

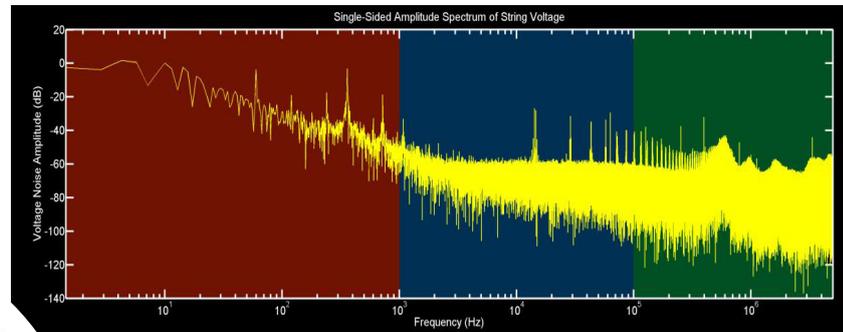
Energy, Climate &
Infrastructure Security

Sandia National Laboratories has undergone a major effort to characterize arc signals and ensure arc fault circuit interrupters (AFCIs) robustly detect arcing conditions while avoiding false trips from noise sources.



Arc Fault Detection and Mitigation

Sandia has world-renowned expertise in photovoltaic systems, RF characterization, and microelectronics and device reliability to assist commercial manufacturers with the testing and development of arc-fault detectors and interrupters.



Reducing the Risk of Arc-Faults

Photovoltaic (PV) arc-faults can lead to fires, which damage property and threaten the safety of building occupants. In response, Article 690.11 was approved for the 2011 National Electrical Code® (NEC)—requiring new PV systems, 80 V or greater, on or penetrating a building to include a listed arc-fault protection device to extinguish series arc-faults. As a result, arc-fault circuit interrupters (AFCIs) are being developed to meet the new NEC requirements.

Currently available AFCIs can miss arcing conditions if the signal is attenuated or masked, or can trip due to RF noise under normal operating conditions. Sandia National Labs has undergone a major effort to characterize arc signals and ensure AFCIs robustly detect arcing conditions while avoiding false trips from noise sources.

Sandia fundamental research and direct collaborations are supporting AFCI manufacturers in the development of robust arc-fault detection algorithms by:

1. Performing arcing tests at the Distributed Energy Technologies Laboratory (DETL) with AFCI prototypes to verify their functionality on PV strings with different PV technologies, inverters, and BOS components.

2. Assisting manufacturers calibrate arc-fault detector algorithms by providing high-fidelity current and voltage signatures of arcing, baseline (non-arcing), DC disconnects, and inverter noise.
3. Investigating sources of noise on PV systems and suggesting robust arc-detection algorithms which avoid noisy bandwidths.

Commercialization Path

Sandia National Laboratories is working with collaborators to develop commercial arc-fault detectors (AFDs). SNL facilities are ideal for testing the robustness of AFDs and AFCIs because DETL contains reconfigurable PV arrays with a diverse portfolio of PV technologies, ages, and I-V characteristics, along with a range of connectors, DC disconnects, combiner boxes, line lengths, and inverters.

Sandia looks forward to collaborating with AFD manufacturers to create robust AFDs to improve the safety of US PV installations. Opportunities for research and development partnerships are available through Sandia's Corporate Research and Development Agreement (CRADA) process. Please contact us to discuss company needs and collaboration goals.

**For more information
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