CDF

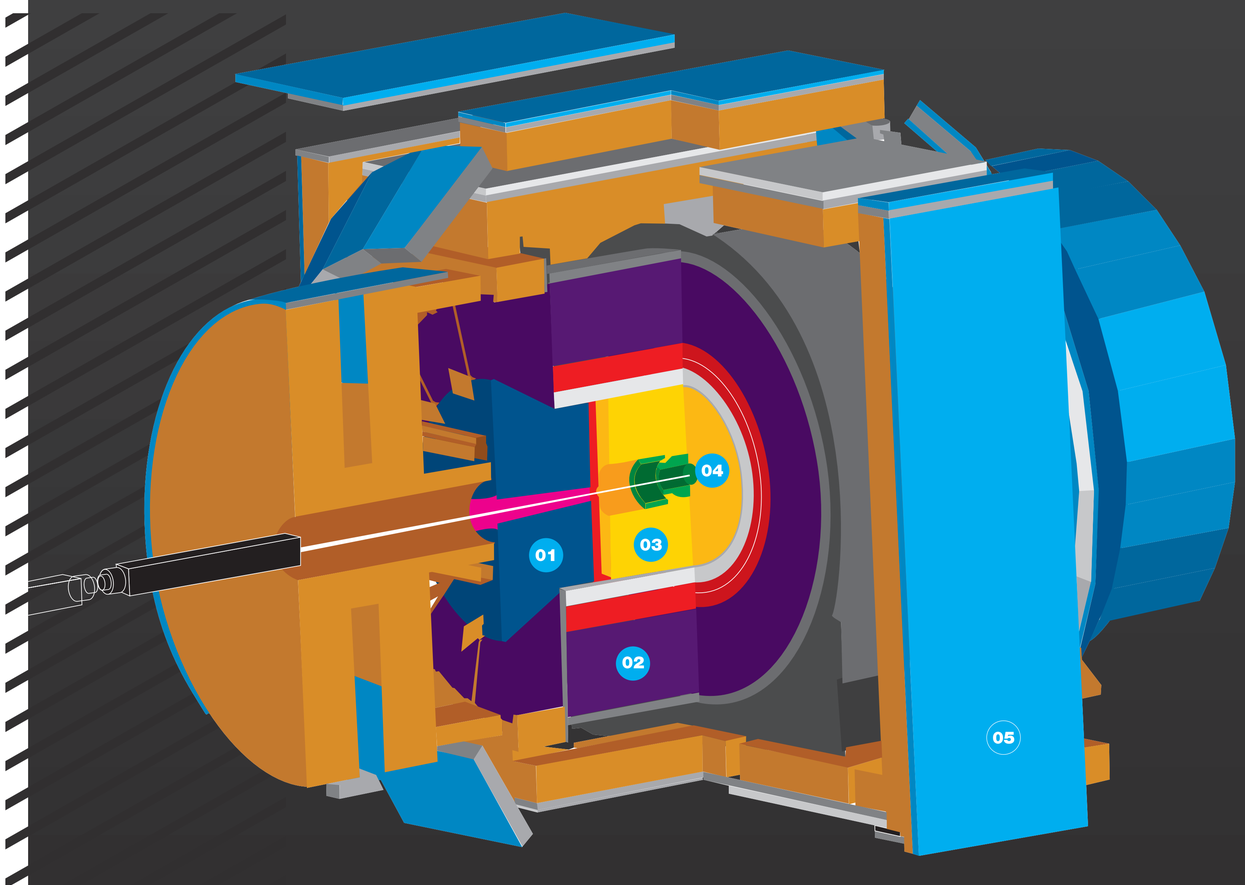
Collider Detector at Fermilab

With 800 collaborators representing 62 institutions and 12 countries, CDF in Run 2 at the Fermilab Tevatron is challenging the standard model while searching for dark matter, supersymmetry and other exotic phenomena.

WHAT IS THE NATURE OF THE UNIVERSE AND WHAT IS IT MADE OF?

ARE THERE UNDISCOVERED PRINCIPLES OF NATURE : NEW SYMMETRIES, NEW PHYSICAL LAWS?

CAN WE PRODUCE AND DETECT DARK MATTER, WHOSE MYSTERIOUS PARTICLES FORM 25% OF THE UNIVERSE?



