QICS Spring School

on Foundational Structures in Quantum Computation and Information

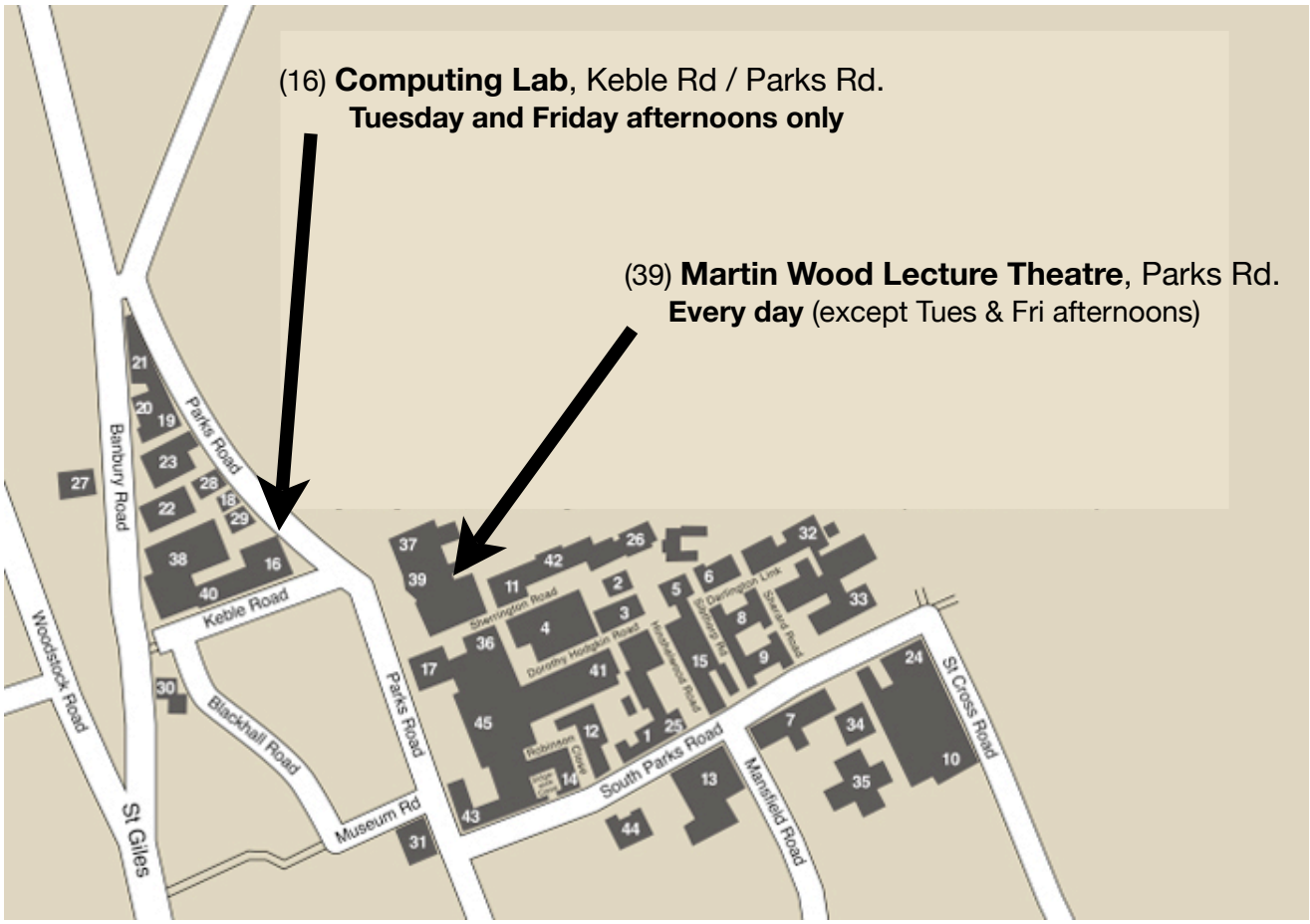
This event marks the end of the EU FP6 STREP QICS on Foundational Structures in Quantum Computation and Information. It consists on extended tutorials on the main research strands within QICS, namely:

- Structures and methods for measurement-based quantum computation
- Categorical semantics, logics, diagrammatic methods
- Classical-quantum interaction and information flow
- Quantum automata, machines, calculi

Lectures will be given both by senior members of the network as well as by former and current QICS researchers.

