



TECHNISCHE UNIVERSITÄT
CHEMNITZ

Institut für Physik Physikalisches Kolloquium



Mittwoch, 10.04.2019, um 16:00 Uhr

Ort: Reichenhainer Str. 90;
Zentrales Hörsaal- und Seminargebäude,
Raum 2/N013

Dr. Andy Thomas

Leibniz-Institute for Solid State and Materials Research
Dresden

Memristive Tunnel Junctions

In recent years, Memristors have attracted great interest for a variety of applications. An obvious use would be as a memory device or, more ambitiously, a reconfigurable logic device. However, the arguably most interesting implementation of memristive devices is neuromorphic computing.

Neuromorphic engineering is a relatively young research field, which was originally proposed by C. Mead in the late 80s. Neuromorphic devices and architectures are designed to emulate the style of computation of biological systems and exploit biological strategies for optimizing robustness to noise and fault tolerance, as well as maximizing compactness and minimizing power consumption. Nevertheless, the most attractive feature of biological systems is their ability to learn and adapt to new situations.

A possible realization of a memristive device is a metal-insulator-metal structure. In particular, this can be a tunnel junction. Then, a 1–3 nm thin insulator separates two metal electrodes. We can apply a bias voltage at this device and measure the corresponding current.

Utilizing the memristive properties, we looked into the use of the junction structures as artificial synapses. We observed analogs of long-term potentiation, long-term depression and spike-time dependent plasticity in these simple two terminal devices. We will explain these mechanisms and their significance in biological systems. Finally, we suggest a possible pathway of these devices towards their integration in neuromorphic systems for storing analog synaptic weights and supporting the implementation of biologically plausible learning mechanisms.

Alle Zuhörer sind ab 15:45 zu Kaffee und Tee vor dem Hörsaal eingeladen.



Informationen zum Vortrag erteilt:
Prof. Dr. Olav Hellwig, Tel. 0371 531 30521

www.tu-chemnitz.de/physik