Virtual National Laboratory for Heavy Ion Fusion

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HIF News

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Grant Logan appointed VNL Director

After a several month search process, the Governing Board of the Heavy Ion Fusion VNL announced the appointment of B. Grant Logan to be the next director. Grant succeeds Roger Bangerter who led the VNL through its formative stages. The search committee co-chaired by Bill Hermannsfeldt and Ron Davidson interviewed an international field of candidates before making its recommendations to the Governing Board. We thank the entire search committee for many hours of dedicated work and for their essential role in the selection process.

The Board considered several attributes of the recommended candidates before coming to its final selection: scientific leadership and innovative vision, commitment to excellence in science and its supporting technologies, steadfast dedication to fusion energy research and the underlying base of plasma science and knowledge of the US and international fusion scene. We were gratified to have such a field of excellent final candidates.

Among this field Grant is outstanding. His commitment to fusion over a distinguished 25 year career at LLNL is unquestioned. Few have his broad understanding of the scientific and technical issues within both the inertial and magnetic confinement approaches to fusion. Grant is well known for his broad vision, his willingness to explore the unusual, his ability to look for and analyze diverse paths to make the road to fusion less costly and more attractive developmentally. Grant has a superb sense of scientific excellence. The Board looks forward to working with Grant to assure the success of the VNL scientific program. – *Bill Barletta*

Alex Friedman elected to NUGEX

Alex Friedman, the leader of the Simulation and Theory Group in the HIF-VNL, was elected in February 2001 for a three-year term to the NERSC Users Group Executive Committee (NUGEX) as the newest of three representatives from OFES. This group provides feedback to DOE and NERSC on planning and operation of the center. – *Art Molvik, Editor*

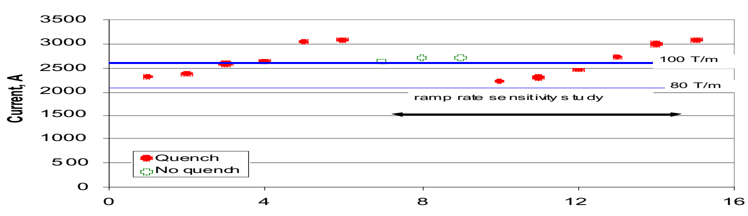
Hermes code to study longitudinal dynamics

This new code is currently under development at LBNL in order to study longitudinal beam dynamics. It is based on the Circe model, in which a beam is divided into slices longitudinally. Each slice contains a fixed amount of charge, and can compress or expand longitudinally as the beam propagates, e.g. in a drift compression system. Transversely, each slice boundary follows its own envelope equation. Whereas in Circe, the arrival times of the slice boundaries at a given position along the lattice are calculated, in Hermes the positions of all slice boundaries are followed as a function of time. This allows us to calculate the longitudinal electric field directly by solving Poisson's equation, instead of relying on the g-factor model. In Hermes, the field can be calculated in two ways. First, the charge of each slice can be deposited onto an RZ grid, and the fieldsolver of WARPrz is used to find the longitudinal electric field. Alternatively, the field can be calculated quasi-analytically by using a Bessel series expansion. The Hermes code is written as a new module to WARP, and has been used so far in the design of a drift compression system for the IRE. – *Alex Friedman, Michiel de Hoon*

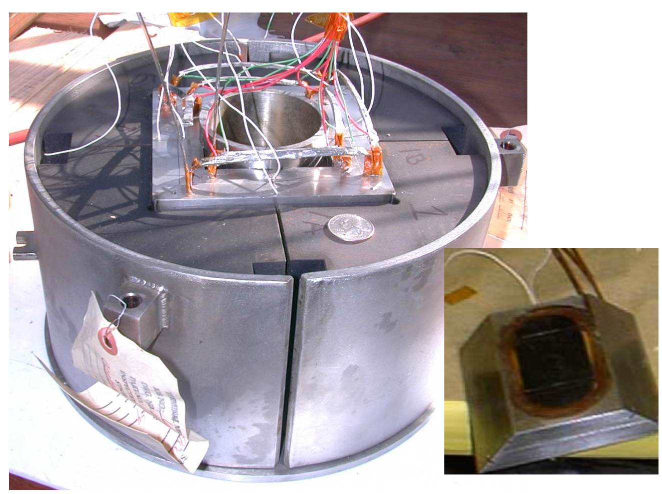
Superconducting magnet development:

We plan to use a magnetic quadrupole transport lattice in later phases of the High Current Experiment (HCX). A lattice with period 2L = 45 cm, a quadrupole occupancy of $\eta = 0.45$, and a clear vacuum pipe radius of 3 cm is designed to transport a 1.7 MeV, K^+ beam with 0.7A of current. The magnets must be less than 14 cm in axial length to be consistent with axial space needs for cryostat terminations, diagnostics, and acceleration, and require an integrated quadrupole gradient (i.e., focusing strength) of $\int B'(z)dz = 8.5$ Tesla. The VNL and external partners at MIT, Advanced Magnet Lab (AML), LLNL and LBNL are developing magnet/cryostat systems consistent with these needs. These systems are adapted from multi-beam transport arrays for the single beam HCX. A HCX prototype quadrupole by N. Martovetsky (LLNL) based on racetrack coils is shown here and has recently been tested at LBNL with encouraging results. After four training quenches (at 75% to 85% of peak excitation), a maximum coil excitation of 3084 A was achieved as shown in the chart. This corresponds to an 11.9 Tesla integrated gradient and a peak field in the coil of about 7 T. The peak current is within a few percent of the maximum theoretically achievable performance based on properties of the superconductor and provides a comfortable operating margin. Ramp rate sensitivity tests indicated that the operating current (≈2600 A) is reached for ramps below 60 A/s.

Another LLNL racetrack magnet with a different superconductor will be tested soon. An alternative prototype quadrupole by AML, based on a competing concept, will be tested within the next few months at MIT. - *Steve Lund and Peter Seidl*



LLNL prototype quadrupole with diagnostic leads



One quadrant, before assembly

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