Contribution ID: **207**　　　　　　　　　　　　　　　　　　Type: **Invited Oral**

# Breakdown insensitive acceleration regime in structure wakefield acceleration

*Tuesday, 8 November 2022 10:30 (30 minutes)*

Structure wakefield acceleration is an advanced accelerator concept which employs short drive electron bunches as compact power sources to accelerate witness bunches. It is promising to raise the accelerating gradient, which is limited to about 100 MV/m in conventional RF accelerators due to RF breakdowns, by confining an intense wakefield in short RF pulses. Based on the extensive research in the high gradient acceleration community, using short RF pulses could mitigate the risk of RF breakdown and increase the operating gradient as a result. In a few recent experiments at the Argonne Wakefield Accelerator (AWA), including an X-band single-cell metallic structure, and an X-band metamaterial accelerating structure, we discovered evidence for a new operating regime, named the breakdown insensitive accelerating regime (BIAR), where the RF pulse for acceleration (or the accelerating field in the structure) is not disrupted in a breakdown event. The pulse length is short, on the order of a few nanoseconds. The BIAR regime could lead to high-gradient acceleration as well as breakthrough in understanding RF breakdown physics.

## Acknowledgments

**Primary author:** LU, Xueying (NIU / ANL)

**Co-authors:** MERENICH, Dillon (NIU); SHAO, Jiahang (Argonne National Laboratory); PENG, Maomao (ANL); Dr CHEN, Gonxiaohui (Argonne National Laboratory); DORAN, Scott (Argonne National Laboratory); HA, Gwanghui (Argonne National Laboratory); JING, Chunguang; LIU, Wanming (Argonne National Laboratory); POWER, John; WHITEFORD, Charles (Argonne National Laboratory); WISNIEWSKI, Eric (Argonne National Laboratory)

**Presenter:** LU, Xueying (NIU / ANL)

**Session Classification:** Plenary

**Track Classification:** Plenary Sessions: Invited Talks