will also show the effect on transport through the rest of the accelerator, and discuss possible surface-cleaning techniques . The calculations make use of an envelope code (LAMDA), beam-slice code (SPROP), and particle-in-cell code (LSP).

Work supported by Los Alamos National Laboratory

RPPH039 Cost and Performance of Rapid-Cycling Proton Synchrotrons

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Alternative rapid-cycling proton synchrotrons using resonant magnet power supply systems are examined as potential replacements for the Fermilab 8-GeV Booster Synchrotron. The design of a baseline 16-GeV machine is described elsewhere in these proceedings; it would replace the Booster and also provide additional functionality as the first stage of a neutrino factory. The study described here scales the cost estimates of the baseline design to estimate costs for alternate machine designs having the same functional requirements as the baseline machine. Effects of varying the maximum energy and circumference, the magnet apertures, the linac energy, and the beam intensity have been examined. It has been found, for example, that it is considerably less expensive to achieve the same beam power by lowering the maximum energy and the circumference while raising the injection energy and the beam intensity. The variable costs are dominated by the guide field magnets and the chokes and capacitors of the resonant magnet circuit, all of which are assumed to scale with their stored energies, and the volts/turn of the RF system. Implications of packing fractions, maximum magnetic fields, ease of implementation, and operating costs are also discussed.

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RPPH040 Development of a Compact Rotating-Wave Accelerator for Medical and Industrial Applications

JOSE VELAZCO (AMERICAN PHYSICAL SOCIETY), PETER CEPERLEY (GEORGE MASON UNIVERSITY)

The rotating-wave accelerator is a novel device that uses a cylindrical TM-110 circularly-polarized resonant mode in combination with an axial static magnetic field to accelerate electrons to energies of 1 to 10 MeV. The intensity and profile of the external magnetic field is chosen to create a gyroresonant condition allowing the electrons to ride the peak electric fields and experience continuous extended acceleration. One long rf cavity both transversely "bunches" the beam and provides for the acceleration. Additionally, it utilizes 100% of the beam without the need for an external buncher or chopper. The hardware has been designed and built for a 5.85 GHz proof-of-principle experiment. This paper will give a progress report on the testing of this device.

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RPPH041 Development of Resonance Depolarization Method at VEPP-4 for High Precision Measurement of Tau Lepton Mass

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We plan to measure the tau lepton mass with an accuracy of 10^{-4} in the experiment with the detector KEDR at the e+e- collider VEPP-4M using the method of resonance depolarization for calibration of particle energy. The energy range is close to the threshold of the tau production (1.78 GeV) so it is suitable to observe beam polarization from intra-beam scattering effect. Previously the experiments on calibration of the J/Psi- and Psi' mass were performed at VEPP-4 in a similar manner. Magnetic structure of VEPP-4M and a newly proposed polarimeter scheme differ from that were used in J/Psi and Psi' experiments. The experiment is complicated by the fact that the tau threshold stands in the vicinity of the integer spin resonance (1.763 GeV) where depolarizing effect of magnetic field imperfections is strengthened. The scenario of experiment, the developed systems of scattered electrons counters and of the TEM wave-based depolarizer are described. In the order to nondestructively measure the beam polarization in VEPP-3 before extraction to VEPP-4M we intend to apply the new polarimeter based on the deuterium jet internal target.

RPPH042 Conceptual Design Study of the Electron-Proton Storage Ring Collider with Polarized Beams

ALEXEI OTBOEV, IVAN KOOP, MAXIM KOROSTELEV, IGOR NESTERENKO, VASILY PARKHOMCHUK, EVGUENI PEREVEDENTSEV, VLADIMIR REVA, VITALY SHAMOVSKY, DMITRY SHATILOV, PETER SHATUNOV, YURI SHATUNOV, ALEXANDR SKRINSKY (BUDKER INSTITUTE OF NUCLEAR PHYSICS), RICHARD MILNER, CHRIS TSCHALAER (MIT BATES)

This report presents a preliminary results of the feasibility study of the electron-proton collider with polarized electron and proton beams with c.m. energy range 15 - 30 GeV.

RPPH043 Concept for a Polarised Electron-Proton Collider with 15-30 GeV c.m. Energy and 10^{33} $cm^{-2}s^{-1}$ Luminosity

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A clear need to investigate the structure of nucleons with electromagnetic probes at much higher center of mass energies than are available at fixed-target facilities has recently resulted in a call for electron-proton colliders with elevated luminosities. A feasibility study for an e-p collider with a luminosity of ~10^{33} $cm^{-2}s^{-1}$ is presented. Both beams are produced in storage rings of 3.5-7 GeV (electrons) and 16-32 GeV (protons). Electron polarisation by the Sokolov-Ternov effect, enhanced by wigglers, is discussed. Electron cooling of the proton beam is evaluated.

RPPH044 Dogbone Geometry for Recirculating Accelerators

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We consider here a dogbone geometry for a recirculating accelerator for a muon-based neutrino factory or muon collider. A dogbone geometry uses a single linac per full turn, passing through in both directions, as opposed to a racetrack geometry which uses two linacs. One can hope for a significant cost savings as a result of this shared linac. The cost of this is a substantial increase in arc length. One can optimize the cost of both the dogbone geometry and the racetrack geometry as a function of the number of turns, and it appears that the dogbone geometry is cost optimal. In addition, the switchyard for the optimal cost machine is less complex for a dogbone geometry, and the relative energy spread in the first arc (a significant problem for muon accelerators) is smaller.

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