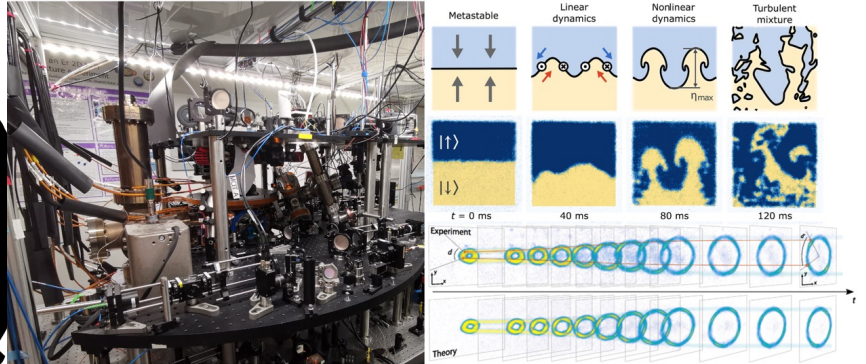


SEMINARS ON TECHNOLOGICAL ADVANCES AND
INNOVATION**BUILDING A QUANTUM
SIMULATOR: A MACHINE
LEARNING APPROACH TO
HARDWARE OPTIMIZATION****Shouvik Mukherjee**

CO-FOUNDER AND CHIEF SCIENTIST

QUBeATS, HYDERABAD

In this talk I'll present the development of an apparatus that efficiently produces ^{23}Na Bose–Einstein condensates (BECs) in a hybrid trap that combines a quadrupole magnetic field with a far-detuned optical dipole trap. Using a Bayesian optimization framework, we systematically optimize all BEC production parameters in modest-sized batches of highly correlated parameters. Furthermore, we introduce a Lagrange multiplier-based technique to optimize the duration of different evaporation stages constrained to have a fixed total duration; this enables the progressive creation of increasingly rapid experimental sequences that still generate high-quality BECs. Taken together, our techniques constitute a general approach for refining and accelerating sequence-based experimental protocols. Leveraging this optimized platform, we explore its application as a quantum simulator for complex fluid dynamics and fundamental physics.

Jan**22****2026**

TIFRH Auditorium 16:00 Hrs

Tea/Coffee 15:45 Hrs