How low can we go?

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It is recognized that the key to reducing power in logic circuits is to lower the voltage. The voltage kT/e (26 mV at room temperature) gives a voltage scale, but is this the right scale? This presentation will discuss the issues involved in reducing voltages as well as more stringent voltage limits. Gigantic noise sources, in the form of random telegraph noise, are seen in very small devices. Will these noise sources set a limit to size scaling? Pure electrostatic devices such as FETs have operating restrictions that can be relaxed if the electrostatic link between input and output were broken. Thus there is a class of devices, which includes relays, where the input voltage is transduced to a different form, such as mechanical force, and then back to an electrical output when the switch is actuated. We call this the transduction principle, which we will discuss in the context of nanomechanical and all solid-state relays.