Soul of a New (Quantum) Machine*

Monday, July 9th 7 pm, Room G1B30 Duane Physics Building University of Colorado

a free public lecture

Your computer (or tablet, or smart phone) is nothing like the computer of your mother's, and hers in turn was very different from your grandmother's (which may have been a pencil). The computer is quintessentially protean – since information is present everywhere and in every physical form, the processing of that information is also not constrained to a particular physical embodiment.

We have come to understand that quantum mechanics, and the concept of a quantum state, is a new embodiment of information, and its processing by computation provides new algorithmic powers. Thus, we foresee yet another generation of computer to come, the quantum computer. In many ways, this computer will be as different from your iPhone 7 as it is from your grandmother's pencil. I will show some of the prototypes that we are working on. Besides involving circuits on chips, everything is different – for example, the operating temperature is around 0.01 degrees above absolute zero.

David DiVincenzo was one of the first physical scientists to engage in quantum information research. His name is associated with the development of criteria for the physical implementation of a quantum computer, known as the DiVincenzo Criteria. As part of the Jülich Aachen Research Alliance (JARA), DiVincenzo is the head of the Institute of Quantum Information at RWTH Aachen University; he is also head of the Institute of Nanoelectronics at the Forschungszentrum Jülich. His PhD was in Electrical Engineering at the University of Pennsylvania; after a postdoc at Cornell, he was a Research Staff Member and Research Manager at IBM TJ Watson Research Center, Yorktown Heights, New York, for 25 years. He is a Fellow of the American Physical Society, Associate Editor of the Reviews of Modern Physics, and von Humboldt Professor.



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