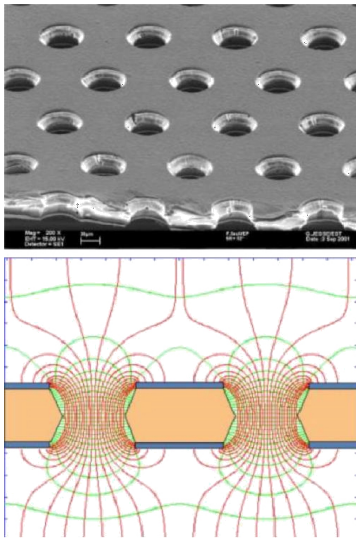


GAS ELECTRON MULTIPLIER



The Gas Electron Multiplier (GEM) is a proven amplification technique for position detection of ionising radiation such as charged particles, photons, X-rays and neutrons, in gas detectors. The GEM is a detector containing a densely pierced polymer foil coated with electrodes on both sides which is able to achieve high amplification gains and performance at low cost, even under harsh conditions. A GEM consists of a thin, metal-clad polymer foil, chemically pierced by a high density of holes. On application of a difference of potential between the two electrodes, electrons released by radiation in the gas on one side of the structure drift into the holes, multiply and transfer to a collection region. This gas detector is extensively used in high-energy physics.

AREA OF EXPERTISE

- High performance detectors.
- Materials sciences.

APPLICATIONS

- Medical Imaging.
- Radiation Therapy Dosimetry.
- High-Energy Physics.
- Astronomy/Astrophysics.
- Material Analysis.
- Systems for Radiation Detection and Monitoring.

SPECIFICATIONS

- 200 cm x 50 cm currently maximum active area.
- 1 MHz/mm² of photon flux rate.
- 40 micrometers of spatial resolution.
- 90% achievable gain – 105.
- 15-20% energy resolution.
- Holes pitch: 140µm
- Holes diameter in copper: 70µm +/-5µm
- Holes diameter in Kapton: 50µm +/-5µm
- Leakage currents: less than 10 nA at 600V @ 30%HR
- Breakdown voltage: 650V in air @ 30%HR

CONTACT PERSON

tiago.araujo@cern.ch

Find out more at:

kt.cern

ADVANTAGES

- Safe non-explosive gas mixtures.
- Very high radiation-rate capability.
- High sturdiness and reliability.
- Flexible detector shape and readout patterns.
- High time and position resolutions.
- High performance at low cost.
- High achievable gains in a multiple pre-amplification structure.
- Can be used as detector on its own.
- Works in harsh radiation environment.

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LIMITATIONS

- Complexity added by gas chamber compared to solid-state detectors.
- Low quantum efficiency compared to solid-state detectors.

IP STATUS

- Ready for licensing.
- Patented technologies:
 - WO1999021211 - Radiation detector of very high performance and planispherical parallax-free x-ray imager comprising such a radiation detector.
 - WO2003055288 - Method for making a multilayer module with high-density printed circuits.
 - WO2009127220 - Method of manufacturing a gas electron multiplier.
- CERN grants royalty-free licenses for research and development use of GEM foils.
- Any commercial use of GEM foils is subject to acquiring a commercial license from CERN, on conditions to be agreed.
- In case of direct GEM purchase, a license fee is included in the price.

