Measurements: Side Effects

Some measurements do not affect what is being measured, but they do something else!

X-rays are commonly used in hospitals to produce photographs for checking bone fractures.

CAUTION X-RAY

But... They could potentially cause cancer when people are exposed unprotected!

The lead apron that shields you from x-ray's side effects.

At the dentist!...

If you time how long you can hold your breath...

You would do just fine the first time, but...

30s

You cannot hold your breath as long the second time, without resting in-between.

20s

This is caused by the side effects of such measurements

Quantum Bits "Qubits"

You cannot measure them because...

– They are fragile.

I could be 0 or 1 at the same time, but never both once you look.
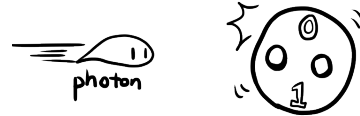
– Measurement methods cause problems.

Measurements: Non-intrusive?

Police radar guns do not affect a car's speed – cars are so big compared to the radar waves!

You cannot slow me down by measuring my speed!

0.99

Measurements: Disturb Aspects Measured

For the carnival game...

BANG!

The measurement device stops the hammer while measuring its speed!

Putting together Quantum and Measurement

The measurement of a 0 or 1 of a qubit disturbs the state of the qubit that you are trying to measure.

And quantum states – states of the minimal amount of physical entity – are so small that a single photon may alter it.

photon

Find more Quantum Computing zines here:

https://www.epiqc.cs.uchicago.edu/resources/

– MEASUREMENT –

Quantum and Measurement