

**Development of a High-Gradient Quadrupole Magnet with a Nb<sub>3</sub>-Sn Cable**, I.V. BOGDANOV, V.I. GRIDASOV, K.P. MYZNIKOV, P.A. SHCHERBAKOV, P.I. SLABODCHIKOV, V.V. SYTNIK, L.M. TKATCHENKO, L.M. VASSILIEV, IHEP; A.D. NIKULIN, A.K. SHIKOV, A.G. SILAEV, A.E. VOROBYOVA, BIIM; E.YU. KLIMENKO, S.I. NOVIKOV, M.S. NOVIKOV, KIAE - In frames of a collaboration between IHEP and FNAL, design of a superconducting high-gradient quadrupole has been carried out at IHEP. The two-layer design implements a Nb<sub>3</sub>-Sn superconductor with 600 A/mm<sup>2</sup> critical current density at 12 T field and 4.2 K temperature. The quadrupole has maximal field gradient of 220 T/m within 70 mm aperture at 4.6 K operating temperature. Results of optimization of both cross-sectional and end-part geometries aimed at achieving a good quality of integral and edge fields and reducing field overshooting are presented. Arch design was adopted as a more preferable one. Effect of deformations upon current-carrying capacity of the Rutherford-type cable at various angles of keystone has been studied. Results of critical current measurements for original wires and for a 28-wire cable as well as of mechanical performance study of the cable are presented.