, the Trichel pulses, the transition of corona regime with a negative space charge into the glow discharge regime with a quasi-neutral plasma in the air gap at atmospheric pressure. Some review of practical applications of a negative corona will be given as well.