

FLAME DETECTOR



Supersensitive flame detector prototype based on wire amplification structure. (Image: CERN)

A photosensitive flame and spark detector that can be used for detection of small flames in the presence of the direct sunlight and in a fully illuminated area.

Supersensitive UV flame detector based on wire- or GEM-type amplification structure. In contrast to commercial UV flame sensors, in these detectors, either semiconducting solid photocathodes or gaseous with small ionization potential are used as main photosensitive elements. As a result, the sensitivity is much higher than the best commercial sensors, depending on a particular design.

Wire and GEM-based gaseous detectors operate in proportional mode and can detect various flames, including sparks, in direct sunlight conditions. Combined with compact pulse UV sources, they can detect simultaneously not only flames, but also smoke and some dangerous gases, for example benzene or toluene vapours. GEM-based detectors supplied with a lens can also provide information on the position of the flame and smoke.

To make the detector robust, modified versions of GEMs were developed and successfully used in the latest designs: either a so-called thick GEM or a resistive GEM, both manufactured from printed circuit boards.

AREA OF EXPERTISE

- Gaseous detectors

IP STATUS

- CERN proprietary knowledge and European patent (EP 2976778 (A1))

TECHNOLOGY READINESS LEVEL

- Prototype system validation

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APPLICATIONS

- Forest fire detection systems
- Flame and fire detection in challenging environments and at large distances such as: industrial halls, ships, offshore platforms, engine rooms, fuel stations, chemical storages, gas storages and hangars.

FEATURES

- Detection of match flame at a distance of 30m
- Detection of small sparks at a distance of 5-7m
- Sensitivity of 100-1000 times higher than the best commercial sensors, depending on a particular design
- Possibility of flame localization and visualization
- Instant respond time (1 microsecond)
- Use of compact regular battery to operate
- Temperature operation:
 - With solid photocathodes from -188°C to 100°C
 - With gaseous photocathodes 5°C to 200°C (below 5°C may lost efficiency)
- Humidity operation: up to 80% - 100%, depending on a design

LIMITATIONS

- May respond to welding at long range, lightning, arcs and corona
- Challenging construction of the detector in some photosensitive gases with alignment of the holes for the thick GEM detector

