Cryogenic AI Software-Hardware Computing for Energy Applications

Shinjae Yoo

Computing and Data Sciences Directorate
Brookhaven National Laboratory
E-mail address: sjyoo@bnl.gov

Abstract:

Recent advancements in cryogenic analog computing—across both quantum and neuromorphic domains—are opening new frontiers for high-performance and energy-efficient computation. This presentation explores state-of-the-art capabilities, key technical bottlenecks, and the near-term outlook for enabling these novel computing paradigms. We highlight recent achievements in quantum and neuromorphic systems at Brookhaven National Laboratory, emphasizing the pivotal role artificial intelligence plays in hardware-software co-design, error mitigation, and system optimization to drive breakthroughs in energy applications.