## 12th International Workshop on the Mechanisms of Vacuum Arcs (MeVArc 2025)



Contribution ID: 21

Type: Poster

## Investigation of Metal Particles Sources and Motion Characteristics in High-Current Interruption

Delayed breakdown in high-current vacuum interruption has emerged as a critical technical challenge restricting the development of high-voltage vacuum interrupters (HVIs). This study focuses on the origin and motion characteristics of metal particles during the post-arc phase, aiming to investigate their potential role as triggers of delayed breakdown. An optical diagnostic platform integrating laser shadow imaging and infrared thermography was established to enable full-process observation of metal particle behavior and electrode surface activity. Experimental results show that metal particles emitted from the cathode molten pool are generally larger in size and slower in speed, and can remain suspended in the post-arc gap for tens to hundreds of milliseconds. These particles typically follow inertial and stable trajectories, without notable reversal or abrupt deviation. This study proposes an intrinsic correlation between the long-term presence of metal particles and the occurrence of delayed post-arc breakdown. The findings suggest that larger particles are more likely to cause dielectric recovery failure in HVIs with wider gaps and higher voltage ratings. Future work will focus on clarifying the formation mechanisms and developing control strategies to improve the reliability of high-current interruption.

## Please choose topic that matches most closely your research

Experiments and diagnostics

Author: LE, Xiaoxi (Sichuan University)

**Co-authors:** Mr XU, Huikai (Sichuan University); Mr CHEN, Liang (Sichuan University); Mr SHEN, Saikang (Sichuan University); Mr HUANG, Xiaolong (Sichuan University); Mr JIA, Shenli (Sichuan University)

**Presenter:** LE, Xiaoxi (Sichuan University)

Session Classification: Poster session