

QuarkNet Summer Workshop 2001

Student Application and Information Packet

A Brief Description...

QuarkNet brings high school students and teachers to the frontier of 21st century research that seeks to resolve some of the mysteries about the structure of matter and the fundamental forces of nature. QuarkNet will support centers at 60 universities and laboratories that are participants in the collider experiments at CERN in Switzerland and Fermilab in Illinois. Physicists will mentor and collaborate with high school teachers. Through these collaborations:

- *Teachers will join research teams with physicists at a local university or laboratory.*
- *Students will learn fundamental physics as they analyze live online data and participate in inquiry-oriented investigations.*

IU QuarkNet Web site:

<http://physi.cs.indiana.edu/~quarknet/>

Fermilab QuarkNet Web site:

<http://quarknet.fnal.gov/>

Counting Cosmics proposal:

<http://www.physics.indiana.edu/~quarknet/proposal/proposal.pdf>

This is the background for the QuarkNet Summer Workshop 2001. Teachers from six different high schools have been developing a plan in which students will become involved in experimentation and research of cosmic rays at their local high schools. Last summer, the QuarkNet associate teachers constructed a proposal for grant monies to purchase equipment necessary for the experiments. **The grant was approved in full!** The next step is organizing design and construction of the experimental setup and equipment. This summer workshop is intended to work toward meeting our objectives. The QuarkNet group feels that students should join the program on the ground floor. The project goals and objectives which will drive the workshop are as follows:

Project Goals and Objectives:

Indiana University associate teachers propose a transfer project to involve students in an investigation of cosmic rays, which will promote the QuarkNet goal of introducing high school students to inquiry-oriented investigations into the structure of matter and the fundamental forces of nature. **This project will:**

Objective 1. Form a collaboration to develop instructional materials, experiments and equipment to engage high school students in HEP and cosmic ray inquiry.

Objective 2. Design and build cosmic ray detector for each high school site that will allow students to conduct a variety of research experiments.

Objective 3. Create an instructional web site for HEP, cosmic ray physics, data sets of cosmic ray events, and for publishing the results of student experiments.

Objective 4. Establish collaboration among students, QuarkNet teachers and the HEP/cosmic ray research communities.

Approximate Calendar of Workshop Events

- Students arrive Sunday night

DATE	Monday June 11	Tuesday June 12	Wednesday June 13	Thursday June 14	Friday June 15
8:30-9:30	Ice-Breaker/Intro	Introduction to the Standard Model	Astrophysics/ Cosmics discussion:	Discussion of data analysis	Examine data from trial runs post to the web
9:30-10:30	Overview: Prof. Van Kooten	Basics of Web Page design Prof.----- (TBA)	Solar lab tour	Examine data from trial run #1 Post to web	
10:30-11:30	PMT discussion -Cherenkov Radiation -Plateauing -Assembly - Gluing	Web page design work	Electronics discussion Prof.----- (TBA), D3	Beams and accelerators Prof. ----- (TBA) (RP?)	Cyclotron tour
Lunch					
12:30-1:30	Swain Tour (->1:00) -visit to prototype 2000 -basement -re-group Group instructions	ACTIV: Construction of metal framework: Groups B & T Light guide to PMT gluing: Groups U & D	ACTIV: Assembly of rack electronics modules connected to 1st prototype: Groups B & T Wrap detectors: Groups U & D	ACTIV: Connection of rack electronic modules to two new detector arrays. & Final assembly. All groups	Assemble take-home units Breadboarding? All groups
1:30-2:30	ACTIV: PMT Plateauing Groups B & T Scintillator to light guide gluing: Groups U & D	Groups rotate	Groups rotate		
2:30-3:30	Groups rotate	Additional web page design work: All groups 3:15 Web update	First Trial Run Experiment #1 (prototype #1): All groups 3:15 Web update	PMT Plateauing of new set-ups 3:15 Web update	Preview of Fermi
4:30-6:30	Afternoon activities: See below**	Afternoon activ.'s: Spelunking	Afternoon activ.'s: Wall climbing	Afternoon activ.'s:	To FERMI ***
Supper	Dave's for BBQ				
7:30-	Union	IU Rec. center	Observatory (weather permitting) Kirkwood	Final Assembly & Trial Runs of both prototypes BT & UD	

** Afternoon and evening activities: Teachers will pair to a variety of tentative activities *such as*:

- Spelunking (caving) at Salamander cave or at Spring Mills S.P.
- Wall climbing at Hoosier Heights
- Horseback riding at Spring Mills S.P.
- Tour of campus
- IU Student Union for bowling, pool, games
- IU Rec. Center
- HPER
- High dive pool*
- Kirkwood Observatory*

*weather permitting

***Students will return to Bloomington/ Elkhart on Saturday night at 8:00/ 6:00. A separate van is being arranged to take Elkhart students straight to Elkhart following the tour of Fermi. All other students will return to Bloomington.

Application Directions:

Please print all information neatly. Make sure you have acquired all of the necessary signatures before submission of this application. **Return this application to your local QuarkNet Associate Teacher by April 6, 2001.**

Name	
Home Address	
Home Phone	
Emergency Phone (and contact name)	
School Name	
Email address	
Grade	

Requirements of QuarkNet Associate Students:

- ✓ Students must attend all scheduled QuarkNet sessions.
- ✓ Students must agree to supervision by any and all QuarkNet Associate Teachers.
- ✓ Students must agree to adhere to behavior consistent with their local school rules as well as I.U. campus regulations.

Student Agreement

Signature _____ **Date:** _____

Parent/Guardian

Agreement Signature _____ **Date:** _____

Please fill out the following table outlining your science, math, and computer science courses and the grade you earned in each course.

Science courses	Grade	Math courses	Grade	Computer science courses	Grade

Overnight Lodging Status

Please check the option that applies to you.

_____ I will need overnight lodging in an Indiana University dormitory.

_____ I will not need overnight lodging because I will be commuting.

_____ Other (Please explain in detail your special situation regarding attendance and lodging concerns below)

Please include a short essay in which you should discuss why you are a good candidate for a QuarkNet Associate Student. The essay should be typed or word-processed and stapled to the back of this application.