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Detectors for non-accelerator particle physics

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Non-accelerator experiments played a long and major role in some of the major discoveries in and development of particle physics. These traditionally included cosmic ray, nucleon decay, neutrino, double-beta decay, dark matter and magnetic monopole experiments. There is a large overlap between detectors used in non-accelerator and accelerator physics experiments. Some of the well known examples of this kind are scintillators, photomultipliers, drift chambers, Resistive Plate Chambers and so on. However, some of the non-accelerator physics experiments employ contrastingly different detection techniques or instrumentation compared to their counter parts. Massive water Cherenkov detectors (used in Super-Kamiokande and IceCube), ultra cold solid state detectors (used in CDMS) and magnetised iron calorimeter (proposed by ICAL) are some of the prominent examples. While typically the accelerator physics experiments are built using more than half a dozen different types of detector layers, non-accelerator experiments are usually designed using a single type or at best using a couple of types of detector elements. Even though many of the non-accelerator detector elements are fabricated using commonly available and inexpensive materials, there is also a demand for ultra-pure and exotic materials for building many of the modern non-accelerator detector elements as well.

In this talk, we will discuss some important detectors which are special to terrestrial non-accelerator experiments. Indigenous efforts for development of various detectors for many of successful past and current non-accelerator experiments as well as for home-grown mega science experiments of the future will be highlighted. Other related design and development activities concerning electronics, data acquisition systems as well as other instrumentation will be mentioned.

Presentation type

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