



What's new at Fermilab?

Office of Communications

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Fermilab's new director, Lia Merminga



April 7 announcement—Collider Detector at Fermilab



CDF collaboration at Fermilab announces most precise ever measurement of W boson mass to be in tension with the Standard Model

April 7, 2022

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Editor's note: Members of the CDF collaboration will give a scientific presentation with details about their measurement on Friday, April 8, at 4 p.m. CDT. Click [here](#) for more information and registration.

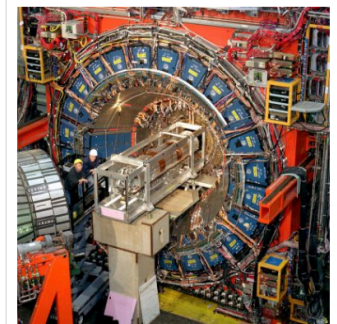
After 10 years of careful analysis and scrutiny, scientists of the CDF collaboration at the U.S. Department of Energy's Fermi National Accelerator Laboratory announced today that they have achieved the most precise measurement to date of the mass of the W boson, one of nature's force-carrying particles. Using data collected by the Collider Detector at Fermilab, or CDF, scientists have now determined the particle's mass with a precision of 0.01% — twice as precise as the previous best measurement. It corresponds to measuring the weight of an 800-pound gorilla to 1.5 ounces.

The new precision measurement, [published in the journal Science](#), allows scientists to test the Standard Model of particle physics, the theoretical framework that describes nature at its most fundamental level. The result: The new mass value shows tension with the value scientists obtain using experimental and theoretical inputs in the context of the Standard Model.

"The number of improvements and extra checking that went into our result is enormous," said Ashutosh V. Kotwal of Duke University, who led this analysis and is one of the 400 scientists in the CDF collaboration. "We took into account our improved understanding of our particle detector as well as advances in the theoretical and experimental understanding of the W boson's interactions with other particles. When we finally unveiled the result, we found that it differed from the Standard Model prediction."

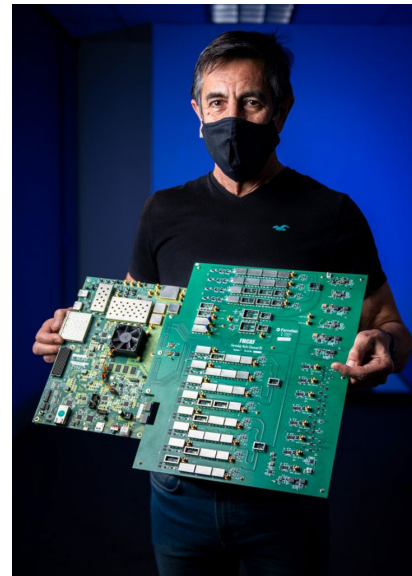
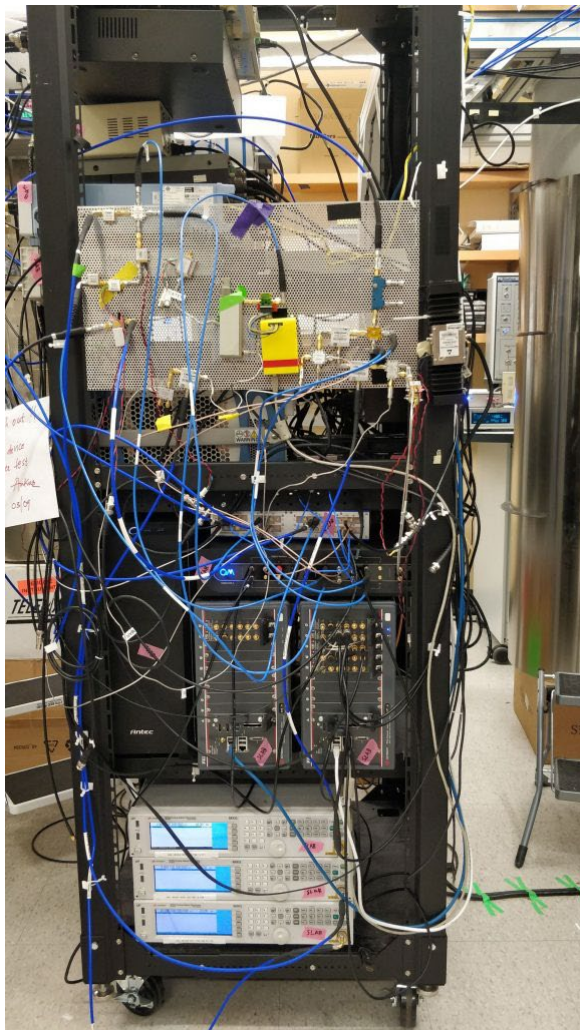
If confirmed, this measurement suggests the potential need for improvements to the Standard Model calculation or extensions to the model.

Scientists have now determined the mass of the W boson with a precision of 0.01%. This is twice as precise as the previous best measurement and shows tension with the Standard Model.



The Collider Detector at Fermilab recorded high-energy particle collisions produced by the Tevatron collider from 1985 to 2011. About 400 scientists at 54 institutions in 23 countries are still working on the wealth of data collected by the experiment. Photo: Fermilab

Fermilab quantum news – new QICK tool kit



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New veteran's program – VALOR

