

CAST Micromegas detector performance

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CERN Axion Solar Telescope (CAST) experiment is searching for axions coming from the sun. Inside transverse magnetic fields, axions can be converted into x-rays, which can be detected by x-ray detectors. The expected signal in CAST is 1-10 keV range. Low noise and low background detectors are highly necessary to increase sensitivity of the experiment. Micro Mesh Gaseous Structure (micromegas) detectors have been used in CAST since the beginning, providing a good energy and spatial resolution for CAST's needs. CAST has been intensely studying micromegas detectors to develop new technologies, decrease background levels, increase stability and understand the nature of the background. While in 2003, there was 1 micromegas, 1 Time Projection Chamber (TPC) and 1 Charged Couple Device (CCD), improvements in micromegas detector encouraged CAST to increase the number to 3, replacing TPC with 2 micromegas detectors. In some periods during CAST run, a special phenomena called "Ultra low background" is observed, where for a few days background rate decrease to $\sim 1 \times 10^{-7} \text{ s}^{-1} \text{ cm}^{-2} \text{ keV}^{-1}$. To investigate this, simulations and shielding tests are being done at the Canfranc Underground Laboratory. If this low background is indeed not a systematic effect, that can open new possibilities on rare event searches at ground.

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