

Progress in gaseous detectors

Ioannis Giomataris, CEA-Saclay

A brief review on Micromegas detector with current developments and future projects will be presented. The detector is used in several experiments in both particle and nuclear physics. Particular attention will be devoted to the neutron detection and to large volume devices for nuclear astrophysics and nuclear structure experiments. This device is also used for solar axion search at CERN. A new development aiming to reach picosecond time resolution is under way by an international collaboration. This is a challenge for future ultra high-luminosity accelerators as well as for particle identification.

A new type of gaseous detector based on a spherical geometry will also be presented. The detector consists of a large spherical gas volume with a central electrode forming a radial electric field. A small spherical sensor located at the center is acting as a proportional amplification structure.

The spherical detector combining sub-keV energy threshold and versatility of the target (Ne, He, H) opens the way to search for ultra light dark matter WIMPs down to 100 MeV. The next project NEWS-G, under construction, is a large detector that consists in a selected pure copper sphere of 1.4 meter of diameter to be installed at SNOLAB-Canada. This device can detect neutrinos from a nuclear reactor through neutrino-nucleus elastic interaction, neutrinos from supernova explosions and is competitive for double beta decay search using Xe-136 high-pressure gas target.