



Contribution ID: 248

Type: **Poster presentation (105min)**

Building a thinner gap in a Gas Gap Heat Switch

Tuesday, 8 July 2014 14:15 (1h 45m)

A gas gap heat switch (GGHS) reaches its highest conductance state when the gap between two exchange surfaces is filled with a conducting gas in a viscous regime. The broader the surface and the thinner the gap, the higher the ON conductance achieved. In this presentation we describe a very thin cold gas gap heat switch based upon the use of the differential thermal expansion of the construction materials. Such a technique overcomes the intricacies of the manufacturing process of the switch.

We designed, built and tested a prototype of a very thin gap heat switch using our new methodology. The high conductance was measured with both helium and nitrogen, at temperatures ranging from 20 K (He) or 75 K (N₂) up to room temperature. The inferred gap opening at low temperature ($\approx 17 \mu\text{m}$) showed up to be slightly above the expected, which allowed us to reinterpret the design calculations performed. The switch was also characterized along its extreme conductance states while using a sorption pump, and its performance was compared with a previously developed model.

Lessons learned from first prototype led us to build up a second one with better performances.

Our experiments suggest that the proposed design allows the development of a customized cryogenic switch with improved ON conductance while keeping the assembly very simple and sturdy, hence widening the scope of the applicability of these devices.

Primary authors: Mr GALINHAS, Bruno (CEFITEC, Departamento de Física, FCT - Universidade Nova de Lisboa, 2829-516 Caparica, Portugal); Mr FRANCO, João (CEFITEC, Departamento de Física, FCT - Universidade Nova de Lisboa, 2829-516 Caparica, Portugal)

Co-authors: Ms MARTINS, Daniel (CEFITEC, Departamento de Física, FCT - Universidade Nova de Lisboa, 2829-516 Caparica, Portugal); Prof. BONFAIT, Grégoire (CEFITEC, Departamento de Física, FCT - Universidade Nova de Lisboa, 2829-516 Caparica, Portugal); Prof. CATARINO, Isabel (CEFITEC, Departamento de Física, FCT - Universidade Nova de Lisboa, 2829-516 Caparica, Portugal); Ms BORGES DE SOUSA, Patricia (CEFITEC, Departamento de Física, FCT - Universidade Nova de Lisboa, 2829-516 Caparica, Portugal)

Presenter: Prof. CATARINO, Isabel (CEFITEC, Departamento de Física, FCT - Universidade Nova de Lisboa, 2829-516 Caparica, Portugal)

Session Classification: Tue-Af-Posters Session 1.4

Track Classification: C-16: Instrumentation and process control