

**Question:** We know that doing a measurement changes the quantum state of a system, even if no one sees the outcome of that measurement. For example, it affects the future evolution of the system, as in the Stern-Gerlach experiment.

In general a pure state  $|\psi\rangle$  can be represented as

$$|\psi\rangle = \sum_a c_a |a\rangle. \quad (1)$$

Let's consider an observable  $\mathcal{O}$  whose eigenvectors are a different set of kets  $|b\rangle'$  associated with eigenvalues  $b$ .

What is the quantum state of a system after measuring  $\mathcal{O}$  in the state  $|\psi\rangle$ ?

*Hint: the state is mixed.*