

FIRST/Quantum Cybernetics/CREST Joint 1.5-day Surface Code Quantum Error Correction  
Tutorial/Workshop

Date : 23 Feb. 2010(Wed) 10:00–17:00, 24 Feb.2010(Thurs) 10:00–12:00

Place : Osaka Univ., Toyonaka Campus, Engineering Science J120 seminar room (23rd),  
C419 seminar room (24th)

Tutors : Rodney Van Meter/Keio Univ., Assistant Prof., Clare Horsman/Keio Univ.,  
Instructor, Shota Nagayama

Feb. 23rd:

1000–1015 introductions/plan for the two days

1015–1045 Basic surface code concepts:

The lattice and cluster state, stabilizers, qubit state  
Shota Nagayama

1045–1115 Advanced topics:

Basic gates: Logical NOT, phase flip and CNOT  
Thresholds on the surface code  
Rodney Van Meter

1130–1200 Advanced topics 2:

Singular state injection  
Non-Clifford group gates  
Comparison to other error correction schemes  
Rodney Van Meter

1200–1315 lunch

1315–1400 Architectures for the surface code

Rodney Van Meter

1400–1445 directed reading

each participant will be given one or more papers to read 1445–1530 directed  
discussion

Topic: Interesting system sizes for surface-code quantum computers, or, how  
big does a surface code quantum computer need to be?

1600–1700 2-D and 3-D topological codes and the Quantomatic tool

Clare Horsman (in English)

Feb. 24th:

1000–1030 Surface code with defective qubits

Shota Nagayama

1030–1145 Directed discussion

Topic: What \*short-term\* experiments can we conduct that will help lead to  
surface code quantum computers?

1145–1200 wrap-up