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## Recent Work

### **Title**

High Field Magnets for Future Accelerator Applications

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**High Field Magnets for Future Accelerator Applications** R.M.SCANLAN, Lawrence Berkeley National Laboratory, Berkeley, CA 94720, USA—The application of superconducting magnets to particle accelerators has shown a steady increase in the operating fields and current densities. The Tevatron, commissioned at FNAL in 1983, was the first large superconducting accelerator, with 4.5 T dipoles. Subsequently, two additional large accelerator projects have used superconducting magnets--DESY, completed in 1986 in Hamburg, Germany, and RHIC, now nearing completion at BNL. The next step was supposed to be the SSC, with 6.6 T dipoles, but this project was canceled in 1993. However, a string of dipole magnets were successfully operated at the design field in the spring of 1994. Currently, the LHC is under construction at CERN, and will have an operating dipole field of 8.6 T. These projects all utilized the ductile alloy NbTi; however, 9 T is near the practical limit for NbTi and if future accelerators are to take advantage of higher field dipoles, new materials must be used. R&D efforts are now underway at several laboratories to develop the technology for using brittle materials in accelerator magnets. This paper will report on the status of this development effort and will discuss some of the problems that are of particular importance for this application. Fields up to about 15 T appear feasible with existing superconductors and magnet fabrication techniques. However, to reach higher than 15 T will require new or significantly improved superconductors and more efficient magnet fabrication techniques. Some promising approaches for achieving these improvements will be discussed.