SGT Time (GMT +8)	2 Dec 2022, EMB Collaborative Lab 1, Level 5
09:45 - 10:15	Registration
10:15 - 10:20	Welcome Address by **Assoc Prof Gu Mile**
10:20 - 11:05	**Joe Fitzsimons** (Horizon Quantum Computing) *Abstracting Quantum Computation*
11:05 - 11:50	**Tommaso Demarie** (Entropica Labs) *Entropica Labs, Software for Large-Scale Quantum Computations*
11:50 - 12:35	**Tennin Yan** (QunaSys) - online *Quantum Computing Startup Focus on Chemistry Simulation*
12:35 – 12:45	Group Photo-taking
12:45 - 13:45	Lunch Break
13:45 – 17:00	**IBM Quantum Workshop** *Introduction to Quantum Computing with Qiskit on IBM Quantum* **Session 1: Introduction** Introduction to Quantum & Quantum tools (Composer, Quantum Lab, Qiskit Runtime, Services) **Session 2: Intermediate** Basic quantum computational principles and overview of quantum algorithms **Session 3: Advanced** Overview of Qiskit Application Modules • Qiskit Machine Learning • Qiskit Optimization • Qiskit Nature • Qiskit Finance

Talks by Industry Speakers

Joe Fitzsimons (Chief Executive, Horizon Quantum Computing)

Abstracting Quantum Computation

Quantum computers have the potential to drastically outperform conventional computers for a variety of tasks, from simulating molecular interactions to machine learning. However, our understanding of how to construct non-trivial quantum algorithms is still in its infancy and human intuition is not well suited to finding ways to accomplish computational tasks through quantum interference. As a result, reaching a future where quantum computing is widely used requires not only overcoming the challenges of building scalable quantum computers, but also finding new ways to program these systems to tackle new and more complex problems. In this talk I will introduce some of the work we have been doing at Horizon Quantum Computing to simplify the task of programming quantum processors through increasing levels of abstraction, and discuss progress towards our goal of compiling classical code to take advantage of quantum processors, through automated synthesis of quantum algorithms.

Joe Fitzsimons founded Horizon Quantum Computing to build tools for quantum software development and secure delegation to quantum computers. Prior to founding Horizon, Joe was a tenured associate professor at the Singapore University of Technology and Design (SUTD) and a principal investigator at the Centre for Quantum Technologies (CQT) at the National University of Singapore.

Joe received his undergraduate degree in theoretical physics from University College Dublin, and his doctorate from the University of Oxford, where he subsequently spent three years as a fellow of Merton College. While at SUTD and CQT, Joe held a National Research Foundation Fellowship and was named as the MIT Technology Review Innovator Under 35 (Asia list).

Tommaso Demarie (CEO, Entropica Labs)

Entropica Labs, Software for Large-Scale Quantum Computations

In this talk, I will present Entropica Labs' work and vision for the future of the quantum computing industry.

Tommaso Demarie is the CEO of Entropica Labs, with a background in quantum information theory. He holds a PhD from Macquarie University, Australia, and is an alumnus of Singapore's Centre for Quantum Technologies. Beyond physics and quantum computing, Tommaso loves yoga, reading and chess.

Tennin Yan (CEO, QunaSys Inc. Japan) - online

Quantum Computing Startup Focus on Chemistry Simulation

In this talk, I will share activities in a Japanese quantum computing software startup focusing on quantum chemistry applications. I will cover all aspects of QunaSys activites research - developing a new algorithm, engineering user-friendly software to access our algorithm easily, and also business - funding industry consortium for developing use case.

Tennin Yan graduated from the University of Tokyo, Department of Mechanical and Information Engineering, Faculty of Engineering. He entered the Graduate School of Information Science and Technology at the same university, and studied abroad as an exchange student at the Technical University of Munich, majoring in management. After he returned to Japan, he founded QunaSys.

QunaSys aims to bring quantum physics, which until now has supported society behind the scenes, to the forefront and actively use quantum properties to achieve what could not be achieved with existing technologies company. QunaSys provides solutions that can be actually used in business by combining research capabilities to solve problems for practical use and development capabilities necessary for utilizing quantum computers.

IBM Quantum Workshop

Introduction to Quantum Computing with Qiskit on IBM Quantum

This session aims to give a brief inspiration and introduction to the world of quantum computing, exploring the possible potential of such a new paradigm of computing to real world problems.

We shall start off introducing quantum computing using visual tools available on IBM Quantum platform to aid in understanding of concepts and proceed to introduce the open source quantum development kit**: Qiskit** as a tool to program quantum computers on cloud using the IBM Quantum platform followed by a brief introduction to our high level Qiskit application modules; Qiskit Machine Learning, Qiskit Finance, Qiskit Optimization and Qiskit Nature as tools to rapidly prototype and experiment with newer types of implementations that leverage quantum computing.

Attending the workshop

You will need an account with IBM Quantum. Apply for the free account here. Please remember your sign-in details and bring along your laptop.

Links to resources to follow along with the lectures:

1. Launch IBM Quantum Composer: https://quantum-computing.ibm.com/composer
2. Launch IBM Quantum Lab: https://quantum-computing.ibm.com/lab
3. Qiskit Textbook: https://qiskit.org/learn/course/introduction-course
4. Qiskit SDK: https://qiskit.org/
5. Qiskit Documentation: Qiskit Nature, Qiskit Machine Learning, Qiskit Optimization, Qiskit Finance
6. Join Qiskit Slack: https://ibm.co/joinqiskitslack