



Contribution ID: 188

Type: not specified

## Quantum Key Distribution for The Undergraduate Curriculum

Thursday, 6 July 2017 12:30 (20 minutes)

Quantum Key Distribution (QKD) is a process of transferring a secure key between two authorized parties. The key is then used to encrypt confidential information [1]. A communication can be achieved and proven secure through laws of quantum mechanics [1, 2]. The QKD scheme is based on transferring quantum carriers, in the form of single photons, through a quantum channel which can be either free-space or fiber optics [3, 4]. Various protocols exist for the implementation of the key distribution process, with BB84 being the most fundamental of protocols [1]. Here, we present the implementation of the QKD process using fiber optics as the quantum channel. We utilized the commercially available id 3000 clavis system and performed the BB84 and the SARG04 protocols [5]. In our setup, communication was implemented over a distance of 12 km. We characterized the system, id 3000 clavis, and constructed a comprehensive manual which will be useful to undergraduate students and researchers.

### References

1. Gisin, N., et al., Quantum cryptography. REVIEWS OF MODERN PHYSICS, 2002. 74(1): p. 145 - 195.
2. Griffiths, D.J., Introduction to quantum mechanics. 2016: Cambridge University Press.
3. Hughes, R.J., et al., Practical free-space quantum key distribution over 10 km in daylight and at night. New journal of physics, 2002. 4(1): p. 43.
4. Gobby, C., Z. Yuan, and A. Shields, Quantum key distribution over 122 km of standard telecom fiber. Applied Physics Letters, 2004. 84(19): p. 3762-3764.
5. Stucki, D., et al., Quantum key distribution over 67 km with a plug&play system. New Journal of Physics, 2002. 4(1): p. 41.

Apply to be considered for a student award (Yes / No)?

yes

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

MSc

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

Prof. Francesco Petruccione  
Email: Petruccione@ukzn.ac.za

Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

yes

**Primary author:** Ms PHEHLUKWAYO, Samukelisiwe (University of Kwazulu-Natal)

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

**Presenter:** Ms PHEHLUKWAYO, Samukelisiwe (University of Kwazulu-Natal)

**Session Classification:** Physics Education

**Track Classification:** Track E - Physics Education