Contribution ID: **3** Type: **Poster**

Design improvements of Electron Gun for PAL Klystrons

Thursday, November 14, 2024 1:00 PM (1h 30m)

Several prototype S-band pulsed klystrons for use in the Pohang Accelerator Laboratory (PAL) have been produced by a domestic company in collaboration with PAL. These klystrons stably produced the required output RF power at a low pulse repetition rate (< 30 Hz) but suffered from gun arcings at 60 Hz which is the operation rep. rate of the PAL-XFEL klystrons. We inspected the arcing spots on the focusing electrode of a failed klystron and found they were not located where the surface electric field was at its maximum. Simulation of particle trajectories in the gun region suggests that the gun arcing is initiated by the emission of electrons and proceeds with clumps emissions, possibly induced by the electrons hitting the anode plate. The gun arcing can also be initiated from the so-called triple point (TP) at the gun bottom, where a negative potential is established during high voltage (HV) operation. Electrons emitted from the TP can travel along the inner surface of the ceramic insulator and multiply until they reach the anode housing which is at the ground potential. Computation of the electric field distribution and electron trajectories under the electric field confirmed the possibility of gun arcing. In this article, we report on our analysis of the gun arcing mechanism and propose design improvements to eliminate it for stable operation at high repetition rates (e.g., 60 Hz).

Paper submission Plan

Yes

Best Presentation

No

Contribution track

ICABU WG1. Accelerator Systems

Primary author: PARK, Sung-Ju (Pohang Accelerator Laboratory)

Presenter: PARK, Sung-Ju (Pohang Accelerator Laboratory)

Session Classification: ICABU Poster Session

Track Classification: ICABU: ICABU WG1. Accelerator Systems