PWF School on Numerical Simulation of Quantum Many-body Systems

Quantumandu

Dates : 25 to 31 July 2024

Location: Central Department of Physics, Tribhuvan University, Kirtipur, Kathmandu, Nepal.

Group Photo session of day 4 of the school with organizers and participants

Challenges of physics education and research in Nepal

1. *Centralized education system : Most of the campuses offering MSc and PhD are centered in Kathmandu valley.*
2. *Early brain drain : Gradual decrease of enrollment throughout the years.*
3. *Lack of resources : Both human resources and research facilities.*
4. *Limited access to the global research community.*

Goals of this school

- *Primary goal : Teach numerical methods to study quantum many-body physics problems to Master's level physics student in Nepal. Focused areas, Exact Diagonalization methods, Tensor network methods, phase transitions and critical phenomenon.*

- *Secondary goal : Teach about* writing and maintaining efficient scientific codes in python.

- Career counselling session to help student search for PhD opportunities around the world.

Organizers and Partner Institutes

The Abdus Salam International Centre for Theoretical Physics
Physics Without Frontiers

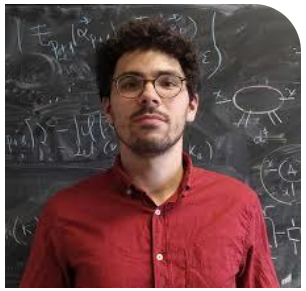
IAEA International Atomic Energy Agency

unesco United Nations Educational, Scientific and Cultural Organization

Quantumandu

SISSA

Nishan Ranabhat



Guglielmo Lami

Prof. Mario Collura

Prof. Narayan Adhikari

A typical day of school

Morning session : 10 a.m. - 1 p.m.
Theory lectures

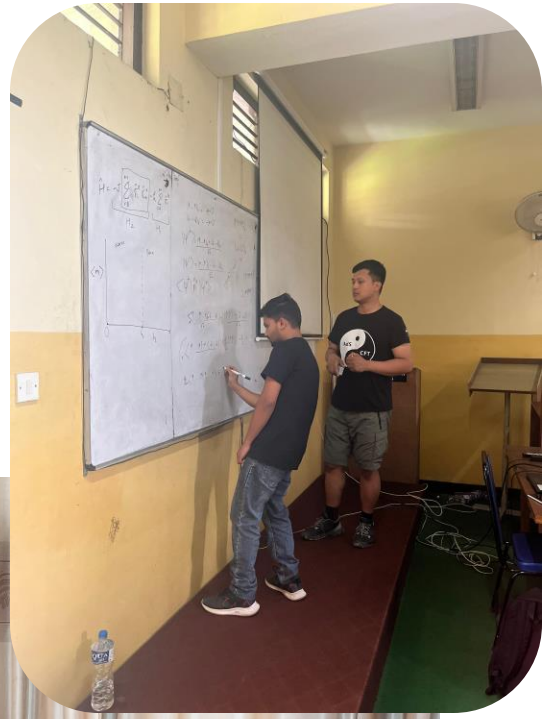
Lunch-Break

Afternoon session : 2 p.m. - 5 p.m.
Hands-on sessions

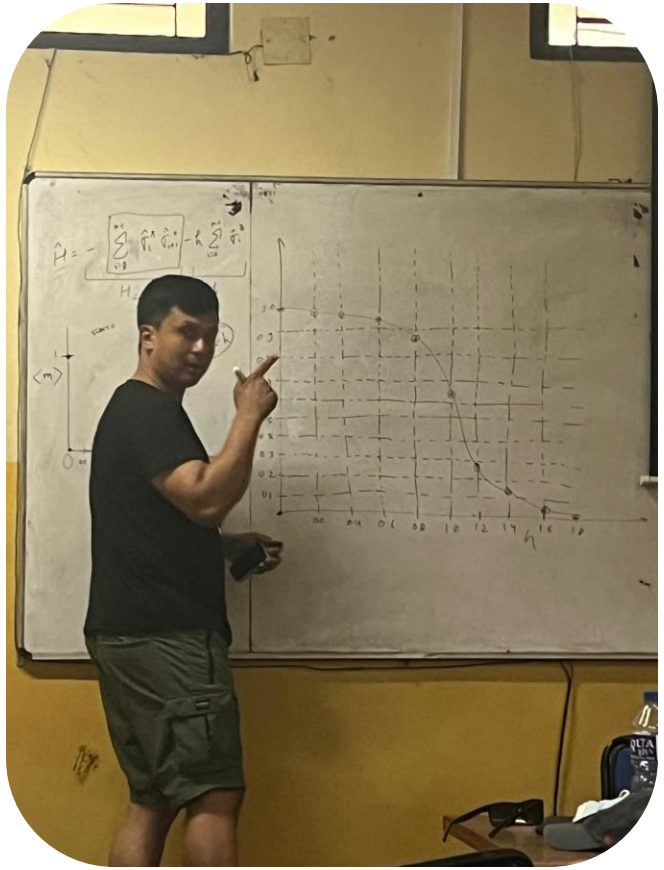
Glimpse of white-board lectures with Guglielmo Lami

Glimpse of hands-on sessions with Nishan Ranabhat

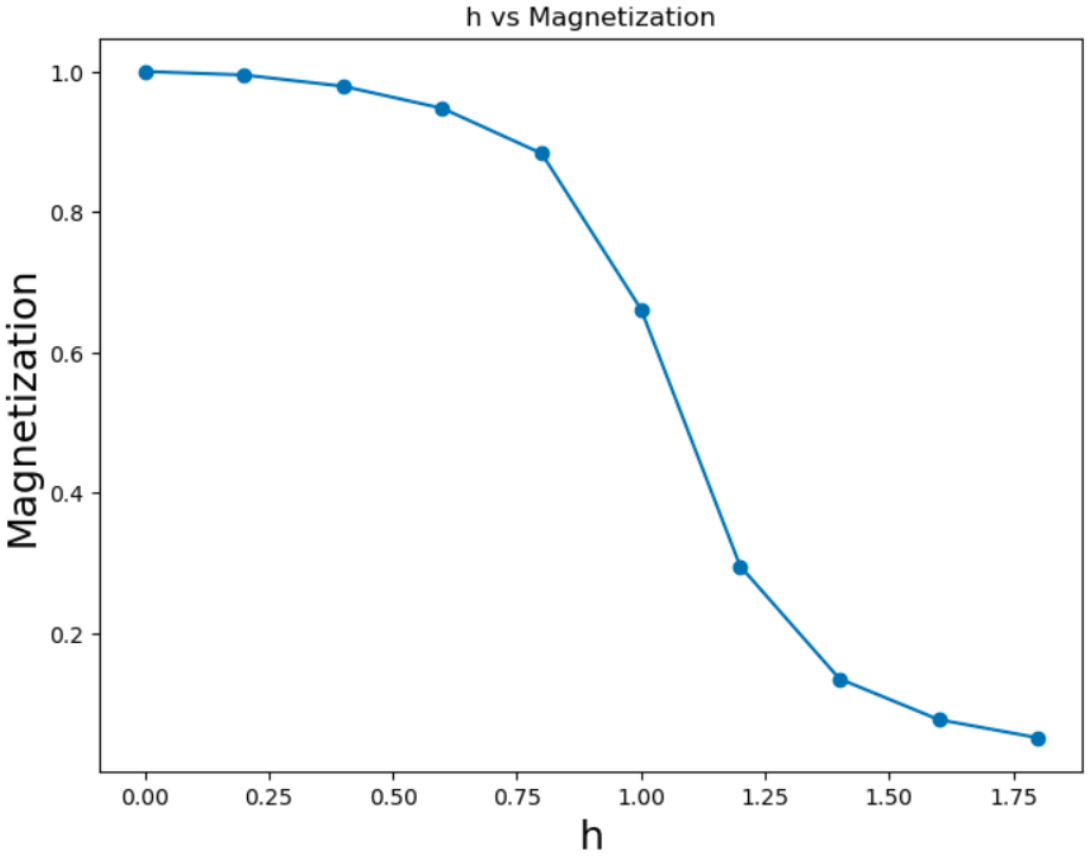
Highlights: learning through class participation



