

## Professor Vacuum Oven

Just like Johann Wolfgang von Goethe, who was very keen on science, already wrote in his famous drama "Faust. A tragedy": "All theory is grey, my friend".

Projects like "Technikland", which was initiated by the Nuremberg School Museum, the Förderkreis Ingenieurstudium e.V. and the Museum for Industrial Culture, show how physics and technology can become fascinating for children by using practical applications and experiments.

## Technology - as easy as ABC

There were 25 stations at which children could experience the basic principles of technology and natural science in the fields of construction and power, energy, light and colours, robotics and computers as well as bionics. Renowned companies such as Siemens or Deutsche Telekom supported Technikland with exhibits that the children could



try out themselves and experiment on. Memmert provided a vacuum oven for the "power" station.

Air has its own weight? Children can hardly imagine that. In everyday life, we cannot really feel the pressure from the enormous air masses in the atmosphere above us, to which our bodies and all objects are exposed to, as the air is homogeneously distributed. In 1654, one of the most famous physical experiments of all times proved the existence of atmospheric forces. Otto von Guericke used an air pump (Fig. 1) to evacuate two sealed copper hemispheres. Afterwards, he harnessed eight horses in front of every hemisphere. Why could the immense strength of the horses not separate them? The reason was the atmospheric pressure that the evacuated objects were exposed to from the outside, which could not be opposed to by any counterpressure inside the sphere. With the help of two evacuated acrylic glass plates, the visitors were able to reenact the famous experiment by Otto von Guericke.

## Entertaining experiments in the Memmert vacuum oven

"Professor vacuum oven", presented by students of the Friedrich-Alexander University of Erlangen-Nuremberg (FAU), was next. In entertaining experiments, the children could learn why water boils faster in a vacuum, why a balloon that is filled with air blows up until it bursts, why a chocolate marshmallow's air-filled beaten can puff up to many times the original size, and why water flows through a small plastic tube into another glass as if it was led by magic.

There was a lot to see and to laugh about. However, some of the young visitors almost felt like crying: When they saw the giant marshmallow collapse again when the vacuum oven was ventilated, they realised that they could not eat it any more. Of course, the students then had another undamaged replacement at hand.

So why should one under no circumstances ever sit inside such a vacuum oven? After such an interesting lesson, most children promptly knew the right answer. People can simply not survive in an airless space (vacuum) because of the



Fig. 1 Magdeburg hemispheres with air pump at Deutsches Museum in Munich; picture LepoRello via [Wikimedia Commons](#), [CC BY-SA 3.0]



Fig. 2 self-experiment, then tasting

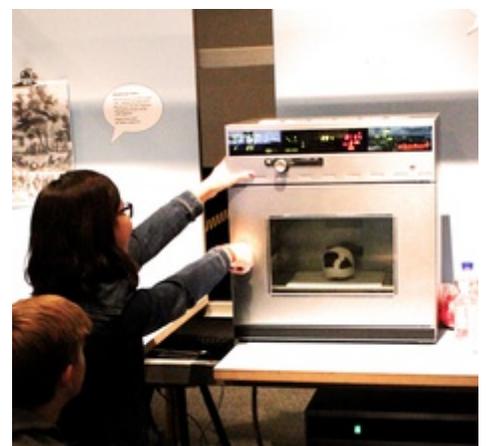


Fig 3. giant marshmallow in the vacuum chamber

atmospheric pressure and the fact that there is no air to breathe.

From 29 September 2015 till 31 January 2016 very successful Technikland will, for the third time, be held at the Museum for Industrial Culture in Nuremberg. It is in any case worthwhile to visit.

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