

# Quantum Technology Resources

A good understanding of Quantum Mechanics, Quantum Optics, Theory of Computation, Open Quantum System Dynamics and many such related topics is needed to delve into the field of quantum technology.

Here we list some resources for some of these topics, we will keep updating this list as we move along. We welcome suggestions for possible additions to this list.

A very popular reference for quantum computation in general is:

"Quantum Computation and Quantum Information" by Michael Nielsen and Isaac Chuang  
Colloquially referred to as **Mike & Ike**

## 1 Quantum Mechanics

1. MIT 8.04 Quantum Physics I  
<https://ocw.mit.edu/courses/8-04-quantum-physics-i-spring-2016/>  
(For building basic understanding and learning how to solve some standard systems)
2. MIT 8.05 Quantum Physics II  
<https://ocw.mit.edu/courses/8-05-quantum-physics-ii-fall-2013/pages/lecture-notes/>  
(Good for understanding the mathematical formalism and quantum dynamics)
3. MIT 8.06 Quantum Physics III  
<https://ocw.mit.edu/courses/8-06-quantum-physics-iii-spring-2018/>  
(Perturbation theory and Interaction Picture)
4. Modern Quantum Mechanics by J.J. Sakurai

## 2 Quantum Computing - Basics & Algorithms

1. Mike & Ike
2. Learning Resources by IBM Qiskit  
<https://learning.quantum.ibm.com>  
(Nice visualizations and good for learning Qiskit as well)
3. Lectures by Umesh Vazirani  
<https://www.youtube.com/playlist?list=PLXEJgM3ycgQW5ysL69uaEdPoof4it6seB>  
(Easy to follow)
4. Lectures Notes for Physics 229 by John Preskill  
[https://www.lorentz.leidenuniv.nl/quantumcomputers/literature/preskill\\_1\\_to\\_6.pdf](https://www.lorentz.leidenuniv.nl/quantumcomputers/literature/preskill_1_to_6.pdf)  
(Advanced)

## 3 Quantum Optics

Important for understanding various physical implementations of qubits.

1. Lectures by Immanuel Bloch  
[https://www.youtube.com/playlist?list=PL4\\_zMhS4uvR8dSbM-f\\_KDivMIAHi3guq2](https://www.youtube.com/playlist?list=PL4_zMhS4uvR8dSbM-f_KDivMIAHi3guq2)
2. Introductory Quantum Optics by Gerry & Knight

## 4 Superconducting Qubits

1. Circuit Quantum Electrodynamics paper by A. Blais  
<https://arxiv.org/abs/2005.12667>  
(Nice overview of the field)
2. Qiskit Summer School Lectures by Zlatko Minev:  
<https://www.youtube.com/playlist?list=PLMVfHNAYaeP6xBfgyaKCsvcmra9dN1JAC>
3. Lectures on Quantum Computing Hardware (EE274 SJSU)  
<https://www.youtube.com/playlist?list=PLnK6MrIqGXsL1KShnocSdwNSiKnBodpie>  
(Covers a considerable amount of important topics)

## 5 Quantum Open System Dynamics

1. Mike & Ike (for density matrices, quantum channels, etc)
2. Lectures by John Preskill (Ph/CS 219A)  
[https://www.youtube.com/playlist?list=PL0ojjrEqIyPy-1RRD8cTD\\_1F1hflo89Iu](https://www.youtube.com/playlist?list=PL0ojjrEqIyPy-1RRD8cTD_1F1hflo89Iu)  
(Nice explanation of quantum channels and then moves on to quantum algorithms)
3. Lectures by Dr. Graeme Pleasance  
[https://www.youtube.com/playlist?list=PLE9Qrf4CJnRHxa\\_0wN7xc2bXacnWzCy1x](https://www.youtube.com/playlist?list=PLE9Qrf4CJnRHxa_0wN7xc2bXacnWzCy1x)  
(Nice buildup of the theory from basic postulates)
4. A short introduction to Lindblad Master Equation  
<https://arxiv.org/abs/1906.04478>