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Electronic tracking system for quantum cryptography and radio telecommunication

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**Abstract content
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Quantum cryptography permits to share a secret key to hide a secret message between two parties exploiting the quantum state of single photons. An eavesdropper cannot measure the quantum state of the single photon without changing the quantum state according to the Heisenberg uncertainty principle. In quantum cryptography in free space, the transmitter sends a series of single polarised photons to the receiver, and the bits of the key depend on the polarisation direction of the single photon [1]. Once the transmission is finalized a set of bits is used to check if the receiver, has received the same bits sent from the transmitter. The presence of an eavesdropper is recognized by the statistical analysis of the errors in the key. Quantum cryptography in free space represents the best solution when a secure cryptography must be done between two non-stationary points.

Quantum cryptography is an optical communication that requires a tracking system to align the transmitter and the receiver. Because the value of the bit of the key depends on the polarization of the single photon, the polarization base of the transmitter and receiver must be aligned.

In this work a portable electronic devices is presented. The electronic device is able to align the transmitter and receiver by using the GPS technology and the polarization bases are aligned using a recent patent presented at the SAIP 2014 [2].

[1] C. H. Bennett, G. Brassard et al., "Quantum cryptography: Public key distribution and coin tossing," in Proceedings of IEEE International Conference on Computers, Systems and Signal Processing, vol. 175, no. 0. New York, 1984.

[2] M. Mariola, A. Mirza and F. Petruccione "System and method for determining angles between apparatuses, devices or systems." Provisional patent. Reference number L 2014/03405

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No

**Level for award
 (Hons, MSc,
 PhD, N/A)?**

none

**Main supervisor (name and email)
and his / her institution**

Prof. Francesco Petruccione, petruccione@ukzn.ac.za , UKZN

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yes

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Primary author: Dr MARIOLA, Marco (UKZN)

Co-authors: Dr MIRZA, Abdul (UKZN); Prof. PETRUCCIONE, Francesco (UKZN); Dr ISMAIL, Yaseera (UKZN)

Presenter: Dr MARIOLA, Marco (UKZN)

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