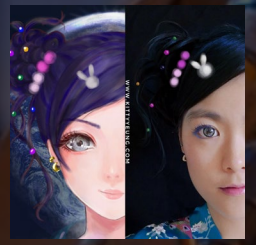
Introduction to Quantum Computing



Kitty Yeung, Ph.D. in Applied Physics

Creative Technologist + Sr. PM
Microsoft

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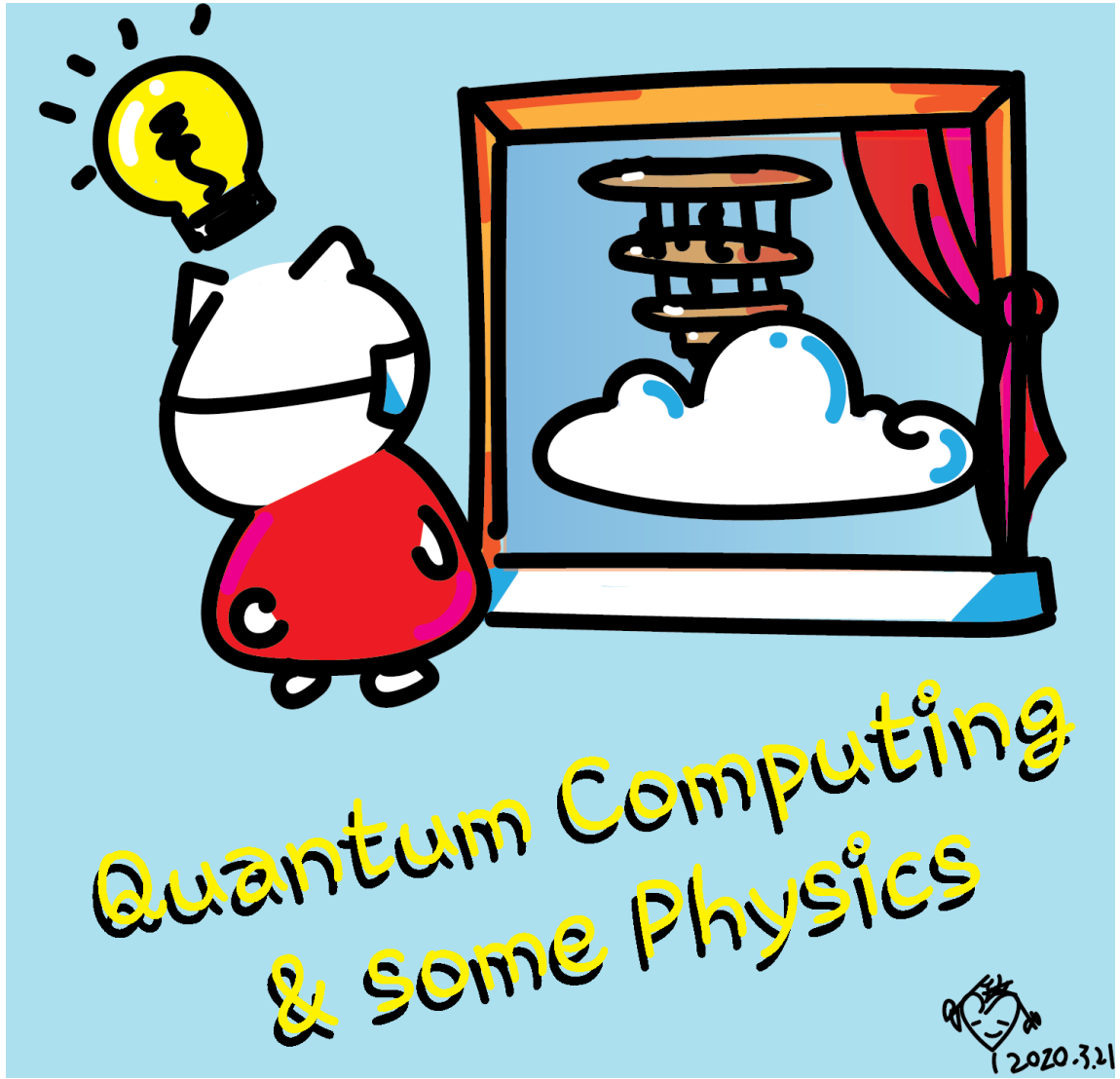
September 27, 2020
Hackaday, session 22
Guest lecture 2

