

The logo features a stylized blue 'Q' with a circular arc and two dots above it, resembling a particle or atom.

QUARKNET AT 25

Interactions you can use

Spencer Pasero, Fermi National Accelerator Laboratory
Kenneth Cecire, University of Notre Dame

Or, less seriously...

with apologies to



QUARKNET
25 PLUS 1



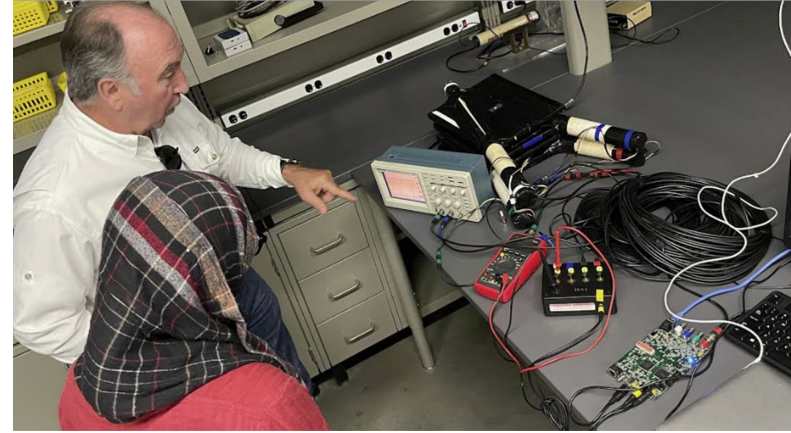
What is QuarkNet?

Improve physics education through

- Particle Physics: methods and content
- Teacher professional development
- Activities using authentic data
- Connect to high school physics curricula

How?

- Cosmic Ray program
- Masterclasses
- Data Activities Portfolio

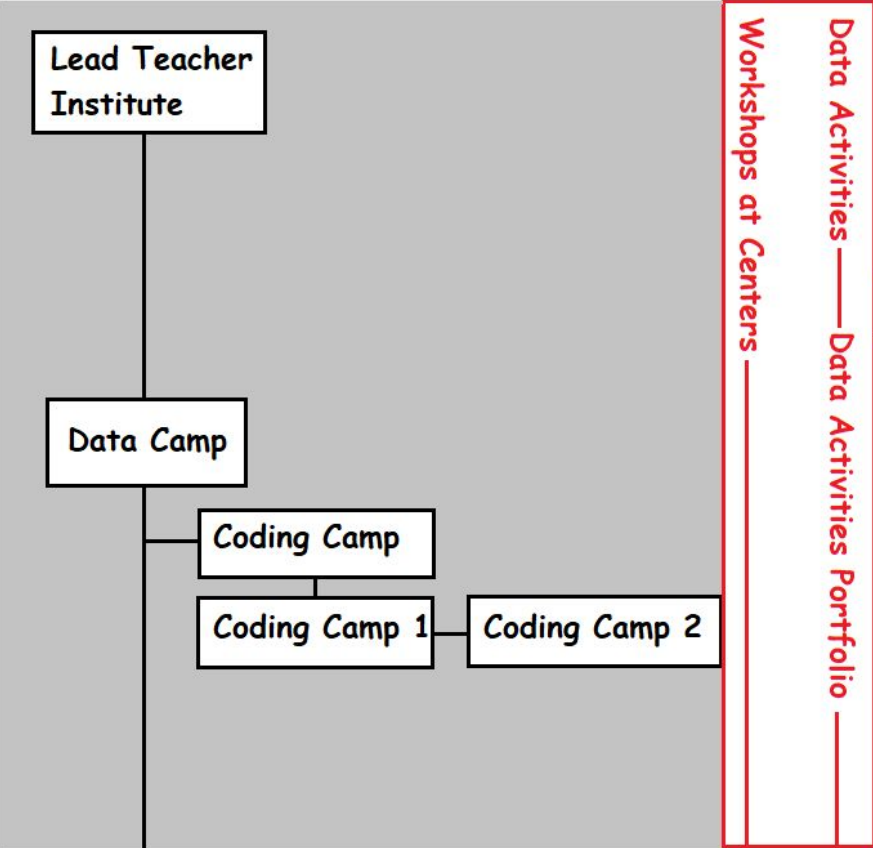


Who is QuarkNet?

