

**Dr Simon J.D. Phoenix**

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**Professional Experience****2014 – Present**

Assistant Professor, Department of Mathematics and Applied Sciences, Khalifa University

**2010 – 2014**

Assistant Professor, Information Security Group, Department of Electrical and Computer Engineering, Khalifa University

**1989 – 2010**

British Telecom Research Laboratories

**2009 – 2010** : Principal Researcher, Centre for Information Systems and Security Research

**2008 – 2009** : Principal Researcher, Networks Research Centre

**2005 – 2008** : Principal Researcher, Security Research

**2003 – 2005** : Principal Researcher, Mobility Research Centre

**2001 – 2003** : Security Architect for BT Ignite Solutions

**1995 – 2001** : Senior Professional, Security Research Team

**1989 – 1995** : Senior Professional, Quantum Processing Group

**Brief Biography**

Simon J.D. Phoenix is an Assistant Professor at Khalifa University, Abu Dhabi, UAE. He graduated from Imperial College, London, with a PhD in Theoretical Quantum Optics under the supervision of Professor Sir Peter Knight, FRS. He joined BT Research Laboratories in 1989 where his initial work focused on the application of the quantum theory of light to telecommunications. During this time he helped develop the quantum theory of light in fibre and applied it to the non-linear interactions in a Kerr medium. He was also able to show that squeezed states of light are the most correlated states of light possible for a field of given energy and was part of the team that demonstrated the world's first quantum key distribution (QKD) in optical fibre. In his work on QKD he developed several novel protocols including a technique for utilizing the Bell inequalities as security measures for single particle systems.

In 1995 he joined the Cryptography Research group in BT where he worked on novel key escrow and digital signature mechanisms and was BT's cryptography liaison with GCHQ. After a spell as BT's technical design authority for BT TrustWise, BT's Certification Authority business where he designed CA solutions for some of BT's largest customers, he rejoined BT's research department in the Mobile Systems Research team. In 2005 he joined the Security Research Centre where he returned to an investigation of quantum cryptography. After developing several new techniques for the implementation of QKD on commercial networks he changed the focus of his work to investigate novel methods of ensuring the regulatory and security compliance of IT business processes.

His current research interests are in quantum information processing, quantum key distribution, quantum game theory, classical cryptography and fundamental quantum theory.

## Qualifications

### University of London, Imperial College (1986 – 1989)

Ph.D. in Theoretical Quantum Optics

Diploma of Imperial College

### University of York (1983 – 1986)

First Class Honours in Theoretical Physics

First recipient of Founder's Prize for Physics

## Courses Taught at Khalifa University

- ◆ Advanced Cryptography (M.Sc.)
- ◆ Cryptanalysis (M.Sc.)
- ◆ Information Theory (Junior)
- ◆ Complex Variables and Transforms (Sophomore)
- ◆ Linear Algebra (Sophomore)
- ◆ Calculus II (Sophomore)
- ◆ Physics Laboratory Instruction (Sophomore)
- ◆ Preparatory Physics (Preparatory Level)
- ◆ Introduction to Engineering Maths I (500 level pre-Masters course)
- ◆ Introduction to Engineering Maths II (500 level pre-Masters course)
- ◆ Introduction to Cryptography (M.Sc.)
- ◆ Mathematics for Information Security (M.Sc.)
- ◆ Calculus III (Sophomore/Junior)
- ◆ Physics II Problem Solving (Sophomore)