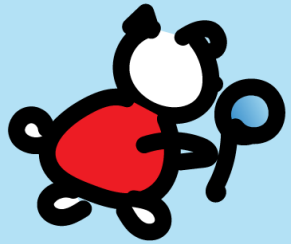
Class structure

- Comics on Hackaday – Quantum Computing through Comics every Sun
- 30 mins – 1 hour every Sun, one concept (theory, hardware, programming), Q&A
- Contribute to Q# documentation http://docs.microsoft.com/quantum
- Coding through Quantum Katas https://github.com/Microsoft/QuantumKatas/
- Discuss in Hackaday project comments throughout the week
- Take notes



THE SUNDAY SPECIALS

September 13
Prof. Terrill Frantz
Quantum Cryptography



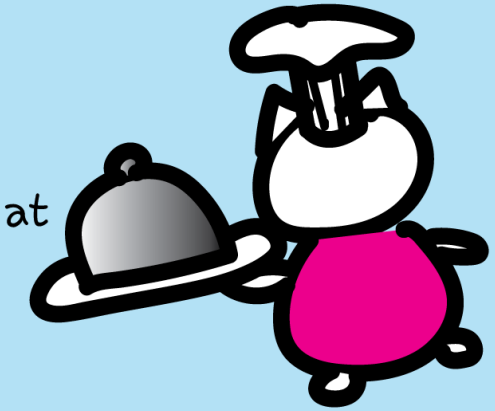
~~September 20~~ October 25
Prof. Chris Ferrie
Quantum Tomography

September 27
Rolf Huisman
Introducing the open source
Q# Community project qTRIL

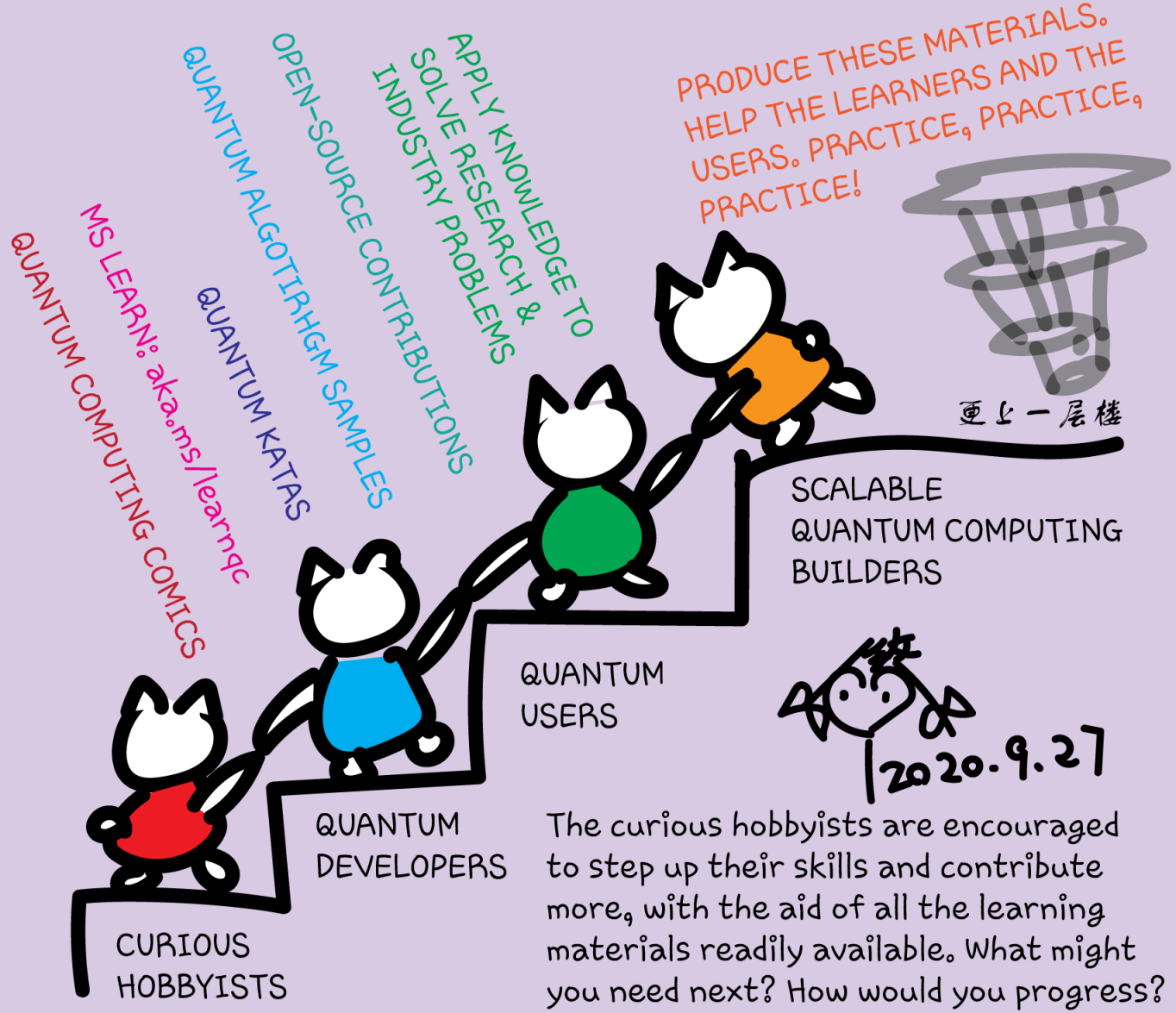
October 11
Dr. Maria Schuld
Quantum Machine Learning

