

## Feedback - Quantum Repeaters

Hi, so now I'd like to explain to you the quantum repeater. First of all, why do we need a quantum repeater? Well, suppose you want to create entanglement between two places which are very far apart. That problem is, is that when you send a qubit it might lose its information during its travels. So the longer the distance the qubit has to travel, the more information might be lost. So we would like to minimize these distances as much as possible. And for this we can use repeaters.

So how do these repeaters actually work? Let's take a look. First of all we start with the two separate stations: we have station Alice and we have station Bob. Alice has two qubits which are entangled and Bob also has two qubits which are entangled, but the two stations are not entangled with each other. This is where the repeater comes in, which is shown here in the middle. So for the next step Alice and Bob both send one of their qubits to the repeater, which looks like this. Now important to note here is that there is still no entanglement between Alice and Bob, because these two particles are not entangled. To create this entanglement, we need to do operations. These clever operations are performed here, in this black box. This black box performs some operations on the qubits and eventually measures them, which results in the qubits in the repeater to collapse and generate an entangled state between Alice and Bob. So we can see now that the two qubits which were there in the middle initially are now gone and there is a pure entangled state between Alice and Bob.

Now I know I might have been a little bit vague about what happened in the black box. But this is because what happens in the black box might be a little bit too technical. If you're still interested in the details, I'd like to refer you to the link below which explains what happens in the repeaters in more detail.