# System Nanoarchitectures: A Fundamental Physics Perspective

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In this talk, we examine the limits of nanodevice scaling, which result from the fundamental laws of physics, and discuss the architectural implications. We show that there is a direct correlation between the overall performance of information processing systems and the raw binary throughput, which is the technological capability. There might be a fundamental underlying relationship between the achievable computational power and the underlying physics of the computational engine, i.e. *Turing-Heisenberg rapprochement*.

In the second part of this talk we consider *system scaling*. Decreasing physical size of the system may increase both system capability and application space. In this talk, we consider an extreme case of a functional integrated system. We examine the hypothesis that as feature size scaling continues, integrated circuit technology may become integrated system technology at the atomic level. Constraint analysis of such extreme microsystems is a useful tool for better understanding of the fundamental limits and potentials of nanodevices in an integrated system. An example of extreme prototypical application of autonomous micron-scale systems is the 'electronic cell'. In the talk, we examine the relation between available volume (number of atoms) and the achievable performance for each of the components of the extreme microsystem based on fundamental physical arguments.