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New Detectors, New Physics, New Life

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A long succession of inventions of particle detectors has given life to generations of scientists and has enabled step by step the understanding of chemistry, the physics of light, matter and cosmos. Over the last hundred years the imaging of the interactions of ionizing particles has allowed to penetrate mysteries of elementary objects and forces, far beyond what we can see and feel with our senses. The detectors often provide the confirmation of a postulated phenomenon, such as the positron, but they may also unveil unexpected surprises such as the X-rays. Once something is well understood, however, it needs not be a prime object of study anymore, and more specific and selective techniques are required to reach a deeper level of observation. This may be achieved by evolution, perfecting existing methods. Fundamentally innovative approaches in instrumentation that tackle the objectives in a different way often achieve a breakthrough in the physics understanding. In particle physics both the accelerators as the probe and the detectors as the analyzer need a continuous process of upgrading. New detection schemes have been based on brilliant but random ideas, such as the Wilson Cloud chamber, or on systematic evaluation of available alternatives. In recent years it has become obvious that the use of the silicon chip technology allows quite innovative and powerful detector designs. It is now possible to envisage unprecedented rates of interactions, nearly a thousand million per second, while keeping the possibility to retrieve all detailed information concerning a few hundred selected interactions only. Some trends in processing and packaging technology may eventually lead to even more advanced detectors. Extrapolating the historical experience one may assume this to be a basis for new observations and new theories, because it seems likely that realms of space structures, forces and quantum phenomena remain undiscovered. Life in science in general, and physics in particular will remain worthwhile and full of purpose. The side-effect that new detectors also lead to new industrial potential is not a usual concern for the scientists at the forefront. However, this must be stressed with more emphasis in order to ensure the continuation of support for scientific activity. In hospitals, new detectors can literally give life to sick people, and in the short term that weighs more than the identification of a new meson.

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