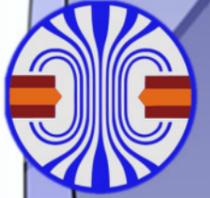


CASCADE 2D-200/300

The ^{10}B based, high resolution, high contrast detector solution for high neutron intensities!

CDT GmbH
 CASCADE Detector Technologies
 Hans-Bunte-Straße 8-10
 D - 69123 Heidelberg
 www.n-cdt.com



represented by
 Beijing Huanhe
 Technology Co.
 Ltd. in P. R.
 China

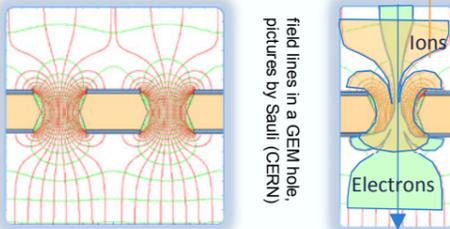
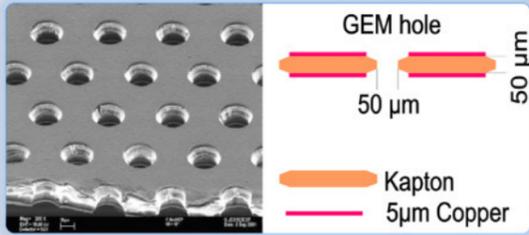
The CASCADE neutron detector concept

It is a GEM-based hybrid solid converter gas detector for efficient and 2D position sensitive detection of thermal and cold neutrons on large areas. The detector concept is based on using solid neutron converter layers in a common gas detector system, which guarantees sub-microsecond absolute time resolution and insensitivity to Gamma-rays. GEM-technology (invented by CERN) provides inherently a rate capacity on the order of 10^7 n/cm²s. The GEM foil serves as the perfect substrate for the solid converter, allowing to cascade several converter layers one behind the other accumulating detection efficiency without loss of position information.

The detector works with ordinary counting gases under normal pressure. So lightweight, easy to handle and in particular large area detectors can be constructed. Cleaning by constant throughput of fresh counting gas avoids ageing effects, which guarantees long term stability and long lifetime of the detector.

Highly integrated ASIC-technology is used to realize hundreds of individual detection channels at non-proportional cost. The actual CASCADE detector design uses an ASIC electronic front-end paired with an adaptable integrated FPGA data processing unit to provide high rate capacity.

