The vote and the resignations have not been officially blamed on the media circus over the faster-than-light neutrinos, which OPERA brought to public attention and was then forced to admit did not exist after all. But that is how they will be interpreted. And if the vote is portrayed as a referendum on how OPERA handled the situation, then scientists everywhere should think carefully about how they would have voted. What kind of science do they want?

The neutrino story is familiar to most researchers now, but here are the highlights. OPERA was measuring a beam of neutrinos coming from CERN, Europe's high-energy physics lab near Geneva, Switzerland. Contrary to everything taught in modern physics, the neutrinos seemed to be arriving 60 nanoseconds faster than light speed. A small sub-team of researchers responsible for the measurement spent months systematically checking OPERA's detector and could find no reason for the discrepancy.

When the smaller group shared their result with the full OPERA collaboration, it leaked to the Italian press. Faced with growing interest, OPERA's leaders — Antonio Ereditato and Dario Autero, the duo who have now resigned — decided to go public with a seminar.

Physicists saw plenty of reasons to doubt OPERA's extraordinary claim, and Ereditato and Auterio did not disagree. Even as they presented the result, they invited their colleagues to comment, and encouraged others to try to reproduce their results. Within months, CERN had sent a new beam of neutrinos to Italy and a second experiment found neutrinos travelling at the expected speed. After a great deal of searching, members of the OPERA group eventually traced the discrepancy to a cable that was not fully screwed in.

Scientists both inside OPERA and out have since fretted about what such a high-profile misstep might mean for funding, reputation and the public's perception of science. In fact, OPERA's handling of the incident, at least publicly, was a model for how scientists should behave. Ereditato and Auterio acted responsibly when speaking publicly by sticking close to their data and avoiding over-interpretation. They shared their work with their competitors, and did their best to quickly address outside criticism. In the end, it was OPERA's internal checks that found the loose cable. When the error was discovered, physicists on the team wasted no time in publicly announcing the problem, along with others they had exposed during their review.

Broadly speaking, the media and the public seemed to grasp that this is the way science is supposed to work. Some Italian journalists aside, the press responsibly reported the initial result as simultaneously incredible and very possibly wrong. The public enjoyed the opportunity to question the world around them and learned a little physics in the process. Media coverage generally sided with the researchers for admitting they were wrong, and no one has called for funding to be cut.

"The message here is that scientists are not afraid to question the big ideas."

Science can fall victim to human frailties. One researcher hoards her samples out of fear of competition; another doggedly promotes his hypothesis long after the data have falsified it; negative results are hidden because of competing financial interests. And the most frequent sin of all: questionable results go unchecked because it is in nobody's interest to check them.

The OPERA collaboration is not exempt from the human condition. Some collaborators believe that publication was rushed out of a desire to beat the competition. But OPERA nevertheless conducted itself openly and properly.

The no-confidence vote and resignations are a matter for the collaboration's internal processes, and have no bearing on the quality of the collaboration's science. But beyond OPERA itself, scientists should celebrate the way in which the results were disseminated and the findings ultimately refuted. The process was open and deliberate, and it led to the correct scientific result. In an era in which politics, business and celebrity fixate on spin, control and staying 'on message', OPERA's rise and fall make science stand apart. The message here is that scientists are not afraid to question the big ideas. They are not afraid to open themselves to public scrutiny. And they should not be afraid to be wrong. ■

All together now

The financial crisis brings Europe unexpected opportunities for international collaboration.

Big pieces of scientific kit aren't getting any cheaper. Neutron sources, synchrotrons, telescopes and particle accelerators all require highly trained staff and lots of consumables. They need to be upgraded periodically for research to march forward, and the next generation must be even bigger and more ambitious.

In the current fiscal environment, just keeping the lights on can be a struggle, but Europe's facilities are finding a way. As we report on page 295, they have begun inviting non-European countries to join them. The decision is driven by short-term need, but the continent's organizations may also be positioning themselves for an era of scientific supremacy over rivals such as the United States and Japan.

Europe understands the need for cooperation. Multinational labs bloomed throughout the second half of the twentieth century, a sign of both Europe's post-war unity and the fact that no single nation could afford the types of facility that were being built elsewhere in the world. Fast-forward 50 years, and bodies such as CERN, Europe's high-energy physics lab near Geneva, Switzerland, and the European Southern Observatory (ESO), based in Garching, Germany, are internationally recognized. They have built instruments that are among the best in the world, and they are training a generation of European scientists.

This year sees non-European members entering the fold for the first time. Last month, Israel became the first state from outside Europe to be represented on CERN's governing council, and ESO will soon admit Brazil. Other bodies, including some facilities now under construction, are partnering with countries such as India. Even national facilities are joining in: after years of cooperation, Italy's Elettra synchrotron light source near Trieste has partnered with India to build two beamlines.

This expansion attracts cash in the short term, but it also lays the groundwork for a more fruitful future. Organizations such as ESO and CERN will gain the best researchers from nations around the world, raising their status and the quality of their research. They will also strengthen the scientific base in their partner countries, increasing the chances that these nations will be politically willing and scientifically able to help with the next big project. In the United States and Japan, by contrast, large national facilities are run by powerful research agencies that are difficult to approach and poorly equipped to engage in major financial and material cooperation at home and abroad. They will lose out in future: the facilities of tomorrow will be so big and costly that only those who can cooperate will win.

Two examples show the strength of Europe's hand. The first is ITER, a multinational fusion experiment that is being built in southern France. ITER's ballooning budget is giving Europe headaches in the short term, but its long-term benefits to the continent's scientific and technical expertise are undeniable. The second project, the Square Kilometre Array radio telescope, will be not be located in Europe for scientific reasons, but European scientists have a central role in choosing where it will be built, and will figure prominently in its operation.

There are risks, of course: chiefly that Europe will cede some control of its own infrastructure to its new partners. But done properly, the shared benefits can keep Europe on the top of the world for decades. ■

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