History of Particle Detectors

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Important steps forward in the field of nuclear and particle physics were often related to the development of novel, sometimes revolutionary detectors and detector technologies. The history of particle detectors started more than 100 years ago. Photographic films and scintillation screens using the bare human eyes as light detection system helped in the early days of nuclear physics to uncover the mysteries of radioactivity. Photographic emulsions, cloud chambers and later bubble chambers made particle tracks directly visible and let to the discoveries of the positron 1932 and the pion 1947 and many new hadronic particles in the following decades.

Development of the first electronic detectors started with the invention of the Geiger-Müller tube based on gas amplification principles to measure charged particles by their ionization. Later, scintillation counters were equipped with photo-multiplier tubes (PMTs) to gain much higher sensitivity. Electronic detectors were equipped with more and more channels, finer granularity and fast data read-out which eventually marked the end of the big bubble chamber era. At the same time, first ideas on the use of semi-conductor devices as high precision tracking detectors emerged which formed a third major detector line beside the well established gaseous detectors and photo detectors.

Today, these basic detector technologies are even combined into hybrid detector systems such as Silicon PMTs, Micropattern Gas Detectors with Pixel Readout or Silicon Tungsten calorimeters. An overview of the history of particle detectors will be given and recent trends in detector technologies for future colliders at the high energy frontier will be shown.