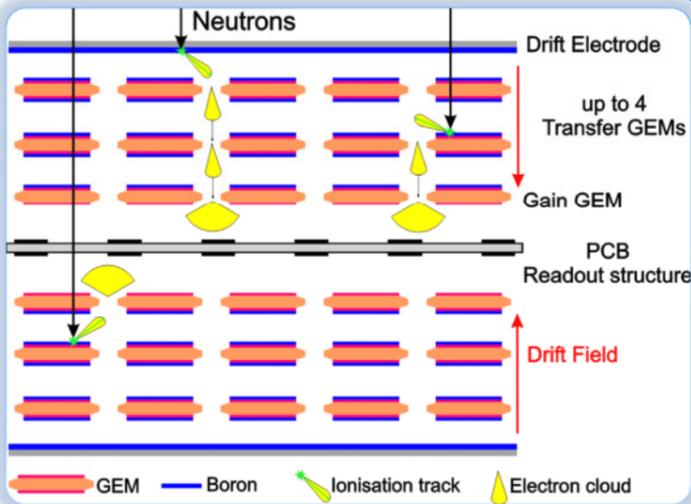
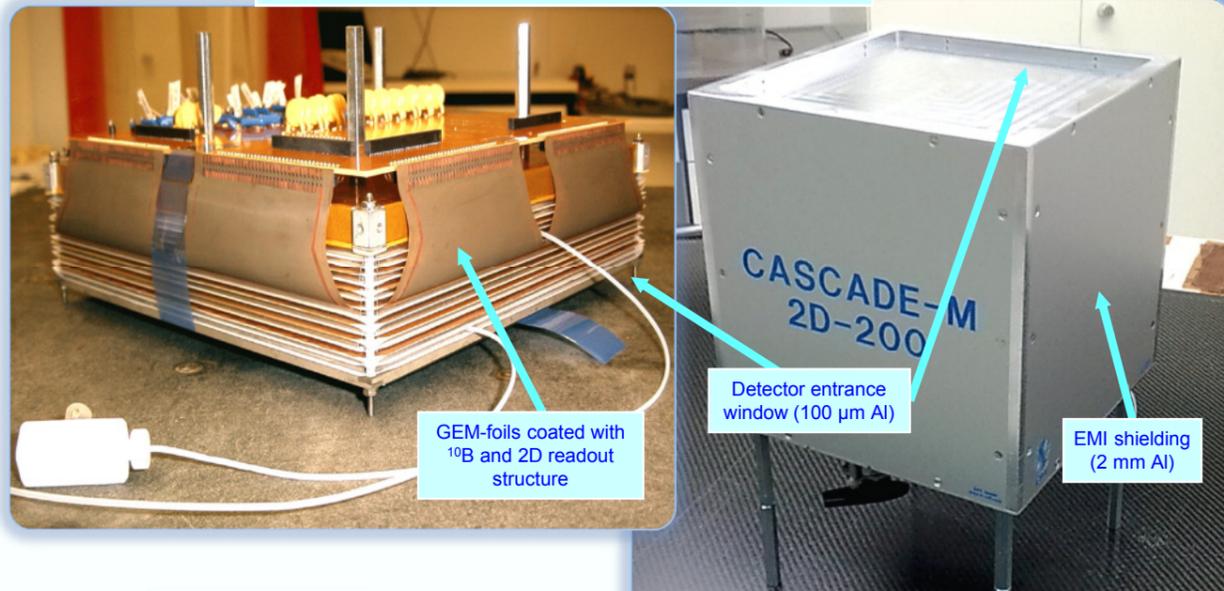
GAS
 Electron
 Multiplier
 (GEM)
 invented
 by CERN:
<http://cern.ch/gem>



GEM-Technology from CERN

2D-200

CASCADE 2D-200 Detector System (area 200mm x 200mm, 128x128 readout stripes)



