

Top Teaches

Top Quark Discovery Inspires a Teacher.



The top quark discovery excited more than physicists. High school teacher Bob Grimm knew quarks would spark the imagination of his students.

With the help of DØ physicists, Bob found a top quark event that took place in two dimensions. Using it and three simulated events, he developed a classroom activity for Topics in Modern Physics and a stand-alone activity on the Web. Students calcu-

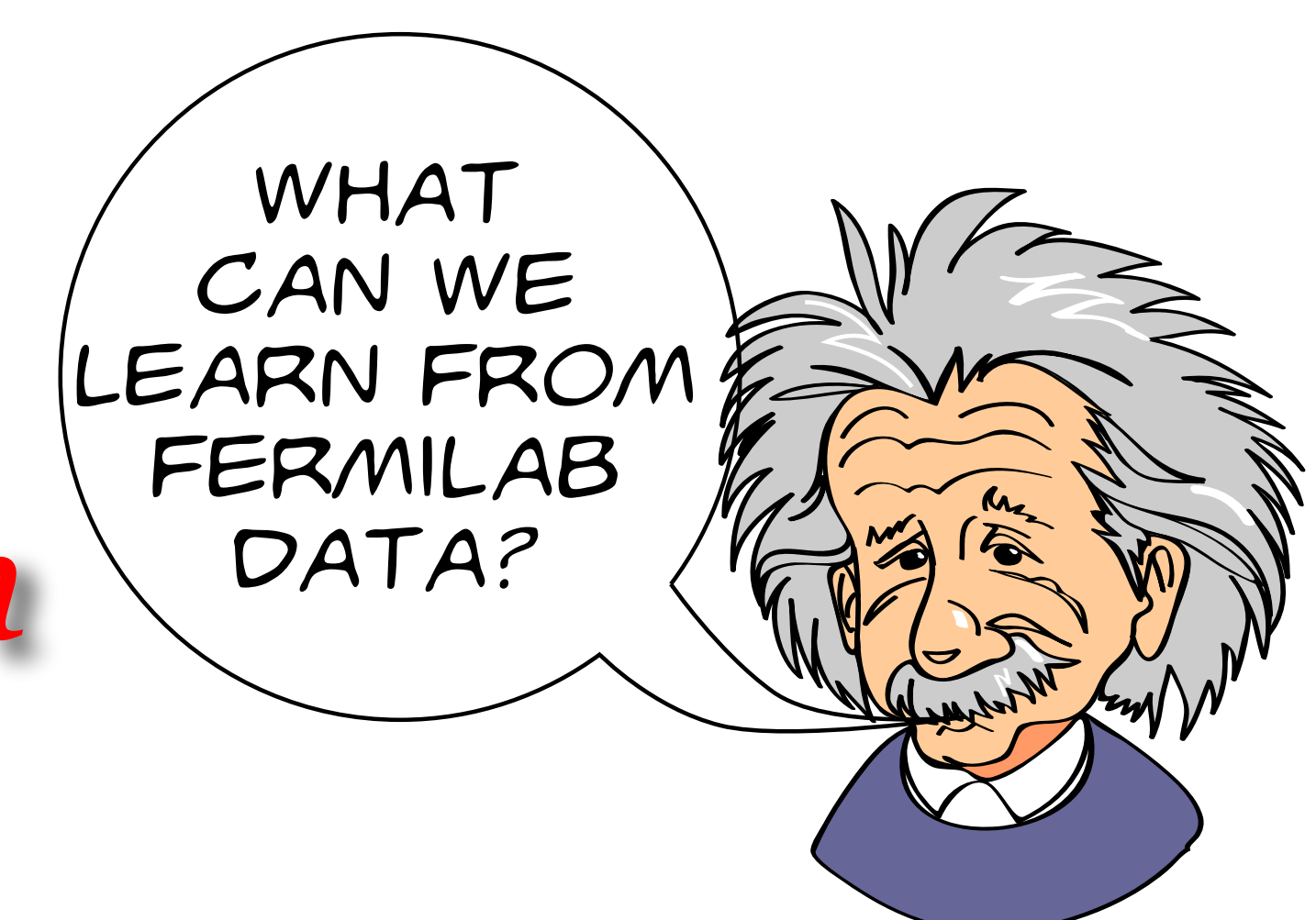
late the mass of the top quark and see a concrete example of conservation of momentum and $E=mc^2$. It's no wonder that Bob was named "Illinois Teacher of the Year" in 2002. For Bob, the payoffs from involving students in real science are: "Students use real data, talented high school students become involved; others read about particle physics in popular magazines."