Highlights: achieving goals through class exercise



Nishan Ranabhat lecturing about quantum phase transition in Ising model during one of the hands-on session.

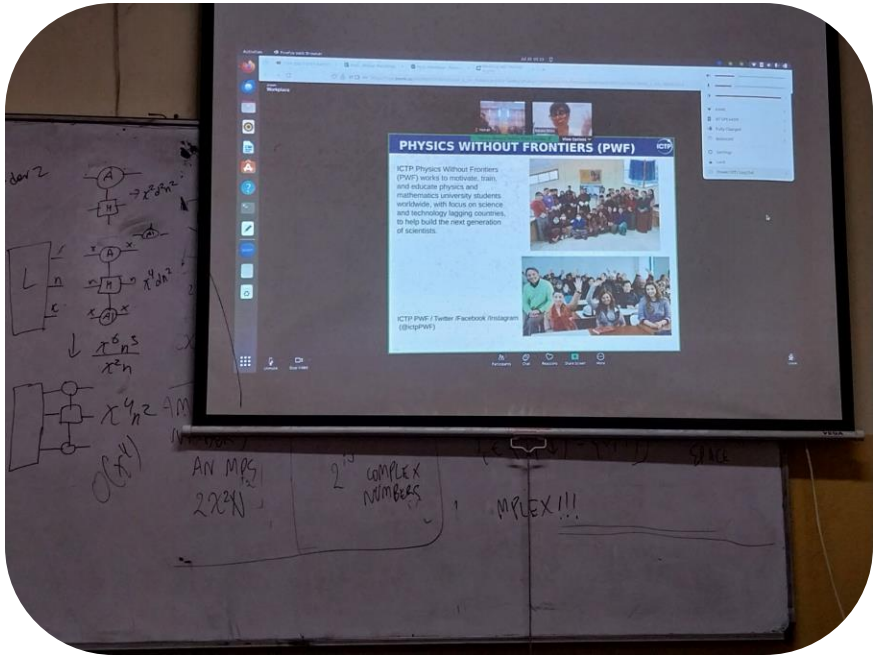


This plot of phase transition observed in Quantum Ising model was generated by one of the participant with exact diagonalization during one of the hands-one session.

Highlights: other events during the school

Attending virtual lecture by Prof. Mario Collura entitled *"Phase transition and critical phenomenon"*

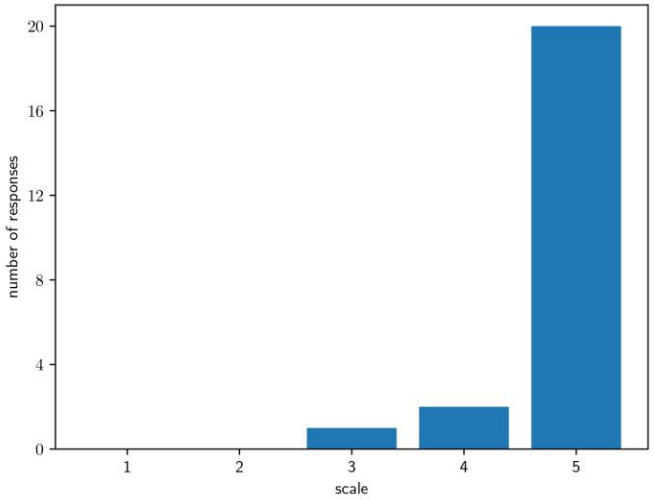
Guglielmo Lami giving popular lecture on Quantum Computation