- Funders: National Science Foundation, Fermilab (in-kind)
- Principal Investigators: Mitch Wayne (Notre Dame), Marge Bardeen (Fermilab, ret.), Morris Swartz (John Hopkins), Angela Fava (Fermilab)
- Staff: Mark, Ken, Shane, Spencer
- Consulting Staff
- Fellows: LHC, Neutrino, Cosmic Ray, Coding, and Teaching and Learning
- ~50 Centers
- ~500 High School Teachers
- Thousands of students affected

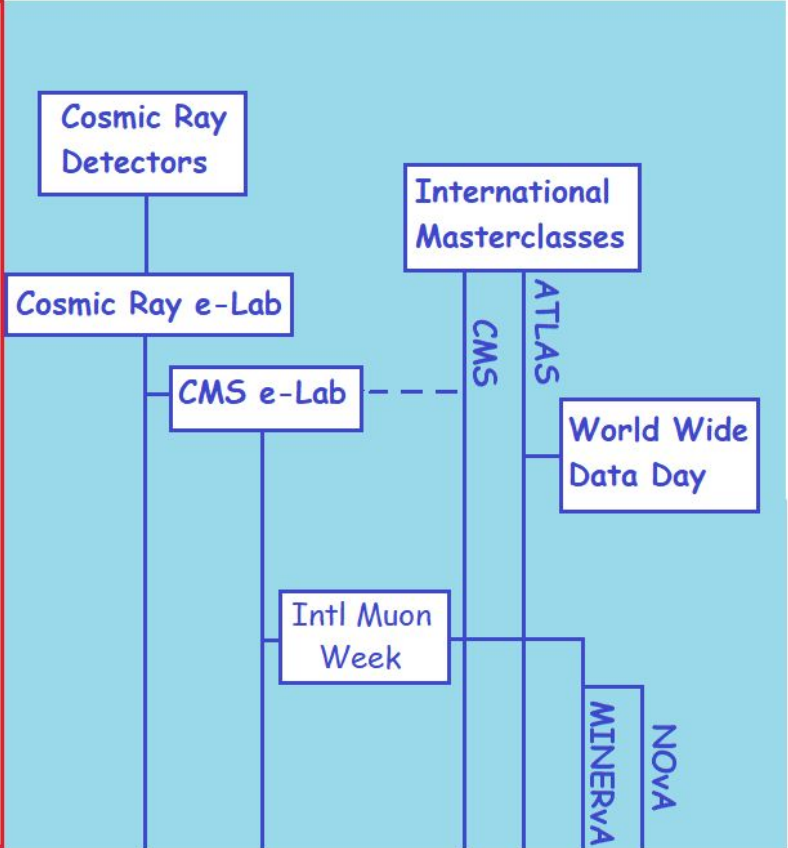
How has QuarkNet developed?

1999



Workshops at Centers — Data Activities Portfolio

now



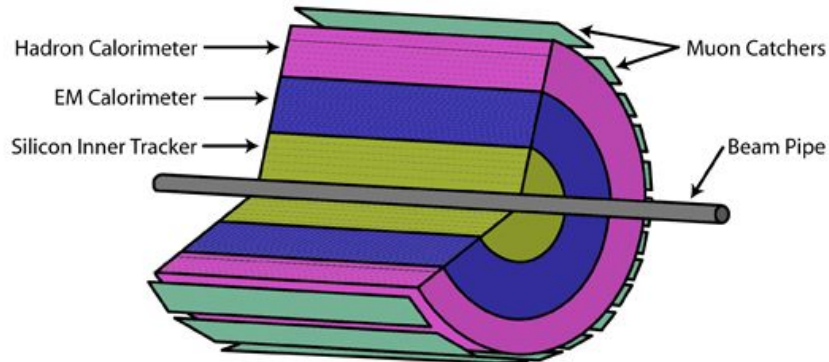
Data Activities: the heart of our program

- Authentic data
- Particle physics focus
- Teacher professional development
- Cutting-edge science for students

[Project Home](#) - [Prior Knowledge](#) - [Project Context](#) - [Resources](#)



