

Speaker: Eric Fullerton

Center for Memory and Recording Research (UCSD)

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Is there still plenty of room at the bottom? Physical challenges for big data



Bio: Eric Fullerton is a Distinguished Professor at the University of California, San Diego in the Departments of Electrical and Computer Engineering and Chemical and Nano Engineering and is an Endowed Chair and Director of the Center for Memory and Recording Research. He received his B.Sc. in Physics from Harvey Mudd College in 1984 and his Ph.D. in Physics from UC San Diego in 1991. Previously to joining UC San Diego he held research positions at Argonne National Laboratory, the IBM Almaden Research Center and Hitachi Global Storage Technologies. His current research focuses on the synthesis and characterization of magnetic nanostructures, both as a probe of materials in reduced dimensions and for the development of novel information technologies. He has co-authored >420 journal articles, been issued 51 US patents, is a Fellow of the American Physical Society and the IEEE and is a member of the National Academy of Engineering.

In Richard Feynman's lecture in 1959 entitled "There is Plenty of Room at the Bottom", he speculated on the impact of manipulating and controlling things on a small scale. In particular, he discussed the potential to store large amounts of data in small volumes, giving rise to the title of the talk. I will discuss the evolution of our ability to store data from Feynman's time highlighting the increasing data storage densities over the last 60 years and the corresponding decrease in cost that has helped drive the modern digital world. However as many of the critical dimensions approach the nanometer scale, a variety of physical phenomena are placing limits on the increases of the capacity of future storage and processing devices. I will discuss the state of the art of data storage and the potential for continued shrinking of bits. I will then discuss challenges highlighted by Feynman related to energy use of data and the potential for a new generation of information storage, memory and processing technologies to address these challenges.

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