DETECTOR UPGRADES

01 NEW SCINTILLATOR TILE ENDCAP CALORIMETER

02 NEW CALORIMETER FRONT END ELECTRONICS

03 NEW CENTRAL OUTER TRACKER FOR CHARGED PARTICLE MOMENTUM

04 NEW SILICON MICROSTRIP VERTEX DETECTOR—THE WORLD'S LARGEST

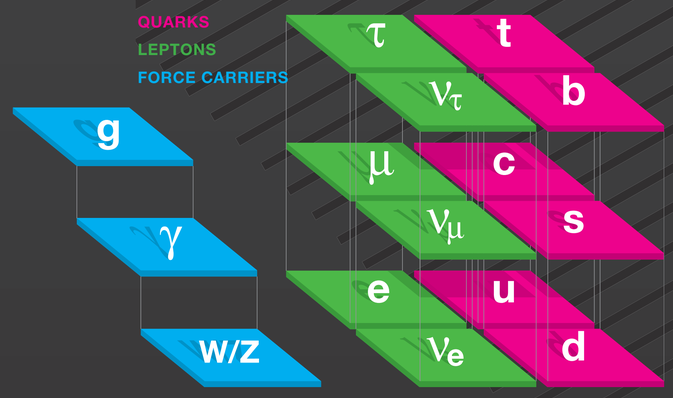
05 IMPROVED MUON DETECTOR COVERAGE

NEW DATA ACQUISITION SYSTEM

NEW TRIGGER ELECTRONICS, INCLUDING TRIGGER FOR SECONDARY VERTICES

NEW RECONSTRUCTION AND SIMULATION SOFTWARE

THE STANDARD MODEL AND BEYOND



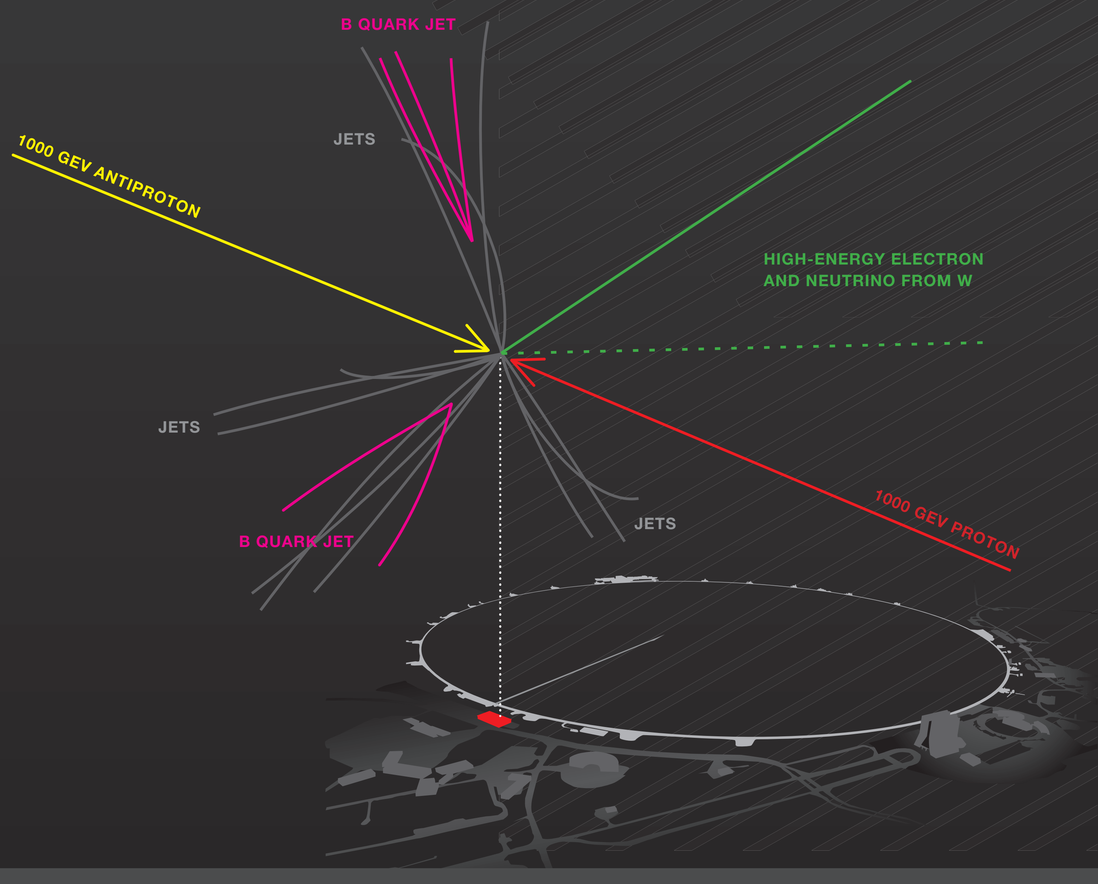
DOES THIS STRIKINGLY SIMPLE PICTURE OF NATURE'S FUNDAMENTAL PARTICLES TELL THE WHOLE STORY?

Discoveries at CDF—the 175 GeV top quark in 1995, the precision measurement of **B mesons** and **W bosons**—have helped to shape the Standard Model, the theory that embodies our most profound understanding of the particles and forces of matter.

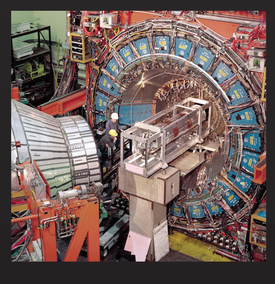
Today, CDF measurements of the masses of the **W boson** and the **top quark** probe the origin of mass itself and the nature of the Higgs boson.

Exploring **B mesons** will help unlock the mystery of matter-antimatter asymmetry.

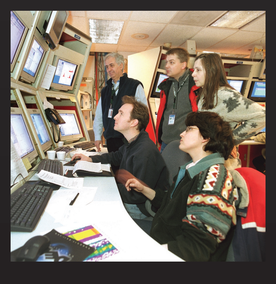
CDF scientists look for signals for new particles using characteristic signatures, like those of the **tau**, the heaviest lepton, and the **top**, the heaviest quark.



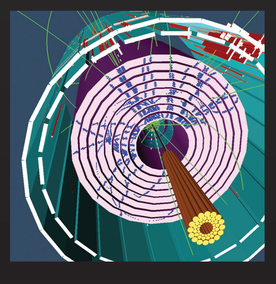
LEFT TO RIGHT



CDF SILICON VERTEX DETECTOR BEING INSTALLED AT B-ZERO



CDF CONTROL ROOM



SIMULATION OF HIGGS EVENT

PHYSICIST WITH SILICON BARREL

THE FERMILAB TEVATRON,

in Batavia, Illinois, (above) is the world's highest energy proton-antiproton collider. The six kilometer ring has 1,000 superconducting magnets cooled with liquid helium.

The Tevatron produces several hundred thousand proton-antiproton collisions per second in the center of CDF.

CDF will record thousands of top pair events, like the one pictured above, in Run 2.

Fermilab

Office of Science / U.S. Department of Energy