



Contribution ID: 24

Type: **not specified**

Presentation 46: Analog simulators of artificial life and AI accelerators based on optical neural networks

Friday 26 January 2024 15:06 (12 minutes)

This research aims to translate Lenia—a computational model of artificial life based on cellular automata—into an optical system to meet the computational demands posed by AI hardware. We introduce nonlinearity into the optical system through the development of a physical nonlinear neural network. The initial phase involves the modeling of nonlinear material layers and comprehension of their modulation properties. To benchmark the physical neural network, we begin by addressing the realization of an optical AND gate, where binary states are encoded on an optical vortex basis. By training the design of phase masks using a gradient descent algorithm known as wavefront matching, two input beams traversing the phase masks can be mapped into an output beam according to the AND operation. Results with and without nonlinear layers are being explored to improve the accuracy of the nonlinear optical gate.

Presenter: ALMEIDA, Carolina