

Photonic AI for the 2030's: can we realize 1000x higher performance AI systems?



Colloquium talk
by

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Automation such as enabled by AI and machine intelligence is here to stay. If we want to avoid a global AI economic 'winter', we need to innovate outside state-of-the-art electronic compute systems, and allow for novel analog-digital compute paradigms, scalable interconnect solutions, and be inspired by the designs of the human brain. In this colloquium, I will break-down the techno-economics of hyperscalers and share innovation solutions to address them. The goal is to enable 1000x higher performance compute and interconnect solutions in the 2030's. In detail, I will cover 1) Fourier-photonic accelerators reducing the computational complexity of modern AI workflows via an energy free Fourier transformation on-chip and mention brain-derived Hebbian Learning ASIC prototypes for unsupervised learning, 2) Photonic random access memories (PRAMs) to address the memory bottleneck, 3) share optical interconnect platform approaches using 3DHI solutions called 'HIPER-X', and 4) share latest results of atto-joule/bit opto-electronic components utilizing plasmonics and novel optoelectronic materials such as ITO. I will conclude by providing an overview Florida's high-tech ecosystem including partnerships with NVIDIA covering photonics, quantum technologies, and semiconductor capabilities. Finally, I will share our latest trusts towards exploring datacenters in earths orbit together with NASA and Space-X.

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 HS C, Victor-Franz-Hess-Haus

Organizers: Katrin Erath-Dulitz, Francine Marleau, Hanns-Christoph Nägerl