Mosaic of the CMS and ATLAS detectors (as in 2007), part of the Large Hadron Collider at CERN. In 2012, research teams used these detectors to fingerprint decay products from the long-sought Higgs boson and determine its mass, successfully testing a key prediction of the standard model of particle physics. See the Breakthrough of the Year special section beginning on page 1524, three Articles beginning on page 1558, and www.sciencemag.org/special/btoy2012.

Photos: Maximilien Brice and Claudia Marcelloni/CERN
CONTENTS

SCIENCE PRIZE ESSAY

1554  How We Got Here: An Inquiry-Based Activity About Human Evolution
      R. M. Price

ARTICLES

1558  The Higgs Boson
      Glossary

1560  Journey in the Search for the Higgs Boson: The ATLAS and CMS Experiments at the Large Hadron Collider
      M. Della Negra et al.

1569  A New Boson with a Mass of 125 GeV Observed with the CMS Experiment at the Large Hadron Collider
      The CMS Collaboration

1576  A Particle Consistent with the Higgs Boson Observed with the ATLAS Detector at the Large Hadron Collider
      The ATLAS Collaboration

RESEARCH ARTICLES

1583  Radar-Enabled Recovery of the Sutter’s Mill Meteorite, a Carbonaceous Chondrite Regolith Breccia
      P. Jenniskens et al.

1593  Evolutionary Dynamics of Gene and Isoform Regulation in Mammalian Tissues
      J. Merkin et al.

1599  C/EBP Transcription Factors Mediate Epicardial Activation During Heart Development and Injury
      G. N. Huang et al.

REPORTS

1604  Symmetry-Protected Topological Orders in Interacting Bosonic Systems
      X. Chen et al.
      Counterparts of topological insulators are predicted to exist in interacting bosonic systems.
      >> Perspective p. 1550

1606  Sign-Problem–Free Quantum Monte Carlo of the Onset of Antiferromagnetism in Metals
      E. Berg et al.
      An effective lattice theory enables an efficient computational solution to an otherwise intractable problem.

1609  Optomechanical Dark Mode
      C. Dong et al.
      The formation of a mechanical dark mode can be used to isolate an optomechanical system from thermal noise.

1613  Porphyry-Copper Ore Shells Form at Stable Pressure-Temperature Fronts Within Dynamic Fluid Plumes
      P. Weis et al.
      A numerical model attributes ore metal accumulation in porphyry deposits to fluid plumes draining from large magma chambers.
      >> Perspective p. 1551

1616  Apatite 4He/3He and (U-Th)/He Evidence for an Ancient Grand Canyon
      R. M. Flowers and K. A. Farley
      The Colorado River carved the Grand Canyon to nearly its modern depth 60 million years earlier than was generally believed.

1618  Multiplex Targeted Sequencing Identifies Recurrently Mutated Genes in Autism Spectrum Disorders
      B. J. O’Roak et al.

1622  Genome-Wide Detection of Single-Nucleotide and Copy-Number Variations of a Single Human Cell
      C. Zong et al.

1627  Probing Meiotic Recombination and Aneuploidy of Single Sperm Cells by Whole-Genome Sequencing
      S. Lu et al.

CONTENTS continued >>
A single protein in male mouse urine makes females Pee Marks the Spot protects mice from cancer and increases life span.

Boosting a protein that keeps chromosomes in order Revved-Up Protein Fights Aging.

Plants take up a surprising amount of moisture Cloud Forest Trees Drink From the Fog.

Highlights From Our Daily News Coverage www.sciencenow.org

Comment: S. Roorda and L. J. Lewis Structure of Amorphous Silicon

TECHNICAL COMMENTS

Comment and Response on “The Local Structure of Amorphous Silicon” Comment: S. Roorda and L. J. Lewis http://dx.doi.org/10.1126/science.1221738 Response: M. M. J. Treacy and K. B. Borisenko http://dx.doi.org/10.1126/science.1222571

SCIENTECAREERS www.sciencecareers.org/career_magazine

Breakthrough of the Year: Seekers of the Higgs Boson E. Pain Science Careers talks to three young investigators who contributed to this year’s monumental discovery. >> Breakthrough of the Year section p. 1524

Science Careers’s Person of the Year: Paula Stephan B. L. Benderly The labor economist has worked for years behind the scenes, but this year she went public.

