

INTERNATIONAL MASTERCLASSES HANDS ON PARTICLE PHYSICS

Neutrino Masterclasses



U.S. DEPARTMENT OF
ENERGY

Office of
Science



QuarkNet



INTERNATIONAL



hands on particle physics

Where we are

Goals:

- Build up to DUNE.
- Bring in new institutes.
- Expand reach of IMC.

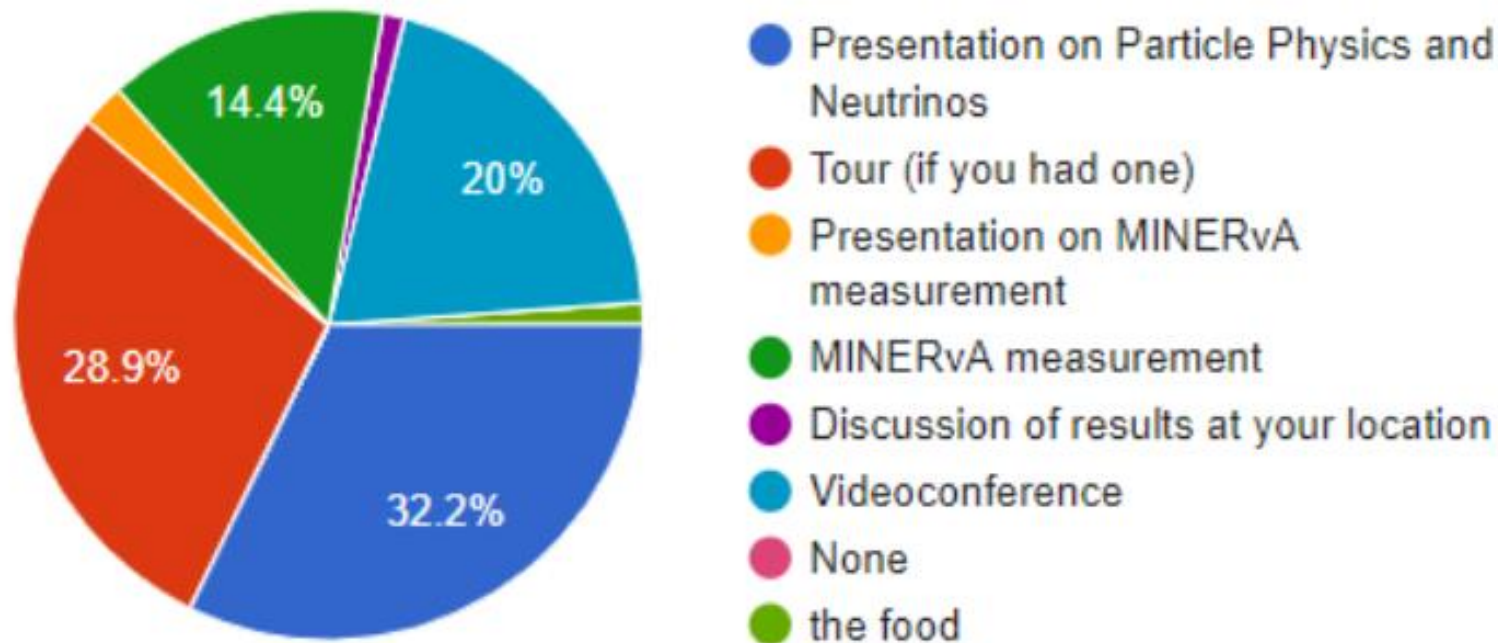
So far:

- MINERvA Masterclass – Passed tests and part of IMC 2019.
- MicroBooNE – Expected for IMC 2020
- Plans and inquiries for more

MINERvA Results

What part of the masterclass did you like best?

90 responses



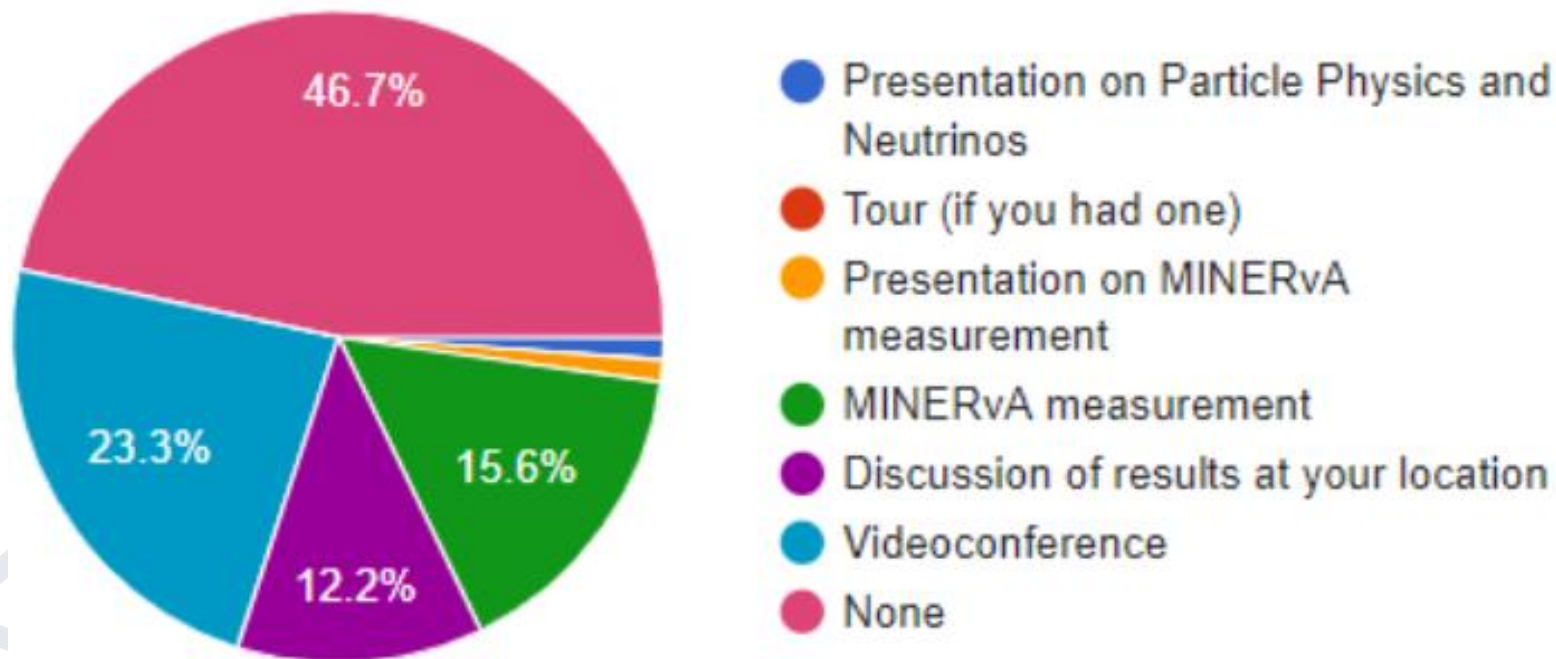
We love doing the experiments and being participants of the videoconference

The discussion is really meaningful and we all feel free to ask, this is not happening in our daily class.

MINERvA Results

What part of the masterclass did you like least?

90 responses



The video conference is always difficult to participate in, since only one person can present at a time.

MINERvA Results

How did the masterclass affect your interest in physics?