October 18
Dr. Michael Beverland
Quantum Error Correction

October 3
Kitty speaking at
Zen4Makers



Quantum computing is not about competition. It's about a community working together to build the ecosystem for societal improvement. Participants support each other to achieve their goals.



The curious hobbyists are encouraged to step up their skills and contribute more, with the aid of all the learning materials readily available. What might you need next? How would you progress?

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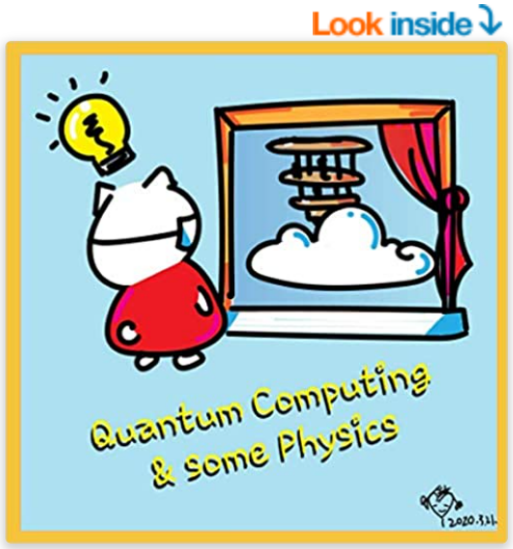

Quantum Computing & Some Physics: The Quantum Computing Comics Notebook

Paperback – September 3, 2020

by Dr. Kitty Yeung (Author)

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Paperback
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Learn about quantum computing through an intuitive series of comics. It is both a book and a notebook, in which readers can note down their thoughts on the back of the comics. The book provides a high-level guide to the basic concepts of quantum computing, linear algebra, and quantum algorithms. Commonly used quantum hardware architectures are also described in the comics. Learners at any age with any background can get something out of this comics. The

Q# Community project qTRIL

- Rolf is an experimental technology enthusiast who likes playing with technologies which aren’t mainstream already. After tasting FPGA's for high performance computing, he got introduced to Quantum Computing after which he got addicted to it. Together with Sarah Kaiser he maintains the Q# community, which is a space for community-driven open source projects and contribution libraries for Q# Quantum Computing language. During his daytime job Rolf works as an enterprise security architect within a large international bank. His personal interests include experimental technologies, high performance computing, analog electronics, security and discrete mathematics. In his free time, next to reverse engineering systems and writing code, he builds machines like 3D printers, CNC machines, and FPGA processor boards.
- We from the Q# Community are group of folks who are excited about Quantum Programming! We maintain and collect open source projects related to the Q# programming language to make it even more useful and pleasant to use. Because the current physical Quantum Computers are still limited power and functionality, a lot of development is done on Quantum simulators. The integrated simulators of Quantum Development Kit (QDK) are often enough, but depending on your hardware there might be other simulators that would be better suited for your task. Our latest project qTrill, makes it possible to run Microsoft Q# programs on those tailored simulators. We can make that work by plugging into the extensibility of the runtime, so let's run through how that works and how you can add your own.

Rolf Huisman

Questions

- Post in chat or on Hackaday project https://hackaday.io/project/168554-quantum-computing-through-comics
- FAQ: Past Recordings on Hackaday project or my YouTube https://www.youtube.com/c/DrKittyYeung

Guest lectures

- Oct 3, Kitty speaking at Zen4Maker https://www.meetup.com/Zen4Maker/events/273466049
- No class on Oct 4

- Oct 11, **Dr. Maria Schuld**, Xanadu, University of KwaZulu-Natal, **Quantum Machine Learning**