



## ICFO Colloquium SETH LLOYD 'Quantum machine learning algorithms'

SETH LLOYD

December 12, 2014

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Friday, December 12th, 12:00, ICFO's Auditorium

### **SETH LLOYD**

Professor of Mechanical Engineering and Engineering Systems, Massachusetts Institute of Technology (MIT), USA \$\$\$eth Lloyd is a professor of mechanical engineering at the Massachusetts Institute of Technology. He refers to himself as a 'quantum mechanics'. His research area is the interplay of information with complex systems, especially quantum systems. He has performed seminal work in the fields of quantum computation and quantum communication, including proposing the first technologically feasible design for a quantum computer, demonstrating the viability of quantum analog computation, proving quantum analogs of Shannon's noisy channel theorem, and designing novel methods for quantum error correction and noise reduction.

Machine learning algorithms look for patterns in large arrays of high-dimensional vectors.

Quantum computers are adept at manipulating large arrays of high-dimensional vectors. This talk presents a series of quantum algorithms for big data analysis. The ability of quantum computers to perform Fourier transforms, find eigenvectors and eigenvalues, and invert matrices translates into quantum algorithms that are exponentially faster than their classical counterparts: complex patterns in datasets of size  $N$  can be identified in time  $O(\log N)$ .

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