

**Genetic Algorithms for the Optimal Design of Superconducting Accelerator Magnets,**  
S. RAMBERGER, S. RUSSENSCHUCK, CERN - The paper describes the use of genetic algorithms with the concept of niching for the optimal design of superconducting magnets for the Large Hadron Collider (LHC) at CERN. Together with finite element calculations of the electromagnetic properties the method provides the designer with a number of local optima which can be further examined with respect to objectives such as ease of coil winding, sensitivity to manufacturing tolerances and local electromagnetic force distribution. A 6 block dipole coil was found to have advantages compared to the standard 5 block version which was previously designed using deterministic optimization techniques. Results were proven by a short model magnet recently built and tested at CERN.