



Meeting the Modern Physics Standards for Indiana

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QuarkNet Centers in the national program



QuarkNet Centers within reach for Indiana



University of Notre Dame
Notre Dame/South Bend

Purdue University Northwest
Hammond

Purdue University (main campus)
West Lafayette

University of Cincinnati
Cincinnati OH

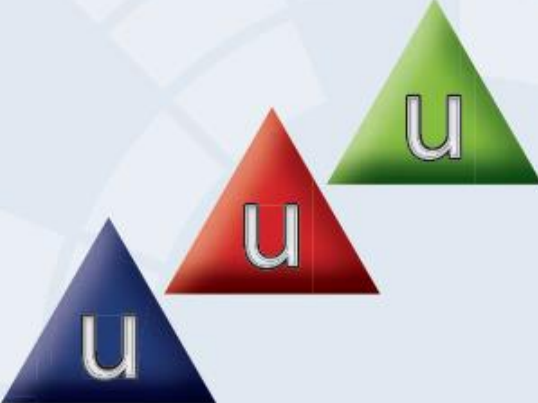
Programs

- Cosmic ray Fellows
 - Cosmic Ray Detectors
 - Data collection and analysis
 - e-Labs
 - Cosmic Watch
 - Cosmic Day (November)
 - Muon Week (February)
- Teaching and Learning Fellows
 - Data Camp (summer)
 - Coding Camp (summer)
 - Step Up
- LHC Fellows
 - MasterClass CMS and ATLAS (March)
 - Big Analysis of Muons (May)
 - World-Wide Data Day (November)
- Neutrino Fellows
 - MasterClass MINERvA and NOVA (March)
 - Neutrino Classroom
- Data Activities
- Summer Workshops at Centers

Activity

Particle Cards

UP QUARK
DISCOVERED: 1969



MATTER PARTICLE

Mass:	2 MeV/c ²
Electric Charge:	+ ² / ₃
Strong Charges:	blue, red, green
Weak Charge:	+ ¹ / ₂
Lifetime:	unlimited

Particle Cards link to the Standards

- **HS-PSII-10.1.* Describe the Standard Model** and explain the composition and decay of subatomic particles using the Standard Model and Feynman diagrams.
- **HS-PSII-10.2.* Explain the stability of the nucleus considering the electromagnetic repulsion in the nucleus and how forces govern binding energy and radioactive decay** for different elements.
- **HS-PSII-10.3.* Qualitatively compare and contrast how particle interactions, fission, and fusion can convert matter into energy and energy into matter and calculate the relative amounts of matter and energy in such processes.**
- **HS-PSII-10.4.* Apply the conservation of mass, conservation of charge, and conservation of linear momentum principles to describe the results of a radioactive particle undergoing either alpha or beta decay.**
- **HS-PSII-10.5.* Know and describe how a particle accelerator functions and how current high energy particle physics experiments are being used to develop the Standard Model.**



<https://quarknet.org>

HS-PSII-10.1.* particle cards, Quark Workbench, making Track 2, Particle Transformations

HS-PSII-10.2.* making tracks, Mean Lifetime,

HS-PSII-10.3.* Z-mass, Top Quark, All MasterClasses

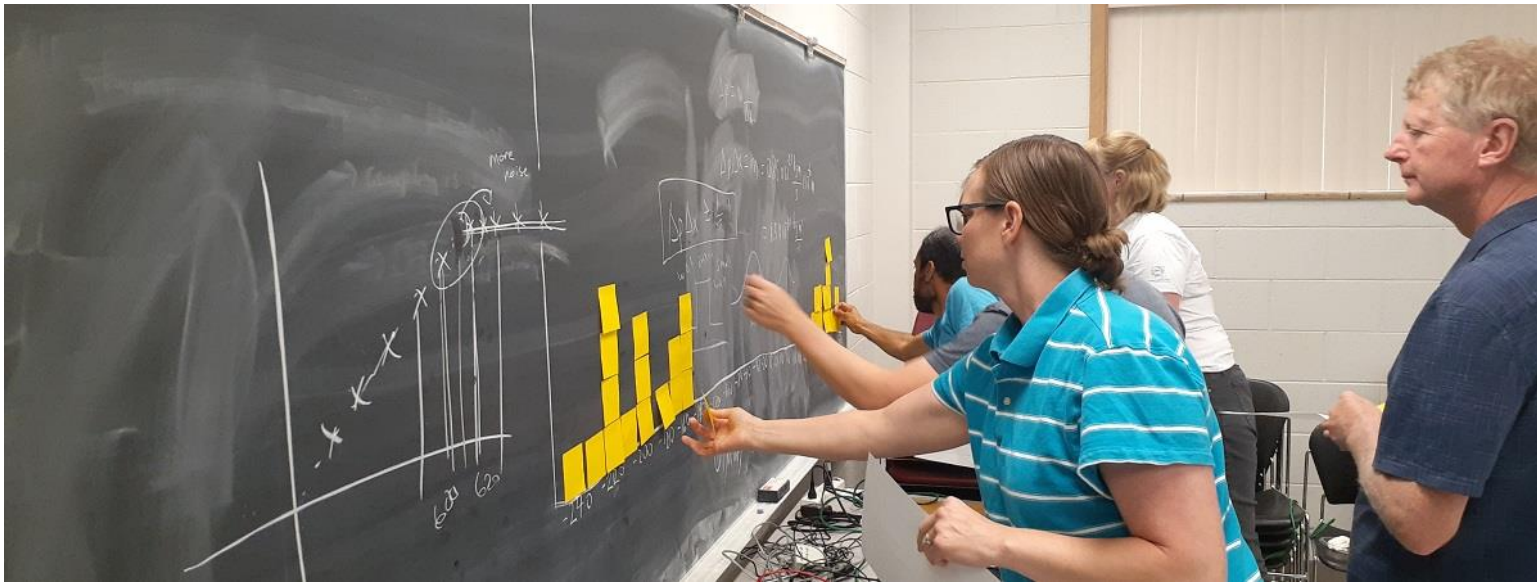
HS-PSII-10.4.* Quark Workbench, Z-mass, Top Quark, Case of the Hidden Neutrino, Energy-Momentum and Mass,

HS-PSII-10.5.* mapping the poles, signal and noise, Rolling with Rutherford, All MasterClasses

Standard 9: Particle and Wave Nature of Light

What Heisenberg Knew
TOTEM







QuarkNet Centers



University of Notre
Dame

Purdue Northwest

Purdue University
(main campus)

University of
Cincinnati

Contact Us

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Thank You!

Questions?



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