No Higgs without Superconductivity

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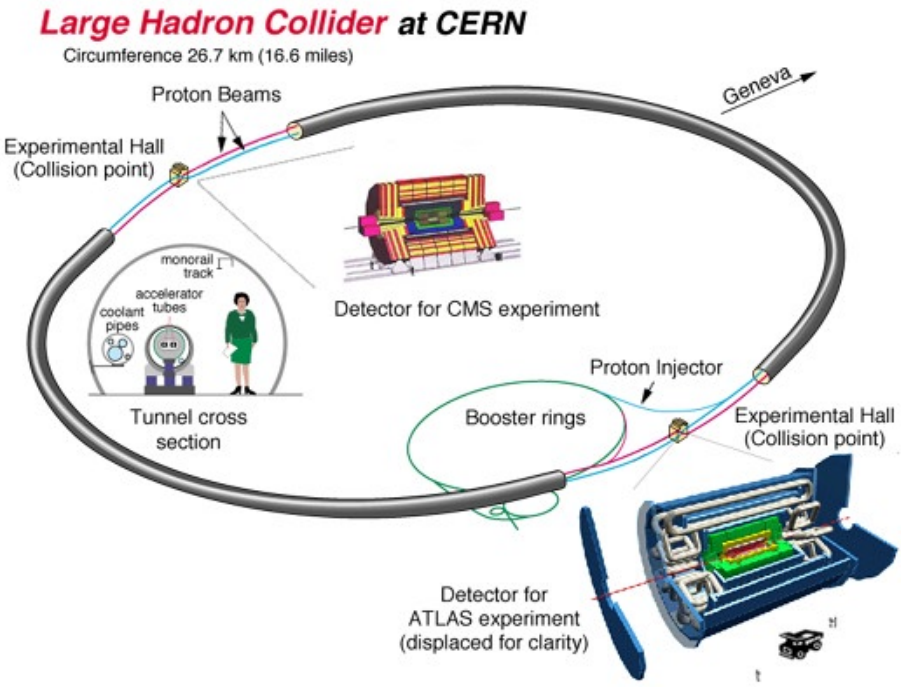
High Energy Physics experiments require high-energy colliding beams of charged particles like electrons, muons, protons or heavy ions. Such beams must be created, accelerated and stored and for this one needs bending and focusing magnets, acceleration cavities and magnets in detectors to separate the charged from the non-charged particles.
The search for smaller particles requires more powerful machines and thereby the use of superconductivity in practically the entire system is requisite. Today we see a history of 25 years of using NbTi superconductors in magnets for particle colliders like at Fermi Lab (Thevatron), Brookhaven (RHIC), Desy (HERA). Presently at CERN the Large Hadron Collider is under construction which uses NbTi superconductors at its limits of about 8-9T. This most powerful collider under construction comes into operation in 2007.
In parallel, however, the technology for the next generation of colliders must be developed because of the very long design and construction time of more than 20 years. Advanced superconductors like Nb_3Sn are boosted to maximum performance in order to create bases for even more powerful colliders in the future requiring magnet structures operating at 13-25T level far beyond the present limits.
The key role of superconducting devices in the construction of present particle accelerators and detectors will be presented and an outlook to even more powerful colliders in the future will be given.



Herman ten Kate was born in Enschede in 1955. He study Applied Physics at the University of Twente and graduated in 1980. His first job was with FOM as doctoral researcher and got his PhD on superconducting rectifiers in 1984 at the same university. After 2 years of post doc he became a staff member in the Low Temperature group. His primary interest covers applied superconductivity and its applications, in particular in superconducting magnets. Important issues are the improvement of transport properties of technical superconductors like NbTi, Nb_3Sn as well as BSCCO and MgB_2 and the development of applications in magnet systems for energy system like transformers and nuclear fusion as well as in magnet systems for high energy physics and NMR. In 1996 he was invited to lead the ATLAS Magnet Project and since then he works at CERN. In 1997 he was appointed as special professor in Industrial Application of Superconductors at the University of Twente and supported by Dutch industry.

Websites:
http://lt.tnw.utwente.nl/
http://user.web.cern.ch/User/Welcome.html
http://atlas.web.cern.ch/Atlas/
http://atlas-ma.web.cern.ch/atlas-ma/