

Normal Conducting QN Quadrupole for the HERA Luminosity Upgrade, E. BONDARCHUK, N. DOINIKOV, B. KITAEV, V. KORSHAKOV, V. KULIGIN, V. LOKIEV, V. MURATOV, A. PETROV, Efremov Institute; B. PARKER, BNL; K. SINRAM, F. WILLEKE, G. WOEBKE, DESY - The magnet QN is a septum quadrupole with a narrow septum coil for focusing the protons with a gradient of 30 T/m. It is 1.93 m long and has a pole radius of 35 mm. The field error must be limited to $3E-4$ at 25 mm reference radius over the whole excitation range of $G_{max} = 20 * G_{min}$. The required current density in the septum coil is 21 A/mm² which results in a high power consumption of 124 kW and a complicated water cooling system. Additional magnetic shielding between the septum coil and the nearby electron beam reduces stray field below the limit of 10 gauss. The optimization of the field quality and the detailed design are described and discussed.