$$E=MC^2$$

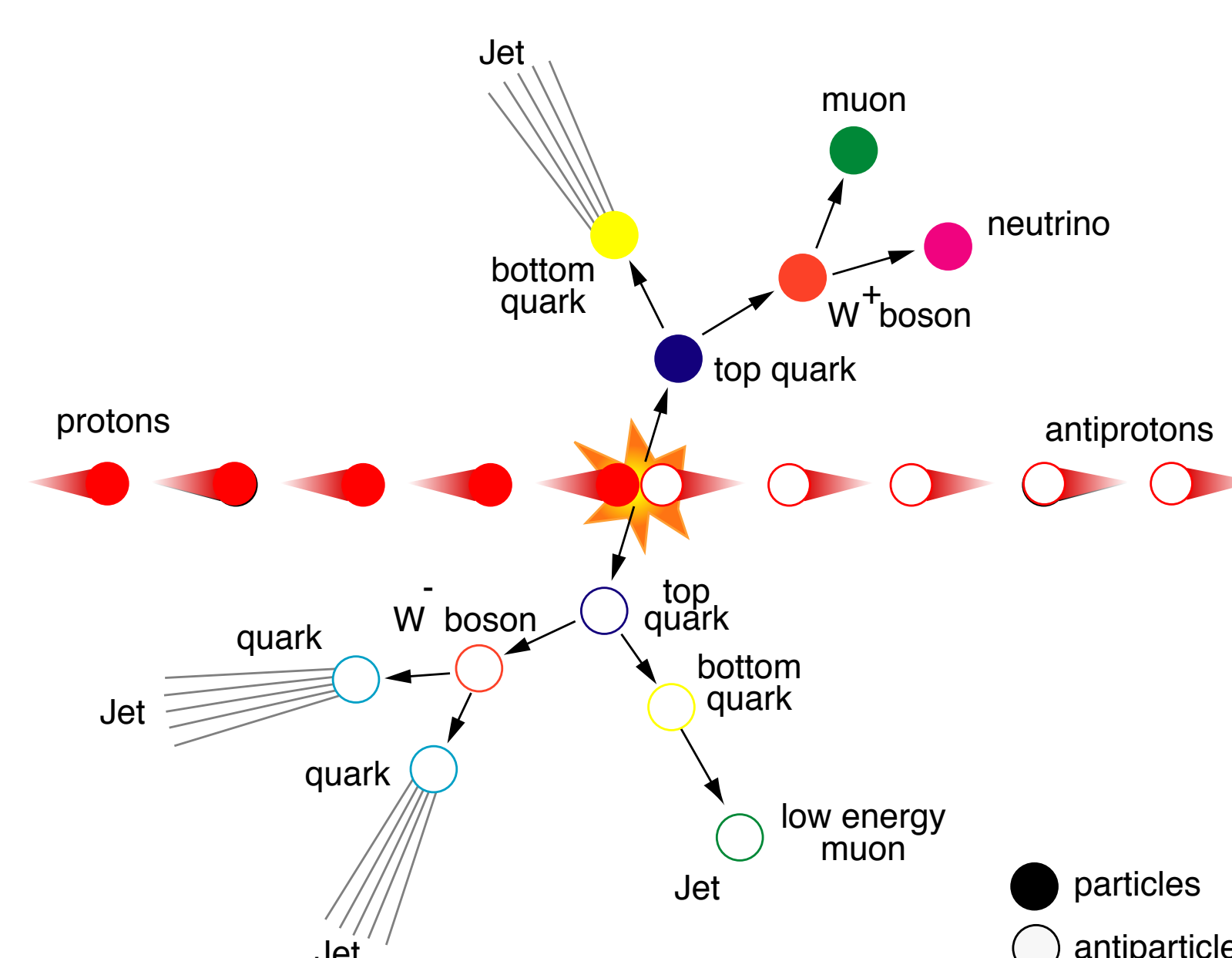
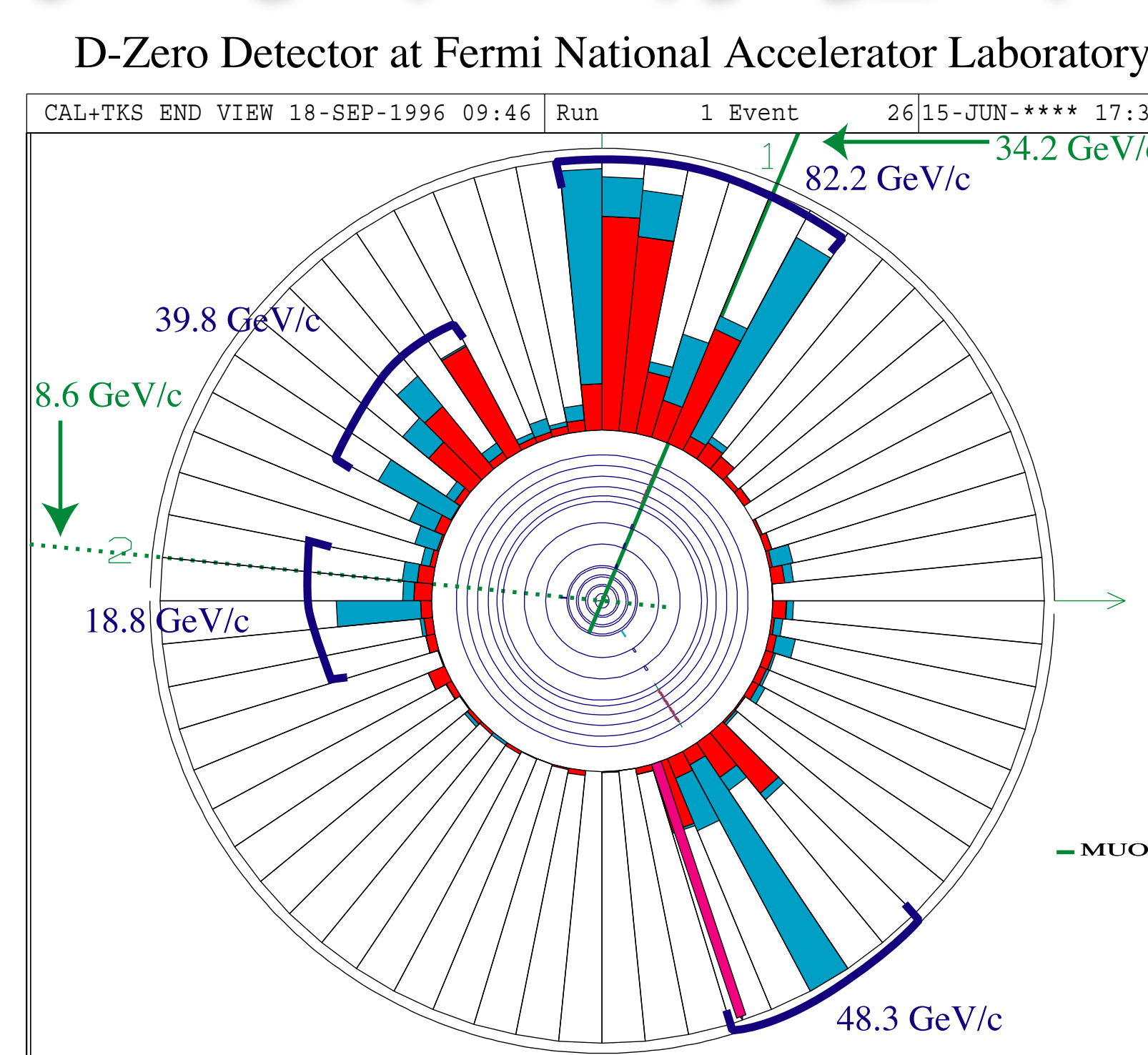
*Calculate the Mass of the Top Quark
with data from Fermilab's DØ Detector -
a real-world example of conservation of momentum*

www-ed.fnal.gov/data/phy_sci/momentum/



Einstein's celebrated equation is verified daily in particle accelerators around the world. Physicists go about the business of converting energy into mass almost as commonly as high school students flip through channels on the television. Still, this revolutionary idea is not often treated as a classroom activity simply because it seems to be so difficult to convey in a "hands-on" manner. We are able to do just that using a special event recorded by Fermilab's DØ detector.

Most events analyzed by the physicists are more complex than this event nature serendipitously supplied.



The Web site includes:

- A classroom activity for high school students to examine the fingerprint of a top/antitop production. It builds on student understanding of vector addition and depends upon only a small amount of particle physics explanation.
- Teacher pages.
- Downloadable graphs of four events.
- Diagrams and animations of top quark production.
- Background material on the discovery of the top quark at Fermilab in 1995.