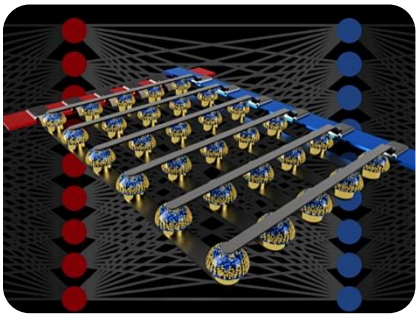
IBM Research –Zurich

Unconventional phase change memory device concepts for in-memory and neuromorphic computing



Ever wondered why our brain can so ever efficiently memorize and learn things? It has to do with how information is stored and processed by the building blocks we know of as synapses and neurons. Unlike modern computers, which require the repeated transfer of data between the physically separated processing and memory units, the brain computes in-place; meaning the same element that stores data, also computes. This makes processing extremely energy and time-efficient. With proliferating high-speed mobile networks, internet-connected devices, and AI generating unprecedented amounts of data- data that needs processing, it is becoming increasingly clear that the non-quantum way forward is to create brain-like computers at the level of the "hardware". This is precisely what this project is going to be about. You will join a team of highly motivated researchers and architect functional components for this emerging paradigm of "in-memory computing". Most specifically you will build and understand the electronic phase-change synapses, broadly referred to by phase change memory in-memory computing.

Excellent as it is, the phase change technology has its challenges that need to be overcome at both the hardware and algorithmic levels when building up reliable and accurate AI inference engines. A key area of research is that of designing new types of memory devices that are specifically suited for in-memory computing. On that note, we invite applications for a Master's thesis to research this exciting topic at the IBM Research – Zurich labs. The project will encompass experimental characterization and modeling (physical as well as behavioral) of novel phase-change memory. The incoming student will have significant advantages: we have some of the most advanced instrumentation and device fabrication facilities in the field, and several individuals (besides the PIs) who can work with the student. By the end of the thesis, the student will gain know-how in many aspects of the "chip" industry.

Your profile will be one of a highly motivated student, evidenced by a multi-disciplinary background, strong mathematical aptitude, experimental, and programming skills. A prior industrial internship experience will be valuable, a knowledge of emerging memory technologies will be a bonus but not necessary as we believe you are likely too soon to pick it up.

If this opportunity picks your interest, please reach out with your most recent curriculum vitae, including a transcript of grades by email to: Dr. Syed Ghazi Sarwat (ghs@zurich.ibm.com) and Dr. Abu Sebastian (ase@zurich.ibm.com)