

Physics Colloquium

Dr. Sina Najmaei

“2D Semiconductors for Future Electronic Device Applications”

The power scaling of silicon devices have reached a major roadblock. This has disrupted the progress towards higher performance processors and computers, established through Moore’s law. As a result, the scientific community has focused on discovery of new materials and device concepts that can continue the progress in the semiconducting device world. Additionally, this is all happening at a time where big data, the Internet of Things, and distributed electronics are becoming commonplace. This is changing how we collect, process, and use information and, inevitably, will revolutionize how we build and integrate devices in circuits for computing and processing applications. In many ways, this is a unique opportunity for drastic change in the paradigms of computing and demands multifaceted solutions to materials and device problems. In this talk, I will focus on a class of 2D semiconducting materials with unique properties that can bridge some of the gaps in assembly and applications of heterogeneous future electronic devices. I will provide a brief review of the 2D materials research and an overview of the core research areas in our team. This will include our research in 2D materials processing and device assembly that creates a roadmap for integration of these materials into electronic devices. I will discuss some of the basic and unique functionalities that these 2D systems provide and point at applications that our team has explored. I will conclude by providing an over view of our future research directions in the area of 2D material research and neuromorphic computing at US army research lab.

Dr Sina Najmaei is a research scientist and the technical lead for US Army Research Laboratory Neuropipe program. He received his PhD from Rice University in Materials Science and Engineering in 2014 and started at US Army research lab as a postdoctoral fellow in 2015. After transitioning to a civilian position at the lab, he is now leading several research programs including a triservice (NRL/ARL/AFRL) effort in neuromorphic computing devices research. He has over 60 publications with over 10,000 citations and several patents. His research focus and interests include 2D materials processing, device integration, and 2D excitonic devices. He has been a recipient of numerous awards, including the ARL early career award (2019), Department of Army Civilian commendation award (2020), and Technically bold career award (2020) for his research accomplishments in 2D materials devices.

Thursday March 25th at 4:25 via Zoom

**If you are outside the Lehigh Physics Department, please email
Professor Bitan Roy (bir218@lehigh.edu)**