Quantum Information II (PH476)
(*Fall 2024*)

- **Subject Code/Name:** PH476, Quantum Information II (3 credits)

- **Instructor:** Prof. Young-Sik Ra (http://qoqi.kaist.ac.kr)

- **Time:** (Mon) 13:00~14:30, (Wed) 13:00~14:30

- **Place:** Basic Science Building (E6-6), room 119
  * Students from other universities can join the lecture via online. However, for the midterm and final evaluations, they should come to the KAIST campus.

- **Course description:**

  This course provides an introduction to the field of quantum information science. Building on the basic concepts and formalisms studied in "Quantum Information I", we will explore their applications in quantum information technologies: **quantum communication**, **quantum computing**, and **quantum metrology**. For better understanding of the topics, real experimental implementations will be discussed together.

- **Prerequisite:** Quantum Information I (PH475)

- **Lecture topics**:
  - ✓ Quantum Cryptography
  - ✓ Quantum Teleportation
  - ✓ Quantum Algorithm
  - ✓ Quantum Error Correction
  - ✓ Quantum Metrology
  - ✓ Quantum Cramér-Rao bound

- **Textbook:**
  There is no main textbook. The following references can be useful.
  - "Quantum Computation and Quantum Information" by M. A. Nielsen and I. L. Chuang, *Cambridge University Press*.
  - "Quantum Information" by S. M. Barnett, *Oxford University Press.*
  - "Quantum Information Processing" by J. A. Bergou , M. Hillery , M. Saffman, *Springer.*
  - "Introduction to Quantum Information Science" by M. Hayashi, S. Ishizaka , A. Kawachi , G. Kimura , and T. Ogawa, *Springer*.

- **Evaluation Criteria:** (the followings may change)
  - Attendance: 10 %
  - Homework: 30 %
  - Mid-term exam: 30 %
  - Final exam (or final project): 30 %