## Publications (excluding older conference proceedings)

1. R. Collins, J. Pemberton, S.J.D. Phoenix & J.A.D. Matthew, "Output Velocity Distribution of a Langevin System with Random Binary Input", *Eur. J. Phys.*, **9** 312 (1988).
2. S.J.D. Phoenix & P.L. Knight, "Fluctuations and Entropy in Models of Optical Resonance", *Ann. Phys. (NY)*, **186** 381 (1988).
3. S.J.D. Phoenix, "Counter-Rotating Contributions in the Jaynes-Cummings Model", *J. Mod. Opt.*, **36** 1163 (1989).
4. S.M. Barnett & S.J.D. Phoenix, Entropy as a Measure of Quantum Optical Correlation", *Phys. Rev. A*, **40** 2404 (1989).
5. S.J.D. Phoenix & P.L. Knight, "Periodicity, Phase and Entropy in Models of Two-Photon Resonance", *J. Opt. Soc. Am. B*, **7** 116 (1990).
6. S.J.D. Phoenix, "Wavepacket Evolution in the Damped Oscillator", *Phys. Rev. A*, **41** 5132 (1990).
7. K.J. Blow, R. Loudon, S.J.D. Phoenix & T.J. Shepherd, "Continuum Fields in Quantum Optics", *Phys. Rev. A*, **42** 4102 (1990).
8. A.K. Ekert & S.J.D. Phoenix, "The Evolution of Correlations in a Dissipative System", *J. Mod. Opt.*, **38** 19 (1991).
9. S.J.D. Phoenix, "The Effect of the Counter-Rotating Terms on the Field Q-Function in the Jaynes-Cummings Model", *J. Mod. Opt.*, **38** 695 (1991).
10. S.M. Barnett & S.J.D. Phoenix, "Information Theory, Squeezing and Quantum Correlations", *Phys. Rev. A*, **44** 535 (1991).
11. S.J.D. Phoenix & P.L. Knight, "Comment on 'Collapse and Revival of the State Vector in the Jaynes-Cummings Model : an Example of State Preparation by a Quantum Apparatus" ', *Phys. Rev. Lett.*, **66** 2833 (1991).
12. K.J. Blow, R. Loudon & S.J.D. Phoenix, "Exact Solution for Quantum Self-Phase Modulation", *J. Opt. Soc. Am. B*, **8** 1750 (1991).
13. S.J.D. Phoenix & P.L. Knight, "The Establishment of an Entangled Atom-Field State in the Jaynes-Cummings Model", *Phys. Rev. A*, **44** 6023 (1991).
14. K.J. Blow, N.J. Doran & S.J.D. Phoenix, "The Soliton Phase", *Opt. Commun.*, **88** 137 (1992).

