

PHYSICS NEWS FLASH

UT Physics Joins Experiment at the Particle Physics Laboratory CERN

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University of Tennessee physicists have joined a worldwide collaboration that will look deeper than ever before into the matter and forces that created our universe. The new technologies required for this research present breakthroughs in radiation detection, fast communication, and computing.

The UTK accelerator-based particle physics group, led by Assistant Professor Stefan M. Spanier, has just become a member of the scientific team conducting experiments at the super-collider LHC (Large Hadron Collider) of CERN, the European particle physics laboratory in Geneva, Switzerland. The so-called CMS (Compact Muon Spectrometer) collaboration, named after their huge particle detector, is pursuing Einstein's dream of a unified description of the universe by studying its tiniest building blocks, created in collisions of high energetic protons. This is a very exciting time for the 2,000 member scientists from 181 institutes and 38 countries because the first collisions are expected in the fall of this year.

The group at UTK contributes by preparing a device that detects incredibly small and short-lived particles. It consists of 66 million individual sensors that have to be inspected 40 million times a second. But this is only a part of the much larger assembly of detectors in CMS that are placed like layers of an onion around the spot where protons collide head-on. The data amount generated by this experiment is unprecedented as well: per year the storage of the signals collected from the detector would fill 20 million CDs. The computing power required to search for new phenomena in these data is equivalent to 100,000 conventional desktop computers. To tackle this challenge, a completely new infrastructure with worldwide-distributed computing resources had to be invented, the so-called Grid—an ambitious initiative for sharing computer power and data storage capacity over the Internet. It is expected to be the next breakthrough after the World Wide Web, with potentially an even greater impact on everyday business.

The particle physics group at UTK has installed a local Grid computer cluster on campus, which will also be open to computing intensive research in other fields at the university. The project is supported by the Department of Energy and will provide many opportunities for undergraduate and graduate students for hands-on experience with frontier physics, detection technologies and computing. This new involvement fundamentally integrates into the university's 'Ready for the World' initiative. Interestingly, the technologies invented for and by particle physicists are the tools that have “flattened” the world today.

CERN, located at the Swiss-French border near the medieval town of Geneva, is the world's largest particle physics laboratory. Several Nobel prizes in physics have resulted from research on its several particle accelerators, and it is the birthplace of the World Wide Web. Founded in 1954, the laboratory was one of Europe's first joint ventures and now includes 20 European Member States.