

*Department of Mathematics,  
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# Food For Thought Seminar

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## Improve your learning with a quantum computer!

**Abstract:**

After offering some quick answers to the questions "What is learning?" and "What is a quantum computer?", I'll explain how you can improve your learning with a quantum computer. We measure the efficiency of a learning algorithm by its query complexity, and in this field one tries to find upper bounds for the query complexity (by creating algorithms) as well as lower bounds (by proving the optimality of certain algorithms). Many of the first quantum algorithms are in fact learning algorithms, and we'll discuss two important ones: Grover's search algorithm and the Bernstein-Vazirani algorithm. These offer amazing speedups in query complexity over classical computers. If time permits, I'll describe recent research which introduces a huge family of learning problems with nonabelian symmetries for which little is known but the (upper and lower bounds for the) query complexity for any given problem can be easily computed on computer algebra software such as GAP or SAGE. This work is in collaboration with Orest Bucicovschi, Hanspeter Kraft, David Meyer and Jamie Pommersheim.

**Monday, November 14, 2016**

**12:00 PM**

**AP&M 7421**

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