SRCH Detector System



To: Data Reduction Team

Date: 26
June 2000

From: Andy Thomas,
Collaboration Spokesperson

Re: Search

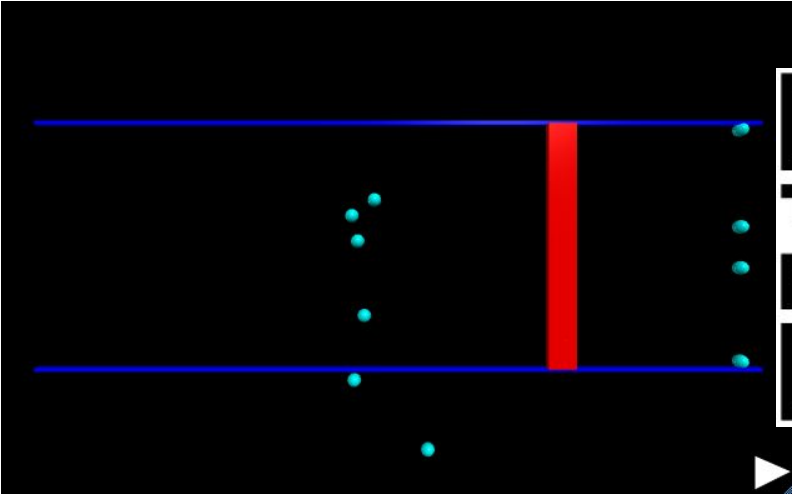
Thank you for agreeing to reduce the electron-positron collider data. Our collaboration must announce the results of our search before other groups finish their reduction. Part of those results is the mass and lifetime that you can derive from the detector data that we have placed on the server.

Follow the [data link](#).

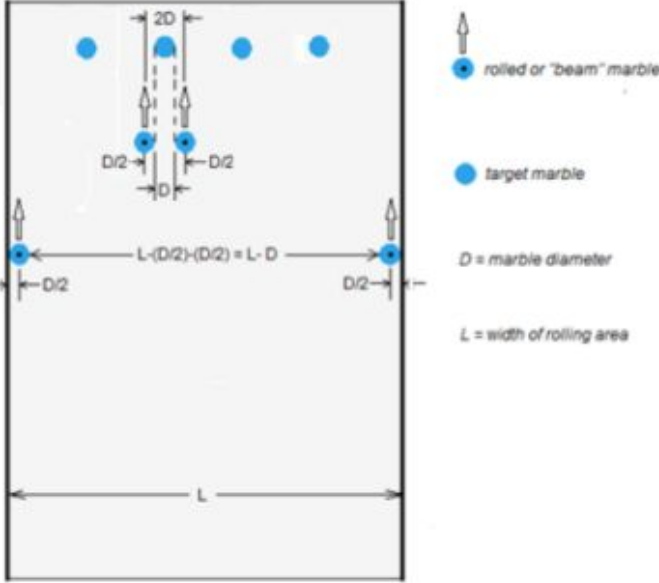
Ask your teacher when your findings are due. Please provide a mass plot for this particle so that we can discuss further investigations.

