

A Particle is Born: Making the Higgs Famous

Science communicators had a field day with the 2012 Higgs discovery, as it offered a chance to energize the public about fundamental physics research.

By Michael Schirber

This article is part of a series of pieces that Physics Magazine is publishing to celebrate the 10th anniversary of the Higgs boson discovery. See also: Poem: [Higgs Boson: The Cosmic Glyph](#); News Feature: [The Era of Higgs Physics](#); Q&A: [The Higgs Boson: A Theory, An Observation, A Tool](#); Podcast: [The Higgs, Ten Years After](#); and Collection: [The History of Observations of the Higgs Boson](#).

The Higgs discovery, announced on July 4, 2012, was a major happening in science but also in science communication. Rarely has so much effort been made to engage the public over a fundamental physics topic. Front-page headlines, best-selling

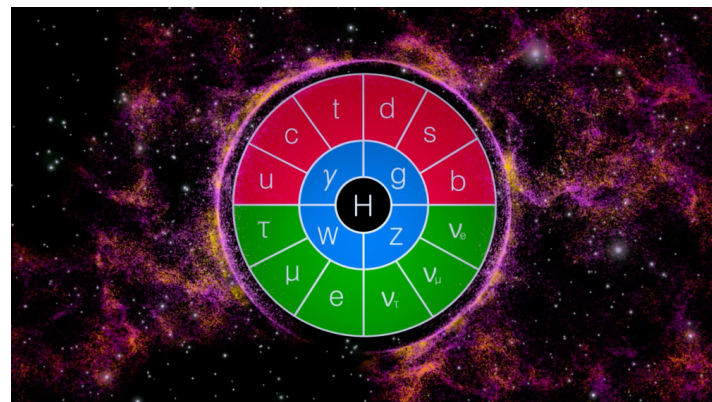


Figure 1. A representation of the standard model, designed by Walter Murch for the 2013 film *Particle Fever*. The Higgs boson is shown in the center, surrounded by the other particles—the photon and other “force-carriers” in blue, the electron and other “leptons” in green, and the quarks in red.

Credit: Particle Fever

books, public lectures, TV interviews, and feature-length films all tried to explain the Higgs boson—a particle whose claim to fame is its association with the generation of mass. Ten years later, the Higgs may not be a household name, but the intense limelight on this fundamental entity did offer communicators an opportunity to tell a larger story about the scientific enterprise.

“The Higgs boson is the capstone of the standard model of particle physics,” says physicist Sean Carroll from the California Institute of Technology, who wrote about the Higgs in his 2012 book *The Particle at the End of the Universe*. He’s also helped to popularize the Higgs by giving public lectures, writing blogs, and making TV appearances. He believes the discovery was a “watershed moment,” as it showed that physicists were clearly on the right track with their understanding of the fundamental workings of the Universe. “That kind of accomplishment should not go unrecognized,” Carroll says.

So how have science communicators tried to make the Higgs boson famous? One of the earliest attempts was by the Nobel prize winner Leon Lederman, who wrote the 1993 popular science book *The God Particle*. In it, Lederman described the Higgs as the crucial but elusive piece to our understanding of the structure of matter. “[The book] was spectacularly successful in that you literally cannot have a conversation with a person on the street about the Higgs without someone talking about the God particle,” Carroll says. But many physicists regret the connection that was made between the Higgs and religion. “There’s a lot of work to be done in undoing the damage,” Carroll says.

Another early attempt at capturing the public’s imagination came with the **cocktail party analogy**, which earned David Miller of the University College London a bottle of champagne from the UK science minister in 1993. Miller likened the Higgs field—a space-filling energy out of which the Higgs boson arises—to a bustling crowd of partygoers. When a celebrity tries to walk through the room, the crowd presses toward them, slowing their progress. In a similar way, the Higgs field can be drawn toward a particle, slowing its progress and giving it mass. The Higgs is more drawn, for example, to the top quark than to the up quark, hence the top is more massive than the up.

These types of metaphors offer a basic appreciation of the physics behind the Higgs boson and its field. But getting people to take the time to learn about the Higgs requires a more human approach, says Mark Levinson—director of the 2013 film *Particle Fever*. “If you really want to get the message out, if you want to engage a bigger audience, it needs to be personalized,” he says. His award-winning film—which ran in theaters across the globe and was distributed on Netflix—recounts the efforts at CERN in Switzerland leading up to the Higgs discovery, with Levinson’s cameras following a handful of theorists and experimentalists during their day-to-day activities. “It is interesting to show why people pursue these incredibly abstract ideas,” he says.

When Levinson started shooting in 2008, he was not focused on the Higgs boson, as physicists had warned him that a discovery might take too long to materialize. But once promising signs showed up at CERN’s Large Hadron Collider (LHC), Levinson and his editor Walter Murch retooled their film’s narrative to give a leading role to the Higgs. They even created a graphic with the Higgs in the center—a representation that the physics community has come to embrace, Levinson says (Fig. 1). The movie’s big climactic scene is when LHC scientists revealed their data to a packed auditorium that included a visibly moved Peter Higgs, who began working in the 1960s—along with other theorists—on his namesake particle. Seeing an 80-year-old physicist tear up over a vindication of his life’s work, “that’s a great story,” Levinson says.

The 2012 announcement was a media hit as well, with over 12,000 news reports on the Higgs boson, according to James Gillies, who was head of CERN’s communication group when the discovery was announced (Fig. 2). Like Levinson, Gillies believes the Higgs was an easy sell to the public because the



Figure 2. The Higgs discovery was covered by newspapers from around the world.

Credit: CERN

human effort surrounding the discovery was so immense. “We cast fundamental science as the latest step in humankind’s journey of exploration,” he says.

Gillies admits that it can be difficult to assess whether the Higgs excitement had a lasting impact on the public’s appreciation of fundamental science. Very little data has been collected on changes in scientific understanding following a big discovery. “But there’s no doubt in my mind that CERN, LHC, and Higgs are quite common currency these days,” Gillies says. “My experience has taught me that people are more curious about basic research than we tend to think.”

Levinson agrees. “Many people have said, I really didn’t understand it, but I loved the film.” The science, he says, is rather complicated, but the story about scientists and their passion is something that audiences can identify with. “The Higgs is fundamental to the physics theory, but it’s bigger than that,” Levinson says. “It’s more about our quest to understand the way the Universe works.”

“There’s no shortage of enthusiasm among the public to learn about the Higgs boson,” Carroll says. He thinks science communicators can always do better, “but I think the Higgs

boson is something where we did take advantage of the excitement to teach people a little bit of physics.” For his part, Carroll used the discovery to explain some of the quantum field theory that lies at the basis of the Higgs boson prediction. “We might as well leverage our big, happy discoveries to better acquaint the public with how science works and what scientists are finding.”

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