

SEMINAR ANNOUNCEMENT

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING
COLLEGE OF DESIGN AND ENGINEERING

Website: <https://cde.nus.edu.sg/ece>

Area: Microelectronic Technologies & Devices (MTD)

Host: Dr Lin Hong Lin

TOPIC	:	Optical Ising Machines: From All-Optical Spin Dynamics to Scalable SLM-Based Solvers
SPEAKER	:	Mr Zhang Dewen Graduate Student, ECE Dept, NUS
DATE	:	Tuesday, 18 August 2026
TIME	:	10:30AM-11:30AM
VENUE	:	Join Zoom Meeting https://nus-sg.zoom.us/j/84457704258?pwd=bLHXSurMVcs8VkhDCROjCjokwv92qh.1 Meeting ID: 844 5770 4258 Passcode: 829663

ABSTRACT

Ising annealers provide a promising computational framework for solving large-scale combinatorial optimization problems through unconventional computing architectures. Many existing Ising solvers, however, rely on algorithmic approaches such as simulated annealing, where the Ising Hamiltonian is minimized through iterative electronic computation. This iterative process can introduce an electrical bottleneck that limits the overall computational speed. All-optical Ising machines offer a potential route to overcome this limitation by performing the optimization directly within the optical domain.

However, a key challenge in developing an all-optical Ising machine is scalability. As the number of spins increases, the required number of optical components grows rapidly, leading to significantly greater system complexity.

In this talk, we present two different approaches: an all-optical two-spin Ising machine and an SLM-based large-scale Ising solver employing iterative feedback loops. The advantages and limitations of both architectures will be compared and discussed, with particular emphasis on scalability, system complexity, and computational performance.

BIOGRAPHY

Dewen Zhang is currently pursuing his Ph.D. degree under the supervision of Associate Professor Aaron James Danner in the Department of ECE, NUS. His current research interests are in VCSEL-based optical Ising machine.

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