Notre Dame QuarkNet Annual Report 2025

The Notre Dame QuarkNet Center started the 2024-2025 academic year as it always has, with weekly meetings starting in September. The group met just about every Monday, aside from holiday-adjacent weeks, until May. Lead Teacher-Mentor Pat Mooney chaired the meetings, in which teachers participated at the QuarkNet Center in the Reyniers Life Building on the Notre Dame campus or via Zoom. Each meeting was taken up with a combination of mutual support in teaching, planning for activities, and discussion of a wide variety of physics and non-physics topics. An ongoing project was redesign of the Notre Dame QuarkNet website. Notre Dame physicist mentor Antonio Delgado participated frequently.

World Wide Data Day was held on November 14, 2024 for classrooms all over the world; teachers and students made simple analyses of ATLAS and CMS data and shared them in videoconferences on that day. Two Notre Dame QuarkNet teachers took part with their students: Rebekah Randall at Canterbury High School in Fort Wayne IN and Jeremy Wegner at Winamac Community High School in Winamac IN. In addition, Mr. Wegner brought students from Winamac to Notre Dame on March 13, 2025 to participate in international Masterclasses. This was an all-day event in which students were “physicists-for-a-day”. They visited the Notre Dame Nuclear Structure Lab, learned about the CMS experiment from Dr. Osherson, made their own detailed analysis of events with one, two, or four charged leptons, and shared results on Zoom.

The Monday meetings in spring 2025 largely focused on selection of students to work with QuarkNet teachers on research at Notre Dame during the upcoming summer. A total of 16 rising high school seniors were chosen to work with 10 teachers and 13 mentors. The research period ran for six weeks in June and July with an additional teacher “QuarkNet week” at the end for teachers to do QuarkNet activities and finish their research.(They mostly did the latter.) The table on the next page below shows the breadth of research activities, mentors, and teachers.

It should be noted that three of the Notre Dame QuarkNet teachers hold special places in the national QuarkNet program. Daniel Kallenberg is a Cosmic Ray fellow and is the expert in building and testing the Cosmic Watch small cosmic ray detectors that are an increasingly important part of QuarkNet overall. Rebekah Randall is a neutrino fellow and helps QuarkNet teachers to learn how to facilitate MINERvA and NOvA masterclasses. Jeremy Wegner is an LHC fellow who also has a strong coding background; he helps both national and Notre Dame QuarkNet teachers on a variety of topics. All three took time off from summer research to facilitate QuarkNet workshops across the United States.

Project	Teachers	Mentor	Meeting Location
CMS Hardware	Ellona Yoder (Elkhart HS)	Randy Ruchti	Reyniers
7:30-1:00			
Astrophysics	Aaron McNeely (Bremen Sr HS)	Jeff Chilcote	Reyniers Rm 103
7:30-1:00		Joel Burke (ND grad student)	
DVT/VR	Ken Andert (LaLumiere School)	Keith Davis	Jordan Hall
9:00-2:30	Peter Hoffman (Edwardsburg HS)	Marc Osherson	
CRDs/Cosmic watches/	Jeff Chorny (Lakeshore HS)	Ken Cecire	Reyniers lab
GRAND	Dan Kallenberg (Adams HS)		
7:30-1:00	Cal Swartzendruber (Bethany Christian)		
Spark Chamber		Laura Fields	Nieuwland
7:30-1:00		Dominic Battaglia (UND grad student)	
CMS Data	Jill Ziegler (Hamilton West, NJ)	Pat Mooney	Reyniers conf rm
9:00-2:30			
Environmental Sensors	Chris Culver (St. Joseph HS)	Brian Davis	IUSB
7:30-1:00			
Microtubule Dynamics		Holly Goodson	Stepan Chemistry
9:00-2:30		Teddy Berente-undergrad	
CMS Cables		Mitch Wayne	Reyniers lab
7:30-1:00			
Nuclear Physics	Jeremy Wegner (Winamac Cmty HS)	Maxime Brodeur	Nieuwland
9:00-2:30			
Condensed Matter		Badih Assaf	Nieuwland
9:00-2:30			
Crystal Growth	Jeff Kindelan (Adams HS)	Nirmal Ghimire	Nieuwland
9:00-2:30			

Table 1. Notre Dame QuarkNet Summer 2025 projects and people.

Figure 1. Student posters in QuarkNet Summer 2025 Symposium.