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Superconductivity Web21

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What's New in the World of Superconductivity (September, 2010)

Akihiko Tsutai, Director
International Affairs Division, ISTEC

Power

Zenergy Power (September 8, 2010)

Zenergy Power has announced its interim results for the six-month period ending June 30, 2010. Revenue for the six-month period totaled €646,000, compared with €214,000 for the same period in the previous fiscal year. The gross margin was €34,000, compared with €29,000 for the same period in the previous fiscal year. As of June 30, 2010, the company had a backlog of €3,606,000 and a closing cash balance of €23,204,000. Contracts were slower to materialize than expected during this period, causing a negative impact on revenue. Trading is expected to improve during the second half of the year, with three magnetic billet heater units scheduled for delivery. Operating highlights for the presently reported period included a repeat order for a magnetic billet heater unit from Weseralu GmbH, a first order for a medium-voltage fault current limiter unit, and a placement to raise £20.04 million.
Source:
"Interim Results"
Zenergy Power press release (September 8, 2010)
http://www.zenergypower.com/images/press_releases/2010/2010-09-08-interim-results-2010.pdf

Communication

Superconductor Technologies Inc. (September 1, 2010)

Superconductor Technologies Inc. has completed a previously announced underwritten public offering of common stock at a cost of $1.50 per share. The company sold 4,000,000 shares of its common stock, with gross proceeds to the Company totalling $6.0 million. After deducting underwriting discounts and commissions, etc., the estimated net proceeds are expected to be approximately $5.3 million.
Source:
"Superconductor Technologies Inc. Announces Completions of Public Stock Offering"
Superconductor Technologies Inc. press release (September 1, 2010)
http://phx.corporate-ir.net/phoenix.zhtml?c=70847&p=irol-newsArticle&ID=1465312&highlight

Accelerator

Bruker Corporation (September 22, 2010)

RI Research Instrument GmbH, a majority-owned subsidiary of Bruker Energy & Supercon Technologies Inc. (BEST), has been awarded a €24.9 million contract from Deutsches

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Elektronen-Synchrotron (DESY) in Germany for the supply of 300 superconducting radiofrequency (srf) accelerator cavities for use in the European X-Ray Free Electron Laser (XFEL) facility. Once completed, the facility is expected to be capable of producing ultra-short X-ray flashes 27,000 times per second and with a brilliance that is a billion times higher than that of the best conventional X-ray sources, enabling completely new research opportunities for scientists and industrial users. RI Research Instruments will be responsible for the manufacturing, surface preparation, and integration of the srf cavities into a helium vessel. The cavities themselves will be composed of thin-walled niobium metallic superconductor structures bonded together using a specialized electron beam welding manufacturing technology to enable ultra-low electrical losses and very high-quality factors. BEST expects to begin delivering the cavities at the beginning of 2012 and to complete the contract in 2014. DESY is expected to require additional srf cavities in the future.
Source:
"BEST Subsidiary RI Research Instruments Announces Contract Award for 300 Superconducting RF Cavities for European XFEL Facility"
Bruker Corporation press release (September 22, 2010)
http://www.bruker-est.com/pr100922.html

Bruker Corporation (September 27, 2010)

RI Research Instrument GmbH, a majority- owned subsidiary of Bruker Energy & Supercon Technologies Inc. (BEST), has received a new contract from the Centre National de la Recherche Scientifique (CNRS) in France for the supply of 670 high-power radio frequency couplers in consortium with Thales for the European X-Ray Free Electron Laser (XFEL) facility. The high-power radio frequency couplers will be a key component in the superconducting accelerating modules used in this project, transferring the radiofrequency from the power source to the accelerating cavity. The contract, valued at €14.8 million, was awarded to a consortium of Thales Electron Devices (TED; France) and RI Research Instruments. Each company contributes its specialized technological expertise, and RI's financial share of the total contract is just under 50%. The first radiofrequency couplers are scheduled for delivery at the beginning of 2011, with the final delivery scheduled for the middle of 2013.
Source:
"BEST Subsidiary RI Research Instruments Awarded Contract for High-Power RF Couplers for European XFEL in Consortium with Thales"
Bruker Corporation press release (September 27, 2010)
http://www.bruker-est.com/pr100927.html

CERN (September 17, 2010)

The CERN council has approved the laboratory's revised Medium Term Plan for the period of 2011 to 2015. The plan was originally presented to the council in June and called for the introduction of cost-saving measures. After some revision, CERN council approved the plan, which will achieve cost savings by slowing the pace of other programs while preserving the LHC program. Rolf Heuer, Director General of CERN, commented, "The plan we presented to Council is firmly science-driven. It reduces spending on research and consolidation through careful and responsible adjustment of the pace originally foreseen in a way that does not compromise the future research programme unduly. The reductions will be painful, but in the current financial environment, they are fair." As a result of the cost-saving measures, the upgrade to the LHC's beam intensity will now occur in 2016, rather than in 2015 as originally planned. Furthermore, the scheduled shutdown of the LHC in 2012 for technical reasons will be broadened to

