

Superconductivity Web21

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What's New in the World of Superconductivity (October, 2013)

초전도 뉴스 -세계의 동향-

超导新闻 -世界的动向-

chāo dǎo xīn wén - shì jiè de dòng xiàng -

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Superconductivity Research Laboratory, ISTE



★News sources and related areas in this issue

► Basics 기초 基础 [jīchǔ]

Superconducting Accelerator in CERN Contributed to 2013 Nobel Prize, Higgs Boson Royal Swedish Academy of Sciences and CERN (October 8, 2013)

The Royal Swedish Academy of Sciences has announced that the Nobel Prize in Physics for the year 2013 has been awarded to François Englert, Université Libre de Bruxelles (Brussels, Belgium) and Peter W. Higgs, University of Edinburgh (Edinburgh, UK) for “the theoretical discovery of a mechanism that contributes to our understanding of the origin of mass of subatomic particles, and which recently was confirmed through the discovery of the predicted fundamental particle, by the ATLAS and CMS experiments at CERN’s Large Hadron Collider.” Englert (in collaboration with Robert Brout) and Higgs independently

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proposed their theories of how particles acquire mass in 1964. Together, their ideas are known as the Brout-Englert-Higgs (BEH) mechanism, and this mechanism now forms an essential part of the Standard Model of particle physics. Last year, in July 2012, their ideas were finally confirmed by the discovery of the so-called Higgs particle at the CERN laboratory. The discovery of the Higgs particle was the result of collaborations between the ATLAS and CMS projects and involved approximately 3000 people from around the world. CERN Director-General Rolf Heuer commented, "The discovery of the Higgs boson at CERN last year, which validates the Brout-Englert-Higgs mechanism, marks the culmination of decades of intellectual effort by many people around the world."

Source: "The Nobel Prize In Physics 2013: François Englert, Peter Higgs"

Royal Swedish Academy of Sciences press release (October 8, 2013)

URL: http://www.nobelprize.org/nobel_prizes/physics/laureates/2013/press.html

Contact: Perina Stjernlöf, Press Officer, perina.stjernlof@kva.se

Source: "CERN congratulates Englert and Higgs on Nobel in physics"

CERN press release (October 8, 2013)

URL: <http://home.web.cern.ch/about/updates/2013/10/CERN-congratulates-Englert-and-Higgs-on-Nobel-in-physics>

Contact: Press.Office@cern.ch



First Computer-designed Superconductor

Binghamton University (October 8, 2013)

Aleksey Kolmogorov, an assistant professor of physics at Binghamton University, and his international colleagues have reported the successful synthesis of a superconductor designed, for the first time, entirely on a computer. Kolmogorov originally proposed the superconductor in 2010 and subsequently collaborated with European experimentalists to test the prediction. The resulting material, a novel iron tetraboride compound, is composed of two common elements, has a brand-new crystal structure, and exhibits an unexpected type of superconductivity for a material that contains iron—exactly as predicted in the original computation study. The superconductor design was originally created using an automated computational tool that Kolmogorov developed to identify previously unknown stable crystal structures. Surprisingly, a subsequent search revealed two promising compounds in a common iron-boron system. Further calculations suggested that one of the compounds should exhibit superconductivity at an unusually high temperature of 15-20 K. Researchers at the University of Bayreuth (Germany) have now produced a very small quantity of iron tetraboride in the predicted crystal structure; detailed measurements demonstrated the predicted superconducting property and, unexpectedly, an exceptional hardness. Kolmogorov commented, "The discovery of this superhard superconductor demonstrates that new compounds can be brought into existence by revisiting seemingly well-studied systems." The findings have been published in Physical Review Letters.

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Source: "Binghamton physicist contributes to creation of first computer-designed superconductor"

Binghamton University press release (October 8, 2013)

URL: <http://discover.binghamton.edu/news/superconductor-3-5435.html>

Contact: Ryan Yarosh, ryarosh@binghamton.edu

▶ Accelerator 가속기 加速器 [jiāsùqì]



Nb₃Sn High-field Magnet for CERN's HiLumi Accelerator

Oxford Instruments (October 25, 2013)

Oxford Instruments will collaborate with CERN in the prototyping and industrialization of HiLumi accelerator magnets, which will be used in the next-generation upgrade of the Large Hadron Collider (LHC) to high luminosity. This upgrade will enable a significant increase in the proton collision rate and will extend the research capabilities of the LHC. The HiLumi accelerator magnets will be constructed using Nb₃Sn superconducting technology and will have a high magnetic strength of 11 – 13 T. Dr. Steve Chappell, head of the consultancy business group at Oxford Instruments, commented, "We are really excited to be collaborating with CERN on HiLumi. In the spirit of partnership and innovation at the heart of our business, this is a valuable opportunity to learn from each other and together advance superconducting magnet technology."

Source: "Oxford Instruments collaborates with CERN on magnet development"

Oxford Instruments press release (October 25, 2013)

URL: <http://www.oxford-instruments.com/news/2013/october/oxford-instruments-collaborates-with-cern-on-magne>

Contact: <http://www.oxford-instruments.com/contact-us?src=tn>, on-line enquiry

▶ Management and Finance 경영정보 经营信息[jīngyíng xìnxī]



New Helium Source Facility Using Extraction of

Helium from CO₂ Gas Source

Air Products (October 28, 2013)

Air Products has announced a new project to extract helium from a naturally occurring underground carbon dioxide (CO₂) gas source that is being processed by Kinder Morgan CO₂ Company, LP, in Colorado, USA.

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Helium production at the facility is scheduled to begin in the spring of 2015. Pure helium will be extracted from a CO₂ stream containing recoverable amounts of helium using a new technology process cycle. The purified helium will be liquefied on-site for subsequent delivery to Air Products' customers. Walter Nelson, Director of Helium Sourcing at Air Products, commented, "This is an innovative project and we see this as an opportunity to leverage our proprietary technology for future CO₂ on-purpose helium extraction projects. This is a critical step in finding new sources of helium at a time when there is a global shortage." Once operational, the facility will be the only site in the world where helium is being extracted from a gas stream composed primarily of CO₂. The facility is expected to produce as much as 230 million standard cubic feet per year, replacing more than 15% of the declining helium supply reserves.

Source: "Air Products 'Thinks Outside-the-Box' in Obtaining New Helium Source: Facility to Use Proprietary Technology to Extract Helium from Carbon Dioxide"

Air Products press release (October 28, 2013)

URL:

<http://www.airproducts.com/company/news-center/2013/10/1028-air-products-thinks-outside-the-box-in-obtaining-new-helium-source.aspx>

Contact: Art George, georgeaf@airproducts.com

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