

The Ada Lovelace Bicentenary Lectures on Computability, December 2015 – January 2016

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Quantum computation: quantum mechanics through the computational lens

Sunday, 20 December, 11:15-12:15

Quantum computation teaches us that quantum mechanics exhibits exponential complexity. This has fundamental implications. We argue that the standard scientific paradigm of "predict and verify" cannot be applied to testing quantum mechanics in this limit of high complexity. We describe how QM can be tested in this regime by extending the usual scientific paradigm to include interactive experiments. This is an example of how ideas from theoretical computer science shed light on fundamental questions; I will hint at other examples during my talk, which will assume no prior knowledge on almost anything.

