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PARTICLE ACCELERATORS : THE BEGINNING OF A DISCUSSION .

André Gsponer  
GIPRI, Geneva

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gipri 41, rue de Zurich CH-1201 Genève  
Téléphone: (022) 32 14 38 Télégramme: Gipri-Genève  
Chèques postaux: 12-13357 Banque: SBS Genève-Cornavin, No 103.611.0

## Particle accelerators : The beginning of a discussion

One important aspect of the development of modern science is its dependence upon the development of new research tools. In the field of nuclear physics, the technology which is playing the most central role is that of particle accelerators. Since 1932, when Cockroft and Watson built the first accelerator with sufficient energy to produce nuclear reactions, the construction of more and more powerful accelerators has led to a succession of scientific discoveries and technological innovations with applications in a variety of fields ranging from the medical to the military.

It is customary nowadays to view the realm of nuclear physics as being split into three broad areas which are those of nuclear weaponry, civilian applications of nuclear technologies, and fundamental research. Whereas nuclear weapons are of great concern to many people, and many civilian applications such as nuclear energy are on trial, there is little discussion on the potential future impact of the recent advances in the technology of particle accelerators.

Elementary particle physics, at the forefront of fundamental research, is mainly carried out using increasingly more powerful and larger high energy accelerators and storage rings. For applications of accelerators requiring lower energies but very high currents, the advances are equally impressive. These developments are leading towards numerous new applications, especially in the fields of nuclear energy and nuclear weaponry. Particle accelerators are becoming usable for efficient breeding of fission and fusion materials, for driving inertial confinement fusion devices, for studying the physics of thermonuclear weapons, etc. The concept of high energy particle beam weapons may become feasible and free-electron lasers using electron accelerators and storage ring technologies may provide a new generation of highly efficient and powerful lasers with many military applications.

The majority of high energy accelerators have usually been built inside or close to national laboratories equipped with reactors and other nuclear facilities. The main exception is the

European organization for nuclear research, CERN, near Geneva, where several large proton accelerators and storage rings are in operation, and where the construction of the world's largest electron-positron storage ring, LEP, is just beginning.

The construction of LEP was decided at the end of 1981. However, as with many other large projects, there was no prior extensive discussion, neither within the scientific community at large, nor with the general public. People are expressing a growing concern, especially because of its very large size (27 kilometers in circumference) and its electrical consumption (140 megawatts at full power). Even though there has been little objection to its scientific interest, physicists are raising questions about potential competition of various machines planned in other countries, its timeliness, and its impact on the future of CERN and the particle physics community.

Finally, after various invitations from the outside to organize a public debate on LEP, the CERN management agreed to cosponsor such a meeting together with a swiss ecological association.

Many technical and general questions were raised in three well attended evenings of public discussions during January and February 1982. Unfortunately, like in the early discussions on nuclear energy or nuclear proliferation, these discussions essentially took place only between CERN proponents of LEP and opponents from outside the particle physics community, and little effort seems to have been made to give voice to opponents from within it. Similarly, the implications of the LEP technology was discussed solely in the context of its application to particle accelerators for scientific research, and was not discussed in the full context of the other possible uses of accelerator technology.

This debate may thus hopefully be only the first of a series of more extensive discussions. It should however be remembered as the first one in which a problem of fundamental research in physics and its associated technology were questioned and debated by scientists and people from many different areas in front of a large public.

André Gsponer