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Pulsed DC Large Electrode System Study of the effects of H- Irradiation on Breakdowns

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In order to determine if beam loss damage can induce breakdown, tests have been done in the pulsed DC system at CERN. This system consists of 2 large surface area high precision machined electrodes that are placed in parallel to each other with a gap between 40um and 100um, under high vacuum. The systems are dedicated to studying electrical breakdown phenomena and conditioning processes. A copper OFE electrode for this system received the same heat treatment as the RFQ and a small area was irradiated using the same energies of H- as estimated for the RFQ. The electrode was then placed in the system acting as a cathode to observe whether the irradiated area had an impact on the breakdown locations, with pulsing parameters as similar to the RFQ as possible. A test was done in parallel with using electrodes of the same material with the same heat treatment to serve as baseline. The main differences observed is an increase in the number of breakdowns during the initial conditioning that reduced with further running. SEM and FIB observations were performed before and after the experiments, and are discussed in another talk.

Further tests are foreseen with copper and with alternative materials (CuCrZR an Nb as first candidates)

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