15. K.J. Blow, R. Loudon & S.J.D. Phoenix, "Quantum Theory of Nonlinear Loop Mirrors", *Phys. Rev. A*, **45** 8064 (1992).
16. V. Buzek, H. Moya-Cessa, P.L. Knight & S.J.D. Phoenix, " 'Schrodinger's Cat' States in the Jaynes-Cummings Model : Collapse and Revival of Oscillations of the Photon Number Distribution", *Phys. Rev. A*, **45** 8190 (1992).
17. S.M. Barnett & S.J.D. Phoenix, "Bell's Inequality and the Schmidt Decomposition", *Phys. Lett. A*, **167** 233 (1992).
18. K.J. Blow & S.J.D. Phoenix, "On a Fundamental Theorem of Quantum Cryptography", *J. Mod. Opt.*, **40** 33 (1993).
19. S.J.D. Phoenix, "Quantum Cryptography without Conjugate Coding", *Phys. Rev. A*, **48** 100 (1993).
20. S.M. Barnett & S.J.D. Phoenix, "Information-Theoretic Limits to Quantum Cryptography", *Phys. Rev. A*, **48** R5 (1993).
21. S.J.D. Phoenix & P.D. Townsend, "Quantum Cryptography and Secure Optical Communication", *BTTJ*, **11** 65 (1993).
22. S.J.D. Phoenix & S.M. Barnett, "Nonlocal Interatomic Correlations in the Micromaser", *J. Mod. Opt.*, **40** 979 (1993).
23. S.M. Barnett & S.J.D. Phoenix, "Bell's Inequality and Rejected-Data Protocols for Quantum Cryptography", *J. Mod. Opt.*, **40** 1443 (1993).
24. S.M. Barnett, B. Huttner & S.J.D. Phoenix, "Eavesdropping Strategies and Rejected-Data Protocols in Quantum Cryptography", *J. Mod. Opt.*, **40** 2501 (1993).
25. K.J. Blow, R. Loudon & S.J.D. Phoenix, "Graphical Representation of Self-Phase Modulation Noise", *J. Mod. Opt.*, **40** 2515 (1993).
26. K.J. Blow, R. Loudon & S.J.D. Phoenix, "Quantum Theory of Cross-Phase Modulation", *Opt. Commun.*, **110** 239 (1994).
27. S.M. Barnett, R. Loudon, D.T. Pegg & S.J.D. Phoenix, "Communication Using Quantum States", *J. Mod. Opt.*, **41** 2351 (1994).
28. P.D. Townsend, S.J.D. Phoenix, K.J. Blow & S.M. Barnett, "Design of Quantum Cryptography Systems for Passive Optical Networks", *Elect. Lett.*, **30** 1875 (1994).
29. S.J.D. Phoenix, S.M. Barnett, P.D. Townsend & K.J. Blow, "Multi-User Quantum Cryptography on Optical Networks", *J. Mod. Opt.*, **42** 1155 (1995).
30. S.J.D. Phoenix & P.D. Townsend, "Quantum Cryptography : How to Beat the Codebreakers using Quantum Mechanics", *Contempt. Phys.*, **36** 165 (1995).
31. S.M. Barnett & S.J.D. Phoenix, "The Principles of Quantum Cryptography", *Phil. Trans. R. Soc. Lond. A*, **354** 793 (1996).
32. P.D. Townsend, C. Marand, S.J.D. Phoenix, K.J. Blow & S.M. Barnett, "Secure Optical Communication using Quantum Cryptography", *Phil. Trans. R. Soc. Lond. A*, **354** 805 (1996).
33. S.J.D. Phoenix, "Cryptography, Trusted Third Parties and Escrow" - *BTTJ*, **15** 45 (1997).
34. P.D. Townsend & S.J.D. Phoenix, "Quantum Cryptography : Secure Communications using Quantum Physics", *British Telecommunications Engineering*, **16** 207 (1997).
35. S.J.D. Phoenix & P.D. Townsend, "Quantum Cryptography : Protecting our Future Networks with Quantum Mechanics", in the Elsevier Information Security Technical Report, **2**, no. 2 (1997), ed. C. Ciechanowicz.
36. S.J.D. Phoenix & J.C. Regnault, "Fighting the Information Terrorists", *British Telecommunications Engineering*, **16**, part 4, 300 (1998).
37. S.J.D. Phoenix, S.M. Barnett & A. Chefles, "Three-State Quantum Cryptography" *J.Mod.Opt*, **47** 507 (2000).
38. S.M. Barnett & S.J.D Phoenix, "Extending the Reach of QKD Using Relays", *GCC Conference and Exhibition* (GCC), 2011 IEEE, pp140-142 (2011)
39. S.M. Barnett & S.J.D Phoenix, "Securing a Quantum Key Distribution Relay Network Using Secret Sharing", *GCC Conference and Exhibition* (GCC), 2011 IEEE, pp143-145 (2011)
40. F.S. Khan & S.J.D .Phoenix, "Nash Equilibrium in Quantum Superpositions", *Quantum Information and Computation IX*, SPIE, **8057**, (2011)
41. S.M. Barnett & S.J.D Phoenix, "Asynchronous Quantum Key Distribution on a Relay Network", *J. Mod. Opt.*, **59** (15), 1349-1354 (2012)
42. F.S. Khan & S.J.D .Phoenix, "Gaming the Quantum", *Quant. Inf. Comp.*, **13**(3-4): 231-244 (2013)
43. S.J.D .Phoenix & F.S. Khan, "The Role of Correlation in Quantum and Classical Games", *Fluctuation and Noise Letters* **12**, 1350011 (2013)

44. F.S. Khan & S.J.D. Phoenix, "Mini-maximizing Two Qubit Quantum Computations", *Journal of Quantum Information and Computing*, **12**(12) 3807-3819 (2013)
45. S.J.D. Phoenix & S.M Barnett, "Relay QKD Networks & Bit Transport", *submitted to Physical Review A* (2015)
46. S.J.D. Phoenix & F.S. Khan, "Preferences in Quantum Games", *submitted to Quant. Inf. Comp* (2015)
47. S.J.D. Phoenix, "Quantum Information as a Measure of Correlation", *Quant. Inf. Comp, in press* (2015)
48. S.J.D. Phoenix & F.S. Khan, "Partitions of Correlated Quantum Systems", *in preparation* (2015)