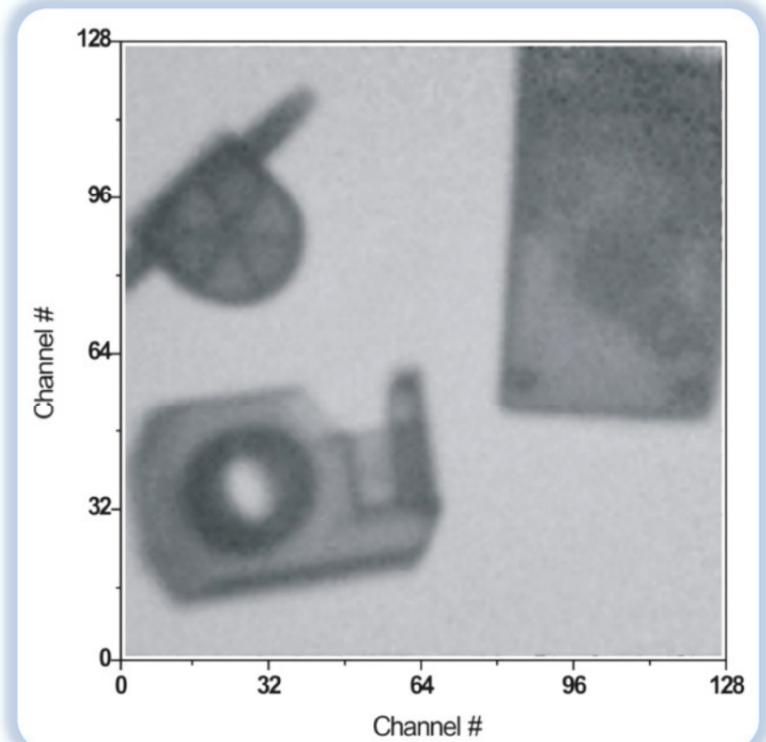
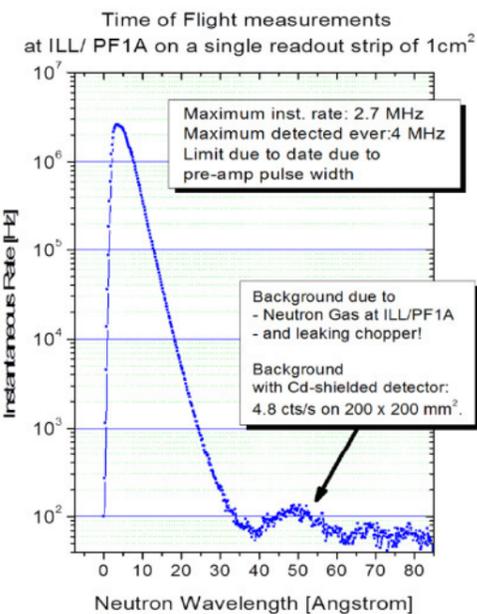
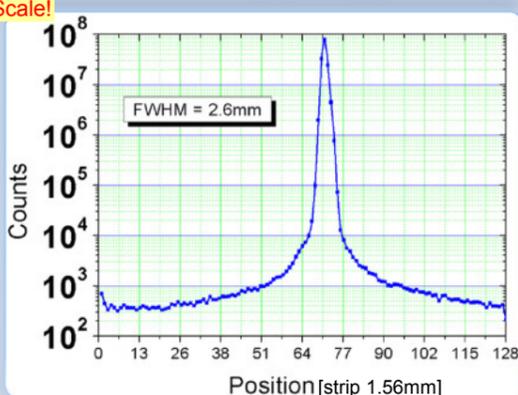
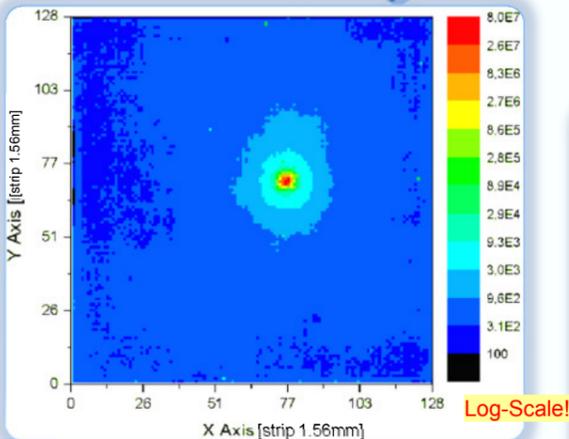
Specs

- **Competitive Efficiency** of 55% for cold neutrons (5 Å) with up to 8 GEM foils and 2 drift electrodes coated with ^{10}B each on one side.
- **Spatial resolution:** FWHM = 2.6 mm at ambient counting gas pressure, down to 1 mm for customized solutions.
- **High count rate capacity** of 1 MHz (10% dead time) due to the micro-structured GEM-foils.
- **No γ -background:** Low Z converter material ^{10}B , the high energy of the α can easily be detected and small drift gaps amplify the enormous difference in ionization density, a fast electron from gamma interaction creates in the counting gas as opposed to an alpha particle from neutron conversion.
- **Long term stability** due to continuous purge of cheap counting gas through detector.
- The current system has a sensitive area of 200mm x 200mm which is framed by a blind area of 17.5mm width.

Imaging

Spatial Resolution and Contrast

Rate Capability



"CASCADE, neutron detectors for highest count rates in combination with ASIC/FPGA based readout electronics", M. Klein, C. J. Schmidt, Nucl. Instr. and Meth. A 628 (2011) 9-18