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include the entire CERN accelerator complex.
Source:
"CERN Council approves Laboratory's Medium-Term Plan"
CERN press release (September 17, 2010)
https://press.web.cern.ch/press/PressReleases/Releases2010/PR18.10E.html

Basic

Swinburne University (September 2, 2010)

Researchers at Swinburne University (Austr alia) have been making significant advances in understanding quantum mechanics in ultr a-cold cryoge nic environme nts. Physicist and grou p lea der, Dr. Chris Vale, explained, "When you cool a gas down to the extreme te mperatures… the laws of q uantum mechanics take over and atoms in the gas st art behaving in strange ways—actin g more like waves than particles. Quantum behaviors in large system s lead to a range of phenomena such as magnetism, superfluidity and supercond uctivity… In our latest study we looked specif ically at h ow strongly interacting fermions can pair up in ultra-cold environments, which is an essential precursor to forming a superfluid." The Swinburne re searchers are the first group to successfu lly test a universal law go verning the p airing of fermions in a lab and to prove it s valid ity. The group' s findings have been published in *Physical Review Letters*.
Source:
"Delving into the world of the ultra-cold"
Swinburne University press release (September 2, 2010)
http://www.swinburne.edu.au/chancellery/mediacentre/media-centre/news/2010/09/delving-into-the-world-of-the-ultra-cold

Rice University (September 3, 2010)

Theoretical p hysicists at R ice University have develo ped a new conceptual mo del cap able of explaining th e origins of ferromagnetism. The model was originally created to learn more about the quantum characteristics of high- temperature superconductors and ot her high- tech materials and was based on a well-studied phenomenon known as the Kondo effect, which has its roots in quantum magnetic effects. The physicists created a model describing a "Kondo lattice", or a fine-grained mesh of electrons that behaves like the electrons observed in Kondo studies of real-world materials. This model was capable of providing a rigorous explanation of the origins of metallic ferromagnetism on a quantum scale. Furthermore, the ferromagnetic st ate predicted by the model exhi bited quantu m proper ties that clo sely resemble characteristics observed ex perimentally in heavy fermion ferromagn ets. The physicists' research has been reported in the *Proceedings of the National Academy of Sciences*.
Source:
"Magnetism's subatomic roots"
Rice University press release (September 3, 2010)
http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=14710&SnID=2100836610

Helmholtz Association of German Research Centres (September 10, 2010)

In cooperation with an international research group, scientists at the Helmholtz-Zentrum Berlin (HZB)

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have discovered a universal magnetic signature that occurs among all iron- based superconductors, even those for which the parent compounds have different chemical properties. Specifically, the group observed that the symmetry of the magnetic order in an iron-based superconductor corre sponds exa ctly to the symmetry of the supercon ductivity signal (or m agnetic re sonance). The re searchers produced severa l iron-tellurium-selenium cry stals and determined thei r chemical co mpositions u sing X-ray and neutro n diffraction. They then measured t he magnetic signals in the crystals using neutron scattering experiment s. Consequently, the group observed that the symmetry of the magnetic order differed significantly from that of other iron-based parent compounds, such as iron-arsenic compounds. Nevertheless, this difference had no impact on the development of superconductivity, and th e magnetic resonance had the same symmetry as the magnetic order in all the iron compounds that were examined. The group's results have been published in *Nature Materials*.

Source:
"Many roads lead to superconductivity"
Helmholtz Association of German Research Centres press release (September 10, 2010)
http://idw-online.de/pages/en/news385858

Rice University (September 29, 2010)

A team of phy sicists led by Rice University and in volving six o ther universities has r eported the fir st success in a three-year ef fort to build a pr ecision simulator for superconductors us ing a grid of intersecting laser beams and ultracold atomic gas. This project is known as the Optical Lattice Emulator (OLE) program and is being funded by th e Defense Advanced Research Project Agency (DARPA). By cooling lithium atoms to with in a few billio nths of a degree of abs olute zero and loading them into optical tu bes, the researchers were able to create a precise analog o f a one-dimensional superconducting wire. In this simulation, the ultracold lithium atoms serve as "stand-ins" for electrons; by trapping these atoms in beams of light, resea rchers can ob serve how elec trons would behave in p articular types of superconductors and other materials, precisely tu ning the spacing and interactions among the atoms to observe different effects. Specifically, the group created an emulator that allo wed them to simultaneously examine superconductivity and magnetism. This achie vement may lead to direct observations of the "FFLO" state—a theoretical state in which a ma gnetic superconductor is formed under an exotic set of circumstances where a net magnetic moment arise s out of a periodic p attern of ex cess spins and p airs. The group' s research has bee n published in *Nature.*

Source:
"One-dimensional window on superconductivity, magnetism"
Rice University press release (September 29, 2010)
http://www.media.rice.edu/media/NewsBot.asp?MODE=VIEW&ID=14813&SnID=2100836610

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