Times and Venues

The school will take place Monday to Friday, May 24-28, 2010, and will run from **9.00am until 6.00pm** each day. Lectures will usually take place in the **Martin Wood Lecture Theatre** (Physics Department) on Parks Road, with the **exception** being on the afternoons of Tuesday 25th and Friday 28th, when the lectures will be in the **Computing Laboratory Lecture Theatre B**.



Programme

Sunday 23 May : 19:00 : Welcome drinks at the ROYAL OAK (see map)

Monday 24 May

09.00-09.30 coffee

09.30-11.00 **Akimasa Miyake** (Perimeter Institute)
Introduction to measurement-based quantum computing, with connections to condensed matter physics.

11.00-11.30 break

11.30-13.00 **Bob Coecke, Chris Heunen, & Jamie Vicary** (Oxford)
Introduction to monoidal categories and graphical calculus 1.

13.00-14.30 Lunch

14.30-16.00 **Richard Jozsa** (Cambridge)
Classical simulation of quantum circuits.

16.00-16.30 break

16.30-18.00 **Peter Selinger** (Dalhousie)
Higher types in quantum computing.

Tuesday 25 May

09.00-09.30 coffee

09.30-11.00 **Maarten van den Nest** (Max Planck Institute)
Introduction to graph states and their applications.

11.00-11.30 break

11.30-13.00 **Bob Coecke, Chris Heunen, & Jamie Vicary** (Oxford)
Introduction to monoidal categories and graphical calculus 2.

13.00-14.30 Lunch

14.30-16.00 **Prakash Panagaden** (McGill)
Modular tensor categories and topological quantum computing.

16.00-16.30 break

16.30-18.00 **Samson Abramsky** (Oxford)
Coalgebraic methods in quantum computing.

This session in the Computing Lab

Wednesday 26 May

09.00-09.30 coffee

09.30-10.15 **Simon Perdrix** (Grenoble)
Flow and depth in measurement-based quantum computing 1.

10.15-10.45 break

10.45-12.15 **Ross Duncan** (Oxford)
Comlementarity, quantum algebra, and applications to measurement-based quantum computing.

12.15-13.00 **Simon Perdrix** (Grenoble)
Flow and depth in measurement-based quantum computing 2.

13.00-14.30 Lunch

12.15-13.00 **Simon Perdrix** (Grenoble)
Classical-quantum graphical calculus.

14.30-16.00 **Andreas Winter** (Bristol)
The fidelity alternative and quantum measurement simulation.

16.15-16.45 break

16.45-18.00 **Pablo Arrighi** (Grenoble) **& Reinhard Werner** (Hannover)
Quantum cellular automata 1.

Thursday 27 May

09.00-09.30 coffee

09.30-10.30 **Joe Fitzsimons** (Oxford)
Blind quantum computing.

10.30-11.00 **Lucas Dixon** (Edinburgh)**, Ross Duncan & Aleks Kissinger** (Oxford)
Quantomatic demo.

11.00-11.30 break

11.30-12.15 **Mehrnoosh Sadrzadeh** (Oxford)
Vector spaces and meaning.

12.15-13.00 **Peter Hines** (York)
Is coherence important in quantum computing?

13.00-14.30 Lunch

14.30-15.15 **Ottfried Gühne** (Innsbruck)
Quantum contextuality.

15.15-16.30 **Howard Barnum** (Perimeter Institute) **& Jonathan Barrett** (Bristol)
Generalized probabilistic theories 1.

16.30-17.00 break

17.00-18.00 **Pablo Arrighi** (Grenoble) **& Reinhard Werner** (Hannover)
Quantum cellular automata 2.

Friday 28 May

09.00-09.30 coffee

09.30-11.00 **Dan Browne** (UCL)
Measurement-based quantum computing, measurement-based classical computing, and non-locality.

