The aim of the project is to study the mathematical structure of Quantum Information Flow, and its applications to information security, and other important features of quantum information systems. It will build on the previous work by ourselves and others on the use of game semantics and categorical structures to effectively model a wide range of information flow phenomena, in areas ranging from programming language semantics to quantum protocols. We have also recently found striking applications of these ideas to access control and authorization logics.

The research programme has three main strands:

1. To develop and apply the coalgebraic and categorical approach to modelling and reasoning about quantum systems.
2. To study non-locality and contextuality as computational resources, in order to get a deeper understanding of the expressive power of quantum primitives, and the scope and limits of quantum information processing.
3. To develop a quantum form of game semantics, and use this to study higher-order quantum computation, and access control and authorization in a quantum setting.

**Main duties**

The post is for a post-doctoral researcher, to work on one or more of the areas covered by the project.

The requirements for the position include: a strong background in the relevant areas of mathematics, mathematical physics, foundations of quantum mechanics and quantum information.

In particular, a strong background in both category theory and quantum mechanics is essential. This should be evidenced by substantial publications spanning these fields.

The person appointed will be expected to make a strong contribution, both in collaboration with the PI and in independent research, to achieving the objectives of the project. It is anticipated that the work arising from the project will result in high-quality publications and presentations at leading conferences and workshops.
Selection Criteria

Essential
(1) A higher degree, preferably a doctorate, in a subject relevant to the proposed study (e.g. mathematics, mathematical physics, foundations of quantum mechanics and quantum information);
(2) A strong background in the relevant areas of mathematics, mathematical physics, foundations of quantum mechanics and quantum information
(3) A Strong background in both category theory and quantum mechanics evidenced by substantial publications spanning these fields.
(4) Ability to working in a team, good communication skills and reliability.
(5) Real interest in the project and desire to work as a Research Assistant.

Desirable
(1) Research experience in a relevant area.
(2) Demonstrated ability to make clear, well-illustrated scientific presentations;
(3) Willingness to contribute to the supervision of graduate and undergraduate student projects;

Salary and Benefits
The post, which is a full time appointment is available from 1st February 2011 for up to 2 years. It has a salary on the University grade 07S scale (currently £28,983 to £35,646), includes membership of the University Superannuation Scheme (USS) and has an annual leave entitlement of 38 days per year (inclusive of all public holidays and university closed periods).

Method of Application
Applications should be in the form of a letter of application (clearly stating the post title) setting out how the candidate meets the selection criteria, and supported by a full curriculum vitae, together with the names and addresses of two referees. Candidates should state clearly which post they are applying for.

These should preferably be sent by email (most formats accepted) to: Job12@comlab.ox.ac.uk

or alternatively, posted to: The Administrator, Oxford University Computing Laboratory, Wolfson Building, Parks Road, Oxford OX1 3QD.

Applications should be sent in time to arrive by the closing date of 17th December 2010. Applications received after this time may not be considered.

Candidates must also ask their referees to consider these further particulars and email their reference directly to job12@comlab.ox.ac.uk or, alternatively, post or fax it to the above address (fax (+44 1865 283532) such that the reference arrives by, or shortly after, the closing date.
The policy and practice of the University of Oxford require that all staff are offered equal opportunities within employment. Entry into employment with the University and progression within employment will be determined only by personal merit and the application of criteria which are related to the duties of each particular post and the relevant salary structure. In all cases, ability to perform the job will be the primary consideration. Subject to statutory provisions, no applicant or member of staff will be treated less favourably than another because of his or her age, sex, marital or civil partnership status, sexual orientation, religion or belief, racial group or disability.

Applicants who would need a work visa if appointed to the post are asked to note that under the UK's new points-based migration system they will need to demonstrate that they have sufficient points, and in particular that:

(i) they have sufficient English language skills (evidenced by having passed a test in basic English, or coming from a majority English-speaking country, or having taken a degree taught in English)

and

(ii) that they have sufficient funds to maintain themselves and any dependants until they receive their first salary payment.

Further information is available at:
http://www.ukba.homeoffice.gov.uk/workingintheuk/tier2/generallarrangements/eligibility/

All data supplied by applicants will be used only for the purposes of determining their suitability for the post and will be held in accordance with the principles of the Data Protection Act 1998 and the University’s Data Protection Policy, but if the person appointed to the post is a migrant sponsored under the UK’s new points-based migration system, we are required to retain all applications for the duration of the sponsorship.