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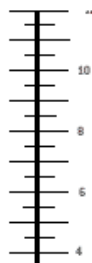
Thermometer Reads Temperature from Noise

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Scientists have designed a new kind of thermometer that uses noise to measure temperature. According to a report published in the current issue of the journal *Science*, the device gives highly accurate readings between room temperature and one kelvin.



Lafe Spietz of Yale University and his colleagues manufactured the thermometer out of two layers of aluminum separated by a section of aluminum oxide. A voltage applied across the apparatus causes electrons to tunnel through the barrier, creating an electrical current. The relationship between the magnitude of the voltage and the amount of noise, or variation, within the current is temperature-dependent. As a result, the so-called shot noise thermometer (SNT) tells temperature as long as the applied voltage is known. The researchers determined that the SNT is accurate to within one part in 1,000 at one kelvin, which is five times as good as thermometers currently used for temperatures near absolute zero.

The new design's greatest strength is that it is a primary thermometer: it does not require outside calibration. That's because the relationship between voltage, noise and temperature relies only on fundamental physics constants. In addition, the device provides accurate measurements over a much larger range of temperatures than other thermometers do. The authors thus propose that their SNT "may have a much broader field of application than present primary thermometers." --Sarah Graham

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