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

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1554</td>
<td>SCIENCE PRIZE ESSAY</td>
<td>R. M. Price</td>
</tr>
<tr>
<td>1558</td>
<td>ARTICLES</td>
<td></td>
</tr>
<tr>
<td>1558</td>
<td>The Higgs Boson</td>
<td></td>
</tr>
<tr>
<td>1560</td>
<td>Journey in the Search for the Higgs Boson: The ATLAS and CMS Experiments at the Large Hadron Collider</td>
<td>M. Della Negra et al.</td>
</tr>
<tr>
<td>1569</td>
<td>A New Boson with a Mass of 125 GeV Observed with the CMS Experiment at the Large Hadron Collider</td>
<td>The CMS Collaboration</td>
</tr>
<tr>
<td>1576</td>
<td>A Particle Consistent with the Higgs Boson Observed with the ATLAS Detector at the Large Hadron Collider</td>
<td>The ATLAS Collaboration</td>
</tr>
<tr>
<td>1583</td>
<td>RESEARCH ARTICLES</td>
<td></td>
</tr>
<tr>
<td>1583</td>
<td>Radar-Enabled Recovery of the Sutter’s Mill Meteorite, a Carbonaceous Chondrite Regolith Breccia</td>
<td>P. Jenniskens et al.</td>
</tr>
<tr>
<td>1593</td>
<td>Evolutionary Dynamics of Gene and Isoform Regulation in Mammalian Tissues</td>
<td>J. Merkin et al.</td>
</tr>
<tr>
<td>1599</td>
<td>C/EBP Transcription Factors Mediate Epicardial Activation During Heart Development and Injury</td>
<td>G. N. Huang et al.</td>
</tr>
<tr>
<td>1604</td>
<td>REPORTS</td>
<td></td>
</tr>
<tr>
<td>1604</td>
<td>Symmetry-Protected Topological Orders in Interacting Bosonic Systems</td>
<td>X. Chen et al.</td>
</tr>
<tr>
<td>1606</td>
<td>Sign-Problem–Free Quantum Monte Carlo of the Onset of Antiferromagnetism in Metals</td>
<td>E. Berg et al.</td>
</tr>
<tr>
<td>1609</td>
<td>Optomechanical Dark Mode</td>
<td>C. Dong et al.</td>
</tr>
<tr>
<td>1613</td>
<td>Porphyry-Copper Ore Shells Form at Stable Pressure-Temperature Fronts Within Dynamic Fluid Plumes</td>
<td>P. Wei et al.</td>
</tr>
<tr>
<td>1616</td>
<td>Apatite $^{4}$He/$^{3}$He and (U-Th)/He Evidence for an Ancient Grand Canyon</td>
<td>R. M. Flowers and K. A. Farley</td>
</tr>
<tr>
<td>1619</td>
<td>Multiplex Targeted Sequencing Identifies Recurrently Mutated Genes in Autism Spectrum Disorders</td>
<td>B. J. O’Roak et al.</td>
</tr>
<tr>
<td>1622</td>
<td>Genome-Wide Detection of Single-Nucleotide and Copy-Number Variations of a Single Human Cell</td>
<td>C. Zong et al.</td>
</tr>
<tr>
<td>1627</td>
<td>Probing Meiotic Recombination and Aneuploidy of Single Sperm Cells by Whole-Genome Sequencing</td>
<td>S. Lu et al.</td>
</tr>
<tr>
<td>1631</td>
<td>Organization of the Influenza Virus Replication Machinery</td>
<td>A. Moeller et al.</td>
</tr>
<tr>
<td>1634</td>
<td>The Structure of Native Influenza Virion Ribonucleoproteins</td>
<td>R. Arranz et al.</td>
</tr>
</tbody>
</table>

**Continued**

---

*Published by AAAS on July 14, 2017 http://science.sciencemag.org/ Downloaded from [www.sciencemag.org](http://www.sciencemag.org)*
CREDIT: DOROTHY KOVEAL/DEPARTMENT OF MOLECULAR BIOLOGY, CELL BIOLOGY AND BIOCHEMISTRY, BROWN UNIVERSITY

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

Olefyn 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

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

SCIENCE NOW

www.sciencenow.org
Highlights From Our Daily News Coverage

Cloud Forest Trees Drink From the Fog
Plants take up a surprising amount of moisture from the air.
http://scim.ag/Moisture_Air

Revved-Up Protein Fights Aging
Boosting a protein that keeps chromosomes in order protects mice from cancer and increases life span.
http://scim.ag/Protein_Aging

Pee Marks the Spot
A single protein in male mouse urine makes females return to old haunts.
http://scim.ag/Single-Protein

SCIENCE SIGNALING

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 IGF1R, 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.

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

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

SCIENCE TRANSLATIONAL MEDICINE

www.sciencetranslationalmedicine.org
Integrating Medicine and 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.

REVIEW: Hidden Killers—Human Fungal Infections
G. D. Brown et al.
Lack of rapid diagnostic tests, drugs, and vaccines impedes treatment and prevention of invasive fungal infections.

RESEARCH ARTICLE: GeneticCorrection 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.

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 transplantaion mouse and human neural stem cells into the spinal cord of the SOD1G93A mouse, a model of ALS.

SCIENCE CAREERS

www.sciencemag.org/career_magazine
Free Career Resources for Scientists

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.

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.

SCIENCE PODCAST

www.sciencemag.org/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.

SCIENCE (ISSN 0036-8075) is published weekly on Friday, except the last week in December, by the American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005. Periodicals Mail postage (publication No. 4844460) paid at Washington, DC, and additional mailing offices. Copyright © 2012 by the American Association for the Advancement of Science. The title SCIENCE is a registered trademark of the AAAS. Domestic individual membership and subscription (51 issues): $149 (1744 allocated to subscription). Domestic institutional subscription (51 issues): $990; Foreign postage extra: Mexico, Caribbean (surface mail) $155; other countries (air assist delivery) $156, First class, airmail, student, and emeritus rates on request. Canadian rates with GST available upon request. GST #1254 88122. Publications Mail Agreement Number 1069624. Printed in the U.S.A.

Change of address: Allow 4 weeks, giving old and new addresses and 8-digit account number. Postmaster: Send change of address to AAAS, P.O. Box 96178, Washington, DC 20090-6178. Single-copy sales: $10.00 current issue, $33.00 back issue prepaid includes surface postage; bulk rates on request. Authorization to photocopy material for internal or personal use under circumstances not falling within the fair use provisions of the Copyright Act is granted to AAA to libraries and other users registered with the Copyright Clearance Center (CCC) Transactional Reporting Service, provided that $30.00 per article is paid directly to CCC, 222 Rosewood Drive, Danvers, MA 01923. The identification code for Science is 0036-8075. Science is indexed in the Reader’s Guide to Periodical Literature and in several specialized indexes.

Published by AAAS
Science 338 (6114), 1508-1638.