construction, and the applicability of this solid state technology for power supplies and modulators.

### TPAH108 A Versatile Method of Beamline Construction

*Kevin Beczek, John Lewellen (Argonne National Laboratory)*

At the Advanced Photon Source a method for beamline construction has been developed that allows the researcher to reconfigure the beamline quickly and easily. This technique has been extensively incorporated into the APS injector test stand. Rather than use a statically designed system, it was decided at the beginning of the project that an approach that emphasized versatility would provide maximum utility. A concise review of similar previous approaches at APS will be explored, followed by a presentation of this method and other possible variations with a bias toward fabrication, assembly, and operator considerations.

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### TPAH109 Vibration Damping Systems for Magnet Girder Assembly at the ESRF

*Lin Zhang, Marc Lesourd (European Synchrotron Radiation Facility), Tom Lewis (Damping Technologies, Inc.)*

A damping system to reduce storage ring quadrupole magnet vibrations, called damping link, is being implemented at the ESRF. The damping link is a device using viscoelastic material, installed between the girder and the floor. It is used to attenuate the resonant motion of the magnet girder assembly and to improve the electron beam stability: thus to reducing the apparent beam size and increasing beam brilliance. Vibration tests and finite element analysis (FEA) are intensively used to identify the resonant motion of the magnet girder assembly, to optimize the design and to check the performance of the damping links. Special attention was paid on the installation of the damping links in order to accommodate the environment of the storage ring tunnel. Vibration tests on the magnet girders before and after installation of damping links show very satisfactory damping performances. The first measurement results on the electron beam motion also show significant improvement in stability. The cooling water flow induced vibration issue is also addressed, some designs to reduce these vibrations are discussed.

### TPAH110 Slow Extraction from FNAL Main Injector Using Electron Lens

*Vladimir Shiltsev, John Marriner (Fermi National Accelerator Laboratory)*

We propose to use an electron lens to control slow extraction from the Fermilab Main Injector. Negatively charged electron beam colliding with protons causes positive tuneshift proportional to the electron current. If the resulting tune satisfies resonance condition, protons move to larger betatron amplitides as in conventional slow extraction systems. Time variation of the electron current allows slow extraction of a particular batch(es) or even single bunch extraction.

### TPAH111 VLHC/NLC Slow Ground Motion Studies in Illinois

*Vladimir Shiltsev, Joseph Lach (Fermi National Accelerator Laboratory), Boris Baklakov, Andrei Chupira, Alexander Erokhin, Mikhail Kondaurov, Vasily Parkhomchuk, Evegeni Shubin, Shavkat Singatulin (Budker Institute of Nuclear Physics)*

Tunnel drift measurements had been performed in a shallow cut-and-cover PW6 tunnel on Fermilab site and in a 300-ft deep dolomite tunnel (Conoco mine, Aurora, IL). Hydrostatic level system is used for slow ground motion detection over periods of 1 minute to 3 months, while geophenes cover frequency domain from 0.1Hz to 60Hz. We discuss experimental results and compare the measured ground motion amplitudes with VLHc and NLC requirements.

### TPAH112 Geology and Slow Ground Motion on Future Accelerators

*Shigeru Takeda (High Energy Accelerator Research Organization)*

The power spectrum density and coherence function for slow ground motions are studied for the construction of the large future electron-positron linear colliders. Dominant part of the ground motion in the low frequency range (f<0.1 Hz) is usually related to the ATL model using the integrated power spectrum density. Recently we have obtained new information on the ground motion. The coherence changes as a function of detailed geological condition even though the value of A is not so different between each other. We will present detailed discussion about this new information.

### TPAH113 APT/LEDA Facility Vibration Environment

*Stephen Ellis (Los Alamos National Laboratory)*

Mechanical vibration spectra have been measured periodically on the tunnel floor below the APT/LEDA RFQ since installation in May of 1998. Facility vibration levels are of concern because they will degrade the performance of vibration sensitive components and thus overall accelerator performance, if excessive. The measured spectra accurately quantify the accelerator's mechanical vibration environment, permitting reasonably accurate finite element calculations of the dynamic response of sensitive hardware. Identification of the various vibration sources, as well as detection of anomalous vibration sources, is also readily performed. The vibratory environment is largely due to nearby operating mechanical equipment such as coolant pumps, vacuum pumps, compressors and blowers. Input from external natural sources such as wind and flowing water as well as man-made sources such as traffic are also present.

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### TPAH114 Global Coordinates of the SNS Accelerator Complex

*Weishi Wan, John Galambos, Jie Wei (Oak Ridge National Laboratory)*

The global coordinates of the Spallation Neutron Source are determined following the officially approved site wide coordinate system. Lattice output files from computer codes such as PARMILAR, TRANSPORT and MAD are used. Due to the fact that different parts of the facility are designed by different partner labs, integration of various parts becomes critical. Issues related to integration, including interfacing between linac and ring, between beam transport line and the target and between accelerator and the conventional facility are presented.

### TPAH115 Time Domain Modeling of Ground Motion for Linear Colliders

*Andrei Seryi, Sri Adiga (Stanford Linear Accelerator Center)*

Understanding the time structure of ground motion is essential for analyzing the performance of a linear collider. Position stabilization feedback is required for a linear collider and simulations must include the time evolution of motion in order to optimize the feedback design. This paper compares different algorithms developed for time domain modeling of ground motion and gives examples of their applications.

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