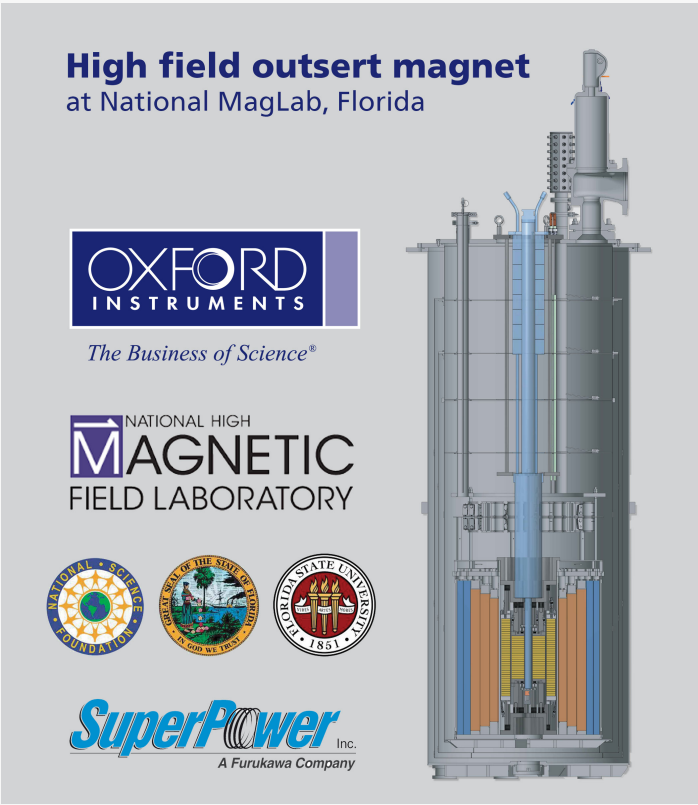
Oxford Instruments commissions high field outsert magnet at National MagLab

Oxford Instruments is pleased to commission a high field outsert magnet system for National Maglab's all-superconducting 32 Tesla (T) user magnet project.



ABINGDON, OXFORDSHIRE, UNITED KINGDOM, April 15, 2015 /EINPresswire.com/ -- Oxford Instruments commissions high field outsert magnet system for the National High Magnetic Field Laboratory 32 Tesla magnet program

Oxford Instruments is pleased to announce the successful commissioning of a high field outsert magnet system to become part of the National High Magnetic Field Laboratory's (National MagLab) all-superconducting 32 Tesla (T) user magnet project.

The Oxford Instruments 15 T outsert magnet system has a very large cold magnet bore diameter of 250 mm, enabling an "insert" of high temperature superconductor coils designed and manufactured by the National MagLab to be fitted within it, together generating the total magnetic field up to the target 32 T. Achieving this high field in an all-superconducting magnet will be a major step forward in high-field user capability at the National MagLab, as well as removing the infrastructure requirements and costs associated with the typical resistive magnets used to generate magnetic fields greater than 30 T today.

The so-called "outsert" magnet generates 15 T within a very large magnet bore of 250 mm, operating at 4.2 K, the normal boiling point of liquid helium. Until recently, such combinations of high magnetic field and large bore size or sample space could only be achieved by super-cooling the magnet to 2.2 K by the use of further cooling applied to the liquid helium. Oxford Instruments has built on its significant experience in such large magnets with high stored energies (in this case some 6.9 MJ) to answer the particular engineering challenges of coil stress and quench management. Oxford Instruments combined extensive modelling with innovative construction techniques in order to produce the reliable high field niobuim tin superconductor coils required. Furthermore, specific cryogenic design and manufacture techniques were employed to mitigate the large forces which can be created by induced eddy currents in the cryostat during a magnet quench.

Throughout the outsert magnet project, the respective magnet engineering and project teams in Oxford Instruments and at the National MagLab's headquarters facility at Florida State University

(Tallahassee, FL, USA) have worked closely together, ensuring careful management of the significant technical challenges and risks. The successful first-time commissioning of the magnet system is a testament to that close partnership.

This new magnet commissioning heralds a further success, building upon the success of the 19 T, 150 mm bore magnet system recently commissioned at the Dresden High Magnetic Field Laboratory (Hochfeld-Magnetlabor Dresden – HLD), Germany. Building on the technological advances in the design and manufacture of these new high field, high stored energy magnet systems, Oxford Instruments now has additional customer orders in progress.

An essential enabling factor in these powerful high-field magnets has been the development of RRP® (rod restack process) niobium tin conductor by Oxford Superconducting Technology (OST – Carteret, NJ, USA), a member of the Oxford Instruments group of companies. The RRP conductor is a specialised high-performance product geared towards optimised performance for ultra-high field superconducting magnets. The close cooperation over an extended period between OST as conductor manufacturer and the Oxford Instruments magnet engineering team is a key factor in allowing units such as this to be built.

When completed, the National MagLab's 32 T will be the first high-field magnet available to researchers to incorporate high temperature superconducting YBCO. Commercial companies have been developing YBCO for some years in collaboration with National MagLab engineers and scientists, and the finished 2.3 ton magnet system will feature around six miles of YBCO tape, formed into 112 disc-shaped "pancakes." Two inner coils of YBCO fabricated at the National MagLab will be surrounded by the Oxford Instruments 15 T outsert. The new magnet will be particularly attractive for users whose experiments require lower noise and longer running times than resistive magnets can offer, while the relatively fast ramp-rate of 32 T/hour will also allow for many field sweeps per day..

Director of the National High Magnetic Field Laboratory Greg Boebinger commented on the 15 T magnet system as "Another great magnet from Oxford Instruments! …the foundation for even greater things to come!"

Dr Michael Cuthbert, Managing Director of Oxford Instruments NanoScience said, "We are delighted to be continuing a long-standing relationship with the National MagLab through partnering for the supply of this outsert magnet for the 32 T program. The completion of the magnet for National MagLab, particularly coming so closely after the system for Dresden, further confirms Oxford Instruments' world-class capability to develop state of the art high field superconducting magnet systems."

High magnetic fields are needed by the research community in physical and life sciences to explore new areas in nanoscience, nanotechnology, bioscience and materials research. Moreover, high fields in combination with low temperatures are a crucial aid in studying, modifying and controlling new states of matter. This enables new innovations by discovering advanced materials and allows studies at the nano scale. Superconducting magnets provide high magnetic fields without the enormous power consumption and large infrastructure requirements of resistive magnets.

Read more at www.oxford-instruments.com or, for more information on the National MagLab's 32 T project, visit https://nationalmaglab.org/magnet-development/magnet-science-technology/magnet-projects/32-tesla-scm.

Oxford Instruments NanoScience designs, supplies and supports market-leading research tools that enable quantum technologies, new materials and device development in the physical sciences. Our tools support research down to the atomic scale through creation of high performance, cryogen-free

low temperature and magnetic environments, based upon our core technologies in low and ultra-low temperatures, high magnetic fields and system integration, with ever-increasing levels of experimentalOxford Instruments NanoScience is a part of the Oxford Instruments plc group.

The National High Magnetic Field Laboratory is the world's largest and highest-powered magnet facility. Located at Florida State University, the University of Florida and Los Alamos National Laboratory, the interdisciplinary National MagLab hosts scientists from around the world to perform basic research in high magnetic fields, advancing our understanding of materials, energy and life. The lab is funded by the National Science Foundation (DMR-1157490) and the state of Florida. For more information, visit us online at nationalmaglab.org or follow us on Facebook, Twitter, Instagram and Pinterest at NationalMagLab.

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