Data Activity: Rolling with Rutherford

Estimate the size of a particle from collisions



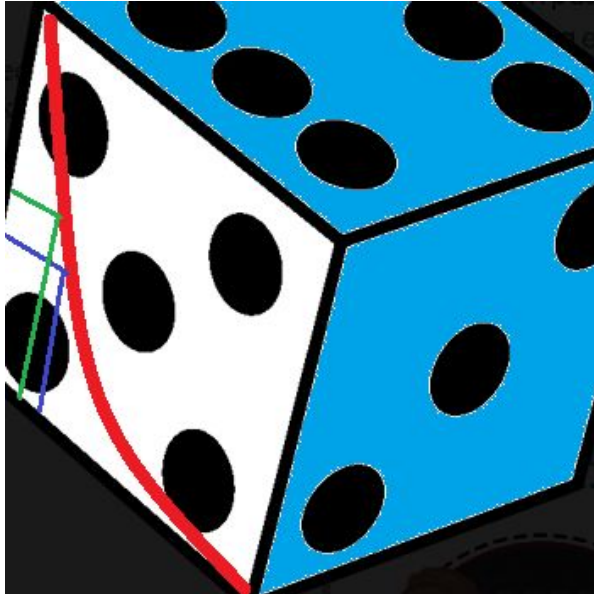
<http://cern.ch/go/Fp7l>



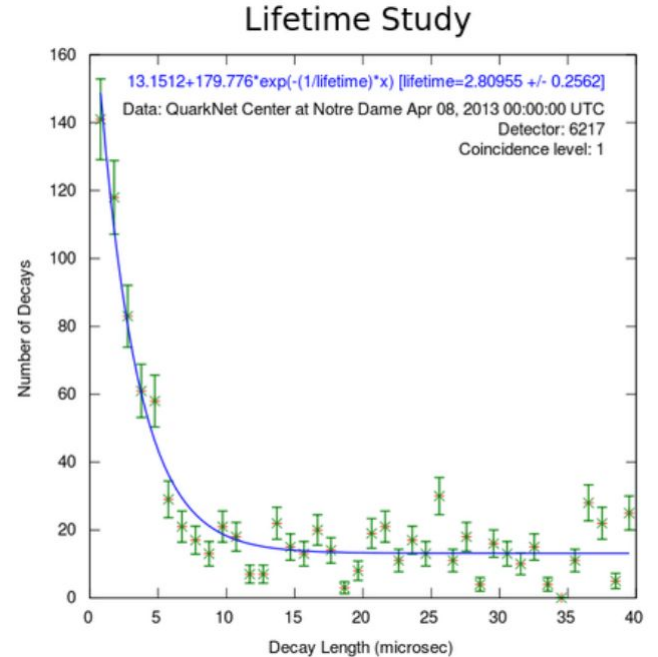
Dimensions of rolling area and collision cross-sections

Data Activities: Muon Lifetime 1 and 2

Demonstrate exponential decay with dice



Find lifetime of cosmic ray muons



Micro-masterclass measurement (latest activity in dev)

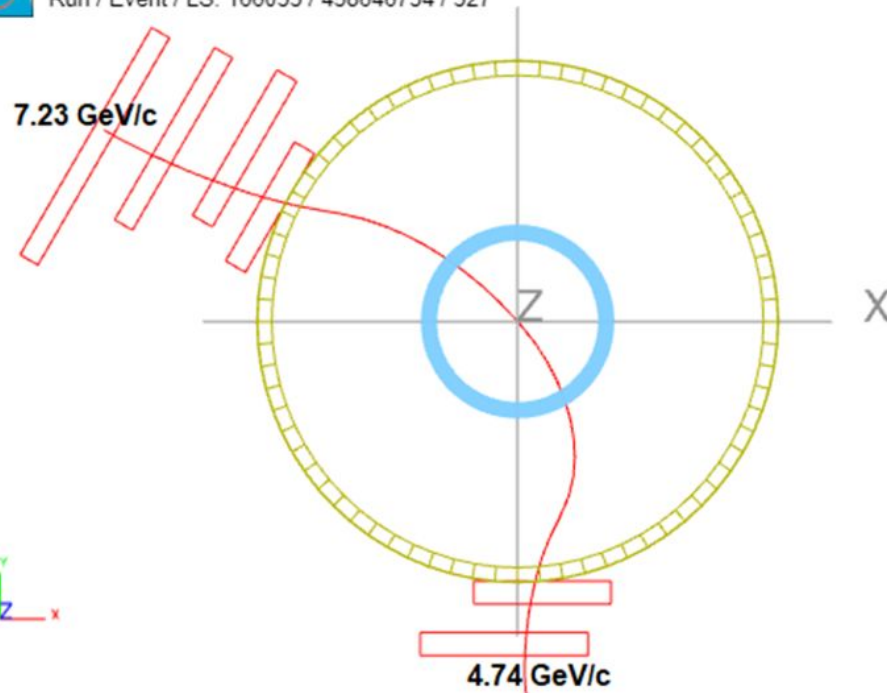
[Events](#)

[Data Form](#)

[Results](#)



CMS Experiment at the LHC, CERN
Data recorded: 2011-May-29 10:52:22.686068 GMT
Run / Event / LS: 166033 / 458646734 / 327



Submit your result:



<https://cern.ch/lhcp24/masses>

There's always more!



Join in real particle physics data analysis at your school.

Collaborate with students worldwide.

Discuss your findings with particle physicists.

Next step: ask your physics teacher!



What's next?

- Spring 2025 IPPOG meeting at Fermilab (May 13–16)
 - Planning a more complete treatment of QuarkNet's history and contributions at that meeting.
 - We would love to share your stories! If you have a memory of a QuarkNet activity or connection you would like to share, please send it to Spencer or Ken.

Thank you!

Contact us:

Ken, kcecire@nd.edu

Spencer, spasero@fnal.gov

Browse the QuarkNet Data Activities Portfolio at:

<https://quarknet.org/data-portfolio>