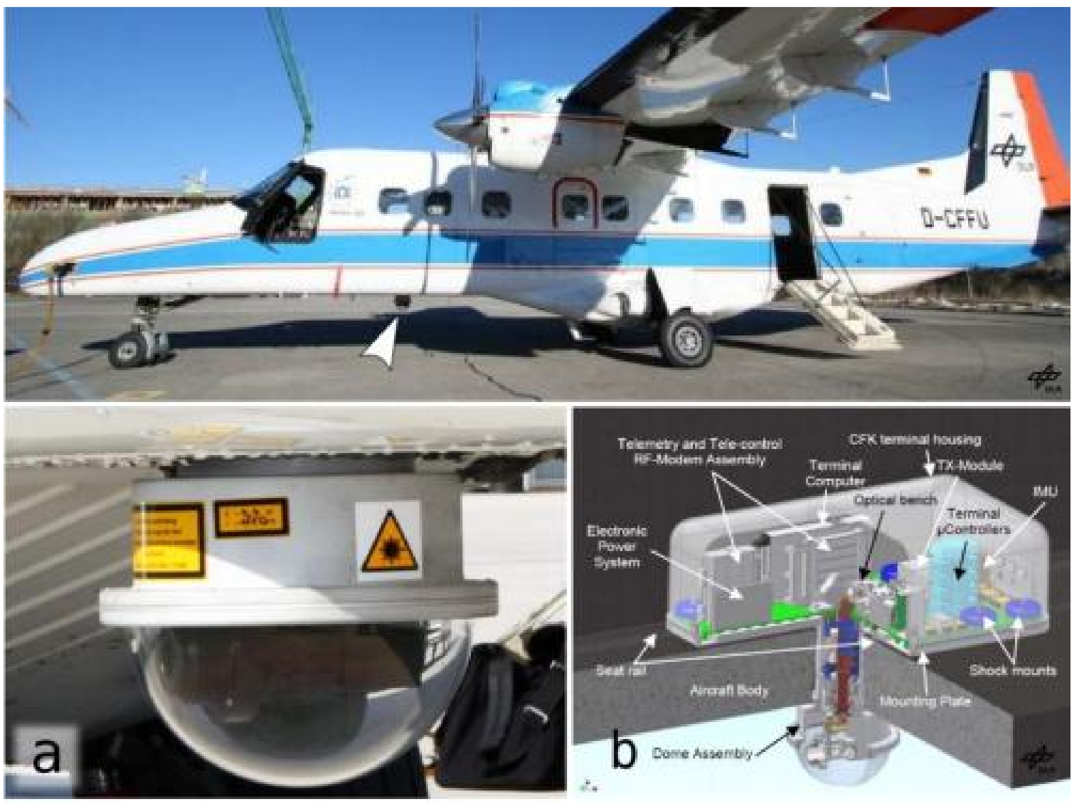
# Engineers achieve first airplane to ground quantum key distribution exchange

September 18 2012, by Bob Yirka

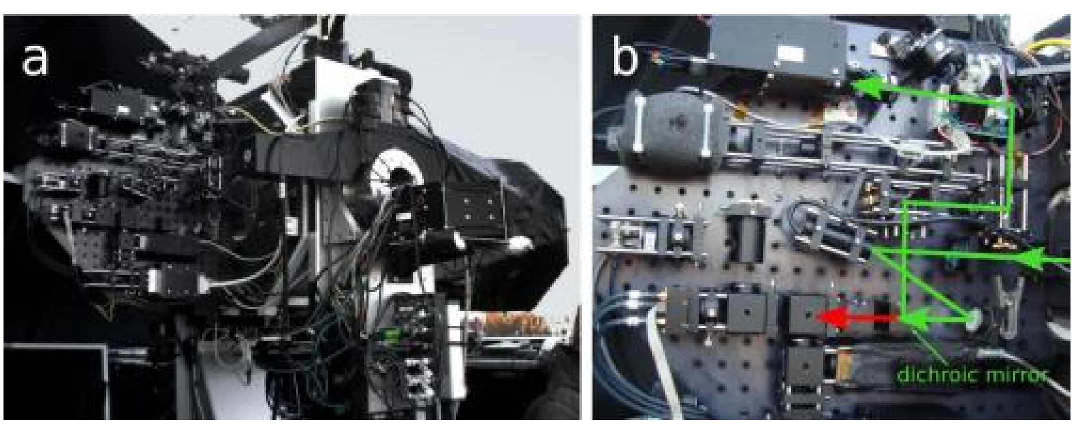



The Do228 aircraft equipped with the ight terminal. One can see the optical dome underneath the fuselage (marker). a shows a closeup of this dome housing the coarse pointing assembly. b shows a schematic section view of the ight terminal. Credit: Sebastian Nauerth et al.

(Phys.org)—A team of German physicists has successfully demonstrated an ability to perform quantum key distribution (QKD) exchange between an airplane in flight and a ground station, paving the way perhaps to the same kinds of communications between satellites and ground stations which could lead to a global quantum based secure communications network. The team presented their results at the QCrypt convention this past week.

Scientists have over the years developed some very powerful encryption schemes that are almost impossible to crack, yet virtually all of them rely on one weak point, the key that is used to unlock them. For this reason, cryptologists have been pinning their hopes on QKD. This is because of the nature of quantum bits; looking at or measuring them causes them to be changed, which would alert the true owners of the key that a breach has occurred.

QKD is where encryption keys are generated based on the polarization of photons to represent 1s and 0s. The photons in such a system are converted to qubits on the receiving end where they can be read and interpreted. While the idea has been around for quite some time, it's only recently that workable devices have actually been built. Prior to this new development, another team had achieved a QKD exchange between two stationary buildings.




Optical ground station. a Telescope of the optical ground station located on the roof of the DLR institute building next to the airport Oberpfa enhofen. b Closeup of the optical breadboard attached to the back of the main telescope mirror indicating the signal path for the qubits (green) and the beacon light (red). Credit: Sebastian Nauerth et al.

Two make such a system work, the photons must be sent from one station and received by another. In this case, they were sent from a moving airplane using a laser and mirrors to a ground station that also used mirrors, no easy feat due to the sensitivity of attempting to read individual photons. Still the researchers managed to make it happen and perhaps even more remarkably, were able to hold on to the connection for ten minutes; long enough to transmit 10 kilobytes of data (at 145 qubits per second) with an error rate of just 4.8%. That's enough to send a key, and that's all that's really needed to build quantum based network.

Based on these results alone, it's clear that a truly secure network could be put in place, in a battle zone for instance, with keys being transmitted from drones hovering overhead. But of course, that won't be enough, the real goal will be to see if the same feat can be achieved between satellites and ground stations giving us a world where all communications can be made almost perfectly secure.

**More information:** Paper PDF: www.qcrypt.net/docs/extended-a … 12_submission_12.pdf