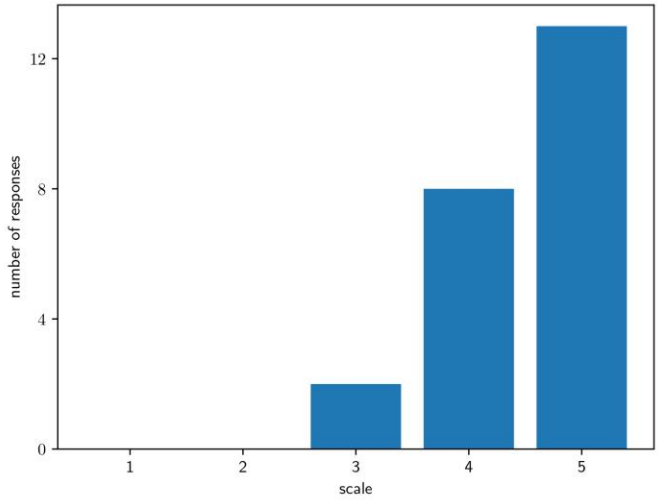
Attending virtual career counselling session by Dr. Natasa Stojic.

Feedback from participants

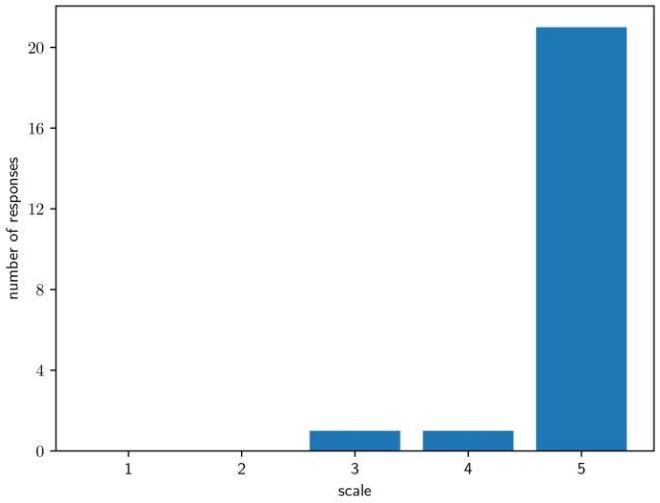
Was the school useful ?



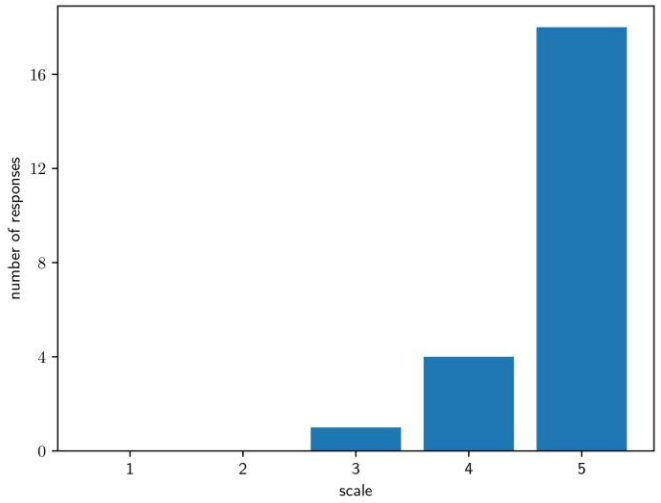
How much new skill did you gain ?



Preparation of instructors



Quality of course materials



"The school would be more effective if it would have lasted few more days so that more details can be covered to the tensor network. "

"I have never attended a better international school than this one. "

" Facilitate small group research projects where students can apply learned concepts to investigate specific problems."

" Encourage interdisciplinary projects that combine quantum simulation with other fields such as material science or condensed matter physics. "