

► South San Francisco, California — identified a number of proteins that are important to the process. Südhof also showed how the fusion of neurotransmitter-containing vesicles is triggered by calcium.

“It’s a fantastic story — it’s how in a relatively short time frame, 25 or 30 years, we’ve gone from knowing almost nothing about how membrane trafficking occurs in cells to knowing the proteins and actors and having a reasonable idea of how they act,” says William Wickner, a biochemist at Dartmouth Medical School in Hanover, New Hampshire. “These three are responsible for major, major advances.”

Johannes Herrmann, a cell biologist at the Technical University of Kaiserslautern in Germany, was trained by Schekman and had nothing but praise for his former mentor. “It’s a great day,” he says. He remembers that Schekman would set grand goals for his laboratory and, when they were reached, reward the entire lab with banquet dinners. Schekman also encouraged his students to pursue outside interests, such as travel and the arts. It may not be surprising then, that Schekman served as the editor of *The Proceedings of the National Academy of Sciences* from 2006 until 2011, when he left to become editor-in-chief

of the open-access journal *eLife*.

Ploegh says that the award also highlights the relevance of basic research to biomedicine. “This recognizes a fundamental discovery that I think was made without any urgent need to solve a medical problem.”

All three laureates are previous winners of the Albert Lasker Basic Medical Research Award, which is often regarded as an indicator of future Nobel prizes in medicine. Südhof won it this year (along with Scheller) for his work on the release of neurotransmitters. Schekman and Rothman shared the award in 2002. ■



Nobel laureates Peter Higgs (right) and François Englert at CERN in July 2012.

NOBEL PRIZE

Higgs theorists amass physics prize

François Englert and Peter Higgs rewarded with Nobel 50 years after hunt for boson began.

BY RICHARD VAN NOORDEN

Thousands of scientists were involved in hunting down the Higgs boson, this generation’s greatest discovery in particle physics. But for the committee awarding the Nobel Prize in Physics, two names mattered most. In an announcement on 8 October in Stockholm, Peter Higgs of the University of Edinburgh, UK, and François Englert of the Free University of Brussels were named Nobel laureates for developing the theory of what is now commonly called the Higgs mechanism: the process by which a field pervading space gives other fundamental particles mass,

and which implies the existence of the Higgs boson. Regarding the committee’s choice, “I think in all honesty, this is what I would have done,” says John Ellis, a theoretical physicist at CERN, Europe’s particle-physics lab near Geneva, Switzerland.

The existence of the boson was announced to cheers at CERN on 4 July last year, after the particle was fleetingly produced in high-energy collisions at the lab’s €3-billion (US\$4.1-billion) Large Hadron Collider. It would have been too complicated to try to honour the experimenters with the Nobel, says Ellis, who joined other CERN theorists in popping open champagne as the award was

announced. “Englert and Higgs’ pioneering work richly deserved this prize,” he adds.

“I’m very, very happy to have the recognition of this extraordinary reward,” says Englert. Higgs, who is notoriously modest and suffered a bout of bronchitis last month, made himself unavailable for interviews. The two winners had met for the first time at CERN last July.

The Higgs boson was the missing piece in the standard model of particle physics, which describes all known fundamental particles and forces, apart from gravity. The boson itself is the smallest possible ripple of the Higgs field, which gives mass to particles including electrons, quarks and the W and Z bosons that carry the weak nuclear force.

The idea was mooted in the 1960s, when physicists trying to describe the fundamental forces were wrestling with “embarrassing massless particles floating around in their theories”, as Ellis puts it. In 1964, six physicists independently worked out how a field would resolve the problem. Robert Brout (who died in 2011) and Englert were the first to publish, in August 1964, followed three weeks later by Higgs — the only author, at the time, to allude to the heavy boson that the theory implied. Tom Kibble, Gerald Guralnik and Carl Hagen followed. “Almost nobody paid any attention,” says Ellis — mostly because physicists were unsure how to make calculations using such theories. It was only after 1971, when Gerard ’t Hooft sorted out the mathematics, that citations started shooting up and the quest for the Higgs began in earnest.

So numerous were the theorists involved, that Higgs reputedly referred to the ABEGHKK’tH (Anderson–Brout–Englert–Guralnik–Hagen–Higgs–Kibble–’t Hooft) mechanism. But that list of names is nothing compared with the legion of experimenters who joined the quest to track down the boson, with increasingly powerful particle accelerators that produced their own Nobel-prizewinning findings along the way.

“It’s really an incredible thing that it’s happened in my lifetime,” Higgs told the audience at CERN when the particle was announced.

Alan Walker, a colleague of Higgs at Edinburgh, says, “That day was for the experimentalists. I guess today is for the theorists.” ■

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