36 T Series-Connected Hybrid Magnet Achieves its Design Field

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<u>The MagLab's new Series-Connected Hybrid (SCH) magnet reached its intended full field of 36 teslas on November 8, 2016!</u>

By installing a set of Florida-Bitter resistive coils inside a superconducting magnet, the SCH reaches 36 T while consuming less than half the power that would be required by an all-resistive magnet. This will enable experiments that run at intense magnetic fields for many hours to be performed that would be prohibitively expensive otherwise. *<u>This achievement is the culmination of ten years of work by a team of >40 people developing this new system.</u>*

One unique feature of this magnet is that it is designed to achieve high homogeneity. Once that specification is achieved, the magnet will be used to extend Nuclear Magnetic Resonance (NMR) from 23.5 T to 36 T. Working at higher fields extends the reach of NMR further into the periodic table. Much of biological chemistry involves oxygen, which has been out of range of existing NMR magnets. In addition, elements including zinc, copper, aluminum, nickel, and gadolinium – all of interest for battery and other materials research – will now be observable using the SCH magnet.

<u>The development of the SCH magnet required new and better magnet technology</u>, technology that has already been applied to a magnet being used for neutron scattering at the Helmholtz Zentrum Berlin and will be used in magnets for nuclear fusion research at the International Thermonuclear Experimental Reactor (ITER) and for condensed matter physics at the Nijmegen High Field Magnet Lab.

Facilities: DC Field Facility and Magnet Science and Technology's CICC and Resistive magnet shops.

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The Series-Connected Hybrid magnet during installation.

Engineers and scientists monitor the magnet as it achieves its specified 36T peak magnetic field.