SCIENCEPODCAST www.sciencemag.org/multimedia/podcast Free Weekly Show for 21 December 2012 A special year-in-review show featuring the Breakthrough of the Year and Runners-Up and science news highlights from 2012.

RESEARCH ARTICLE: Multimodal Actions of Neural Stem Cells in a Mouse Model of ALS— A Meta-Analysis Y. D. Teng et al. A meta-analysis reports the beneficial effects of transplanting mouse or human neural stem cells into the spinal cord of the SOD1G93A mouse, a model of ALS.

SCIENCEVOL 338 21 DECEMBER 2012
Published by AAAS

www.sciencemag.org

ONLINE HIGHLIGHTS

SCIENCEEXPRESS
www.scienceexpress.org
Publication Ahead of Print

Reconstitution of the Vital Functions of Munc18 and Munc13 in Neurotransmitter Release C. Ma et al. 10.1126/science.1230473

Comparative Analysis of Bat Genomes Provides Insight into the Evolution of Flight and Immunity G. Zhang et al. 10.1126/science.1230835

An Update of Wallace’s Zoogeographic Regions of the World B. G. Holt et al. 10.1126/science.1228282

Cyclic GMP-AMP Is an Endogenous Second Messenger in Innate Immune Signaling by Cytosolic DNA J. Wu et al. 10.1126/science.1229963

Cyclic GMP-AMP Synthase Is a Cytosolic DNA Sensor That Activates the Type I Interferon Pathway L. Sun et al. 10.1126/science.1232458

Olefín Cyclopropanation via Carbene Transfer Catalyzed by Engineered Cytochrome P450 Enzymes P. S. Coelho et al. 10.1126/science.1231434

Boson Sampling on a Photonic Chip J. B. Spring et al. 10.1126/science.1231692

Photonic Boson Sampling in a Tunable Circuit M. A. Broome et al. 10.1126/science.1231440

Membrane-binding domain in KSR1.

RESEARCH ARTICLE: A CC-SAM, for Coiled-Coil–Sterile α Motif, Domain Targets the Scaffold KSR1 to Specific Sites in the Plasma Membrane D. Koveal et al. A previously unknown module that mediates membrane binding is identified in the scaffold KSR.

REVIEW: Extracellular Phosphorylation and Phosphorylated Proteins—Not Just Curiosities But Physiologically Important G. Yakov and V. Vogel Extracellular proteins and extracellular protein domains can be phosphorylated.

INTegrating Medicine with Science 19 December issue: http://scim.ag/stm121912

COMMENTARY: To Share or Not To Share—That Is Not the Question L. Ohno-Machado Sharing clinical and biomedical data could accelerate translational research.


RESEARCH ARTICLE: Genetic Correction of Human Induced Pluripotent Stem Cells from Patients with Spinal Muscular Atrophy S. Corti et al. Induced pluripotent stem cell–derived motor neurons from spinal muscular atrophy patients show phenotype rescue after genetic correction.

RESEARCH ARTICLE: Long-Term Follow-Up After Gene Therapy for Canavan Disease P. Leone et al. Gene therapy for Canavan disease results in a decrease in pathologically elevated N-acetyl-aspartate concentrations in the brain and long-term clinical stabilization.

SCIENCEGROWTH
www.sciencesignaling.org

The Signal Transduction Knowledge Environment 18 December issue: http://scim.ag/ss121812

RESEARCH ARTICLE: IGFBP7 Binds to the IGF-1 Receptor and Blocks Its Activation by Insulin-like Growth Factors V. Evdokimova et al. By inactivating the IGFR1, IGFBP7 suppresses growth and promotes cell death.

RESEARCH ARTICLE: c-FLIP Maintains Tissue Homeostasis by Preventing Apoptosis and Programmed Necrosis X. Piao et al. The anti-apoptotic protein c-FLIP blocks multiple cell death pathways in mice.

SCIENCEPODCAST www.sciencemag.org/multimedia/podcast Free Weekly Show for 21 December 2012 A special year-in-review show featuring the Breakthrough of the Year and Runners-Up and science news highlights from 2012.