for investment in this kind of computing.

F. Carminati of the MPP steering group discussed the potential for data analysis and event simulation. S. Cittolin, leader of the ECP Read-out Architecture group, explained his view of the LHC data acquisition architecture. He expressed some doubts about the cost effectiveness of MPP versus computing farming in this particular field and concluded that interactive data analysis was the most likely application for MPP technology at CERN.

G. Shering reviewed problems in the accelerator and engineering design and on-line control areas. Several programs developed by physicists and by industry require large amounts of computing power and have been traditionally run on powerful supercomputers. Amongst other examples, he mentioned the LHC magnet simulation and particle tracking programs, which can easily take 10 hours of CPU time on a Cray.

However other applications, notably magnets and radiofrequency cavities, will need a major increase in computing power to move from two to three-dimensional design, while the complexity and the prototyping cost of future accelerator design should naturally call for more accurate and powerful simulation.

In a panel discussion, R. Brun set the ball rolling by presenting some benchmarks produced by the College de France, running Geant on a parallel machine (Telmat T800) with different parameters to simulate event, primary track and secondary track level parallelism.

Some physicists shared his scepticism on sub-event parallelism, while others expressed concern on the I/O capability of existing MPP products. However people felt more comfortable with data visualization applications because of the analogy with database applications already successfully demonstrated on MPP commercial platforms.

R. Bock presented some benchmark trigger architectures in RD-11. After explaining the shortcomings and advantages of SIMD, MIMD and other parallel systems in this domain, he concluded that general-purpose MIMD systems could may be of interest if the network latency problem could be minimized.

Physicists from large LEP collaborations underlined the importance of writing code for MPP in portable and hardware independent fashion. The price-performance ratio of MPP versus workstation-based computer farms was deemed to be critical. Everybody concurred that an organized approach is called for to better understand MPP and try out some real applications on a modest, but reasonable, hardware platform. This could be done in collaboration with external institutes and firms.

Summarizing, CN Division Leader D. O. Williams pointed to the need to plan further technical investigations, set up a forum to discuss benchmark results, and explore collaboration with manufacturers and other centres already active in the field. It will be vital to try out typical applications on a real machine as soon as possible. This new technology will be successful only when all involved have easy access to MPP.

(A mailing list has been set up to keep people informed of the MPP steering group's activities. Contact F. Gagliardi, CERN CN Division, e-mail FAB@vxcern.cern.ch.)

From F. Gagliardi

SUPERCOLLIDER
String test success

On 14 August at the Superconducting Supercollider (SSC) Laboratory in Ellis County, Texas, the Accelerator Systems String Test (ASST)successfully met its objective by operating a half-cell of five collider dipole magnets, one quadrupole magnet, and two spool pieces at the design current of 6500 amperes.

This major milestone for the SSC was met six weeks ahead of the schedule established two years ago. Cooldown began in June and current was slowly raised, testing the quench protection system along the way. The test demonstrated the quality of the industrially assembled magnets and the associated power, cooling, and control equipment to operate together successfully as a system.

The magnets were assembled this spring by General Dynamics personnel working at Fermilab, and were cooled by a specially built helium refrigerator. General Dynamics is now preparing a plant in Hammond, Louisiana for eventual high rate production of collider dipoles, and Westinghouse is preparing a similar facility in Round Rock, Texas. Magnets assembled by Westinghouse workers at Brookhaven will also be tested at the ASST.

The ASST will continue to be a valuable test bed for magnets, spool pieces, control software, refrigerator operating software (optimizing for efficiency), and magnet installation procedures. Magnet tests will be include longevity, thermal cycling effects, ramp rate effects, and other operating conditions. Future ASST activities will involve one and

On 14 August at the Superconducting Supercollider (SSC) Laboratory in Ellis County, Texas, SSC preparations passed a major milestone when a half-cell of five collider dipole magnets, one quadrupole magnet, and two spool pieces operated at the design current of 6500 amperes. (Photo SSCL)

perhaps two full cells of magnets, mounted one above the other as they will be in the collider. Early next year the first of twelve large helium refrigeration plants, designed to cool a sector of the collider in operation, will be ready and can be tested using the magnet string as a heat load.

AARHUS
ASTRID goes exotic

The ASTRID a multi-purpose storage ring at Aarhus, Denmark, built to function as a 560 MeV synchrotron-radiation source and as a heavy-ion storage ring (July/August 1990, page 16), is now the scene of interesting beam cooling experiments.

Laser-cooling experiments using a positive lithium beam have been in progress for two years, giving momentum spreads down to about 10^{-6}. Also electron recombination experiments using an electron cooler are underway. The ring is now also operational for electrons, with circulating currents in excess of 100 mA.

Recently ion species which were not even thought of in the design phase of the project have been stored. Negative ions, with their characteristically low electron affinities and high collision probabilities, are a challenge. Previously negative hydrogen ions had been stored only at CERN's LEAR low energy antiproton ring. With ASTRID, many different ions and molecules of negative charge have been stored to investigate the effects responsible for the finite lifetime of the beam: vacuum pressure, intrabeam stripping and field stripping.

A new stripping mechanism was identified for loosely bound electrons, namely ionization by the black-body radiation emitted from the surrounding vacuum chamber. By heating the vacuum system, usually done for vacuum bakeout, this stripping mechanism could be increased.

Lifetime of a beam of 100 keV negatively-charged calcium ions as measured in the ASTRID storage ring at Aarhus, Denmark, showing the residual submillisecond lifetime due to ionization by black body radiation.