

# Quantum Club

## Assignment 2

### HILBERT SPACES. ORTHONORMAL BASES

- Study Secs. A.3–4 of the textbook and solve the exercises therein.

**Problem 1.** Problem 1.1 from the set  
<https://users.physics.ox.ac.uk/~lvovsky/443/2017/homework1.pdf>.

### PHOTON POLARIZATION STATES. QUANTUM MEASUREMENTS. QUANTUM CRYPTOGRAPHY

- Study Secs. 1.2–6 of the textbook and solve the exercises therein.

**Problem 2.** Problem 1.2 from the same set.

**Problem 3.** Problem 1.4 from the same set.

**Problem 4.** A quantum tomography experiment on state  $|\psi\rangle$  yielded the following results:  $\text{pr}_H = 1/2$ ;  $\text{pr}_V = 1/2$ ;  $\text{pr}_+ = 9/10$ ;  $\text{pr}_- = 1/10$ ;  $\text{pr}_R = 4/5$ ;  $\text{pr}_L = 1/5$ . Find  $|\psi\rangle$  in the canonical basis.

**Problem 5.**

- a) Problem 1.5 from the same set.
- b) Problem 1.4 from the textbook (p.36).