11.00-11.30 break

11.30-12.15 **Bill Edwards** (Oxford)
Phase groups and non-locality.

12.15-13.00 **Bob Coecke & Aleks Kissinger** (Oxford)
Compositional multipartite entanglement.

13.00-14.30 Lunch

14.30-15.30 **Sandu Popescu** (Bristol)
TBA

15.30-16.00 break

16.00-17.15 **Howard Barnum** (Perimeter Institute) **& Jonathan Barrett** (Bristol)
Generalized probabilistic theories 2.

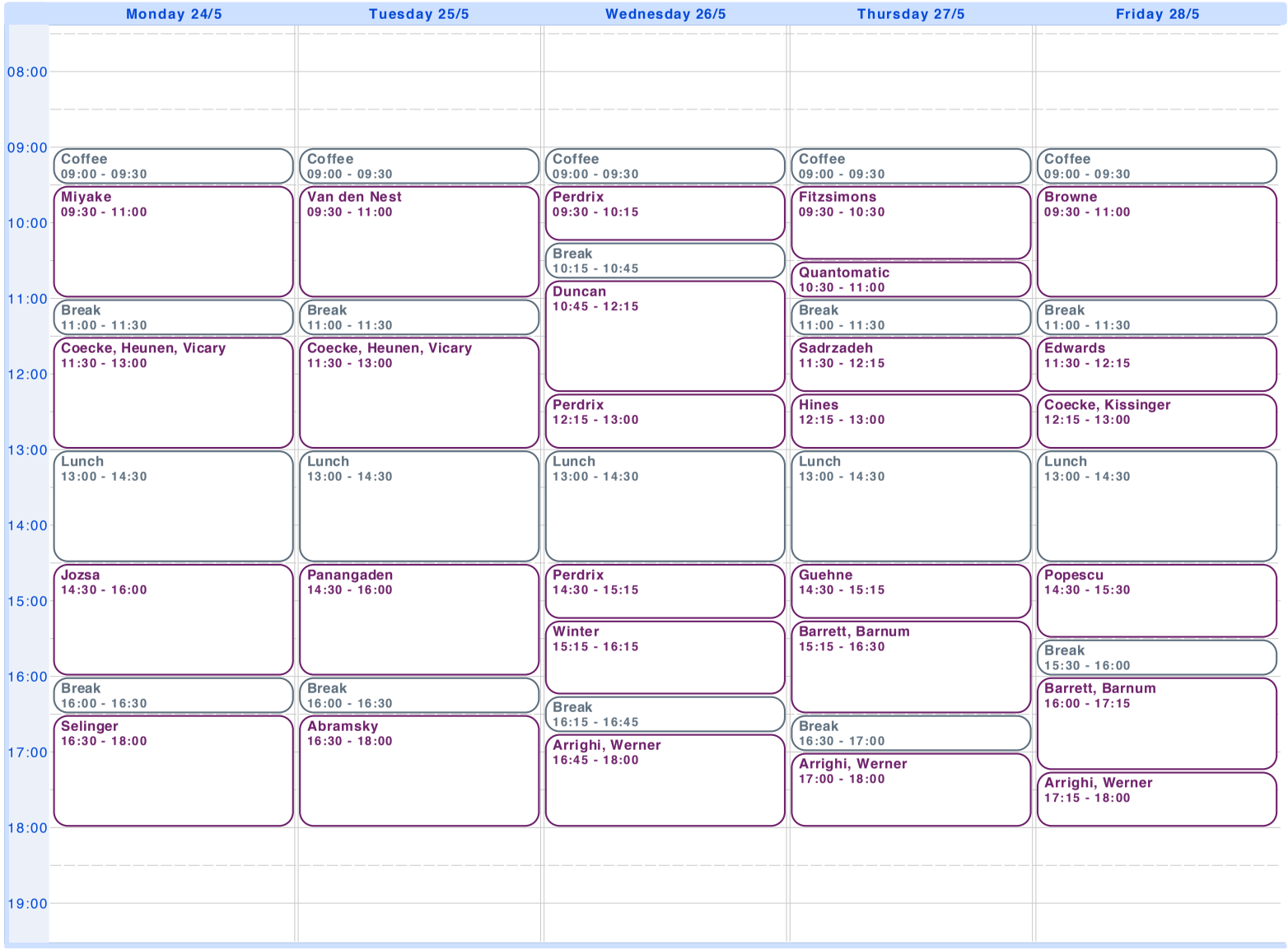
17.15-18.00 **Pablo Arrighi** (Grenoble) **& Reinhard Werner** (Hannover)
Quantum cellular automata 3.

This session in the Computing Lab

Timetable

Breaks, Talks

Mon 24 May – Fri 28 May 2010 (London)



Local Information

How to get to Oxford University

Oxford is about 60 miles (90 kms) northwest of London and has excellent road and national rail links. Regular coach services connect Oxford with the capital and also with Heathrow, Gatwick and Luton airports.

From London airports

London Heathrow and Gatwick airports are linked to Oxford by The Airline coach service, which operates a direct frequent service twenty-four hours a day (tel: +44 (0)1865 785400).
London Stansted airport is linked to Oxford by the National Express 757 coach service, running every two hours (tel: +44 (0)8705 747777).

A number of companies, including Oxicars and CCB Cars, offer pre-bookable airport transfers.

By train

A direct service operates between Oxford and London Paddington (approximately every 30 minutes), and between Oxford and Birmingham New Street via Banbury and Coventry. Other services operate from the north via Birmingham New Street; from the South via Reading; and from the west via Didcot or Reading. For information contact National Rail Enquiries (tel: +44 (0)8457 484950).

By coach

Frequent 24-hour direct services connect Oxford with London (peak times every 10-20 minutes). The Oxford Espress service includes Victoria Coach Station, Grosvenor Gardens, Marble Arch, Baker Street/Gloucester Place and Hillingdon (tel: +44 (0)1865 785410). The Oxford Tube service includes Grosvenor Gardens, Marble Arch, Notting Hill Gate, Shepherd's Bush, and Hillingdon (tel: +44 (0)1865 772250). For information on coaches to other major cities and airports contact National Express (tel: +44 (0)8705 808080). Coaches arrive at Gloucester Green Coach Station in the city centre.

By car

Birmingham-Oxford: M40-A34
Bristol-Oxford: M32-M4-A34
Cardiff-Oxford: M4-A420
Edinburgh-Oxford: A74(M)-A74-M6-M42-M40-A34
Glasgow-Oxford: M74-A74(M)-M6-M42-M40-A34
London-Oxford: A40-M40-A40
Manchester-Oxford: M56-M6-M42-M40-A34
Newcastle-Oxford: A1-A1(M)-M1-A43-M40-A34
Nottingham-Oxford: M1-A43-M40-A34

Parking in Oxford

Many Oxford streets are now closed to traffic and parking is severely limited. Visitors are encouraged to use the Park and Ride bus services which operate between the city centre and parking areas on the outskirts at Pear Tree, Woodstock Road (north); Water Eaton (north); Seacourt, Botley Road (west); Redbridge, Abingdon Road (south); and Thornhill, London Road (east).

Please note that Thornhill and Seacourt are often full, particularly on University Open Days. We therefore recommend that drivers coming to Oxford from the east (including London), the south and the west use the Redbridge Park & Ride, while drivers arriving from the north can choose between Pear Tree and Water Eaton.

Taxis

Taxi ranks are located at Oxford Railway Station, Gloucester Green Coach Station and St Giles' in the city centre.
ABC Taxis, tel: +44 (0)1865 770077
City Taxis, tel: +44 (0)1865 201201
Euro Taxis, tel: +44 (0)1865 430430
Radio Taxis, tel: +44 (0)1865 249743 or 242424

Website

Latest information will be found on the website:

http://web.comlab.ox.ac.uk/people/Bob.Coecke/QICS_School.html

In case of emergency

You can call the following mobile numbers:

Ross Duncan +44 7866 171 344
Bob Coecke +44 7855 298 183