

Abstract Submitted  
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**A Memristive Switching Model of Two-Terminal Programmable Nanodevices.** DMITRI STRUKOV, Hewlett Packard Labs, JULIEN BORGHETTI, DUNCAN STEWART, GREGORY SNIDER, R. STANLEY WILLIAMS, HEWLETT PACKARD LABS TEAM — The existence of a fourth passive circuit element was proposed by Chua in 1971 from fundamental symmetry arguments. Although he showed that such a device, which he called a ‘memristor’ (acronym for memory and resistor), had many interesting and useful circuit properties, until now no one has presented a physical model or example of such an element. We show here using a simple analytical example that memristance arises naturally in systems for which electronic and atomic transport are coupled under an external bias, and we explore the range of validity of the basic nonlinear circuit model of a more general class of dynamical devices called memristive systems. These results serve as the theoretical foundation for understanding a wide range of hysteretic current-voltage behavior observed in next-generation non-volatile resistive RAM devices, including nanoscale titanium oxide crosspoint switches built in our laboratory.

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