among designers of storage rings producing intense X-ray beams and muon beam coolers. The report presents results of analytical study on kinetics of laser-cooling charged particle bunch circulating in a storage ring. A model was considered in which the particle-to-photon interaction causes both excitation and damping of the bunch particle oscillations. Making use of the Fokker-Planck-Kolmogorov method, a particle density in the longitudinal and transverse phase space is derived. As is shown, the mean energy dispersion in a bunch is determined by the laser photon energy and the energy of circulating particles only. The transverse bunch sizes depend on the value of the betatron functions in the interaction point. An expression describing the losses due to fluctuations in the photon-particle interactions is also derived. The results of analytical estimation are compared to those of numerical simulations. Optimal parameters of storage rings for the laser cooling of the beam are discussed.

FPAH090 Energy Absorbers for Muon-Beam Cooling

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Providing an intense beam of muons for a stored-muon-beam neutrino factory or muon collider requires muon-beam emittance cooling. The most efficient known technique for accomplishing this is ionization cooling, which is best carried out in a low-Z energy-absorbing medium such as liquid hydrogen. We present designs for ionization-cooling energy absorbers and summarize the status of the absorber prototyping and testing effort being carried out at Fermilab by a collaboration of university and laboratory groups.

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FPAH091 Longitudinal Cooling of a Strongly Magnetized Electron Plasma

Jinhyung Lee, John Cary (Center for Integrated Plasma Studies, University of Colorado at Boulder)

Crystallization of beams and non neutral plasmas is a fundamental process. A factor limiting the cooling of beams and non neutral plasmas is the energy exchange between the different degrees of freedom. To understand this problem, we study the crystallization of a strongly magnetized, non neutral plasma, where the exchange between perpendicular and parallel energy is small (in the limit of gyroradius small compared with Debye length). We introduce a microwave bath to transfer energy from the poorly cooled parallel degree of freedom to the well cooled (by synchrotron radiation) perpendicular degree of freedom. Results for the cooling of the parallel degree of freedom will be presented.

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FPAH092 Helical Channels for Longitudinal Compression of Muon Beams

Gregg Penn, Jonathan Wurtele (University of California, Berkeley)

Transverse cooling of muon beams can be achieved through ionization cooling. However, longitudinal emittance growth occurs as a by-product of this method; at the muon energy of choice, low energy muons suffer enhanced energy loss. Even a small amount of longitudinal cooling would be advantageous for a neutrino factory, while longitudinal cooling by a factor of 100 is required for a muon collider. We consider 6D cooling using a helical wiggler channel inside a uniform solenoid field, which results in radial dispersion, which is combined with wedge-shaped absorbers to correct the energy spread and transfer longitudinal emittance into the transverse degrees of freedom. These systems are challenging because of the large dispersions required, and because the muon beams have large energy spread and non-zero transverse emittance. We describe scenarios which, in simulations, yield significant reduction of energy spread for unbunched beams. We explore the demands and performance of such channels, as well as the feasibility of longitudinal compression for bunched beams.

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FPAH093 Characteristics of Electron-Cooled Bunched Beams Predicted by a Simulation

Masao Takanaka (The Institute of Physical and Chemical Research)

Characteristics of electron-cooled bunched ion beams have been studied using the particle-tracking simulation in which the space-charge force and the force from a transverse broadband impedance are taken into account. The beams become space-charge dominated during the bunching. The simulation results will be presented about the evolution, the instability, and the stabilization of beams during the bunching, and the equilibrium.

FPAH094 The Design and Development of a 6 MeV X-Band On-Axis Coupling Standing Wave Linear Accelerator

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A 6 MeV X-band on-axis coupling standing wave electron linear accelerator has been developed that is suitable for portable radiation therapy, radiography and electron injection. The phase-focusing technique is used. The design parameters of a 6 MeV X-band on-axis SW accelerating guide, magnetron, thermal cathode and four-port circulator are described. This accelerator system operates in p/2 mode and its frequency is 9300MHz. A prototype of 380 mm long structure has been machined, tuned, brazed and sealed, and tested.

FPAH095 Test of 300 MeV Linac - Preinjector for VEPP-5

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300 MeV linac - VEPP-5 preinjector is developed and tested. The Linac consist of 5 accelerating sections with 2856 MHz operating frequency that are supplied with two 5045 klystrons via SLED system. Electron energy up to 310 MeV is reached.

FPAH096 Conceptual Design of the IPHI DTL

Pierre-Emmanuel Bernaudin, Nicolas Pichoff, Didier Uriot (CE Saclay)

The medium energy (about 3 to 20 MeV) part of high power, new generation cw proton linacs offers a wide range of choice between different type of machines (separated tank DTL, CCDTL or standard Alvarez). For the IPHI project a 5-10 MeV 1 MW DTL following a 5 MeV RFQ has been chosen. This is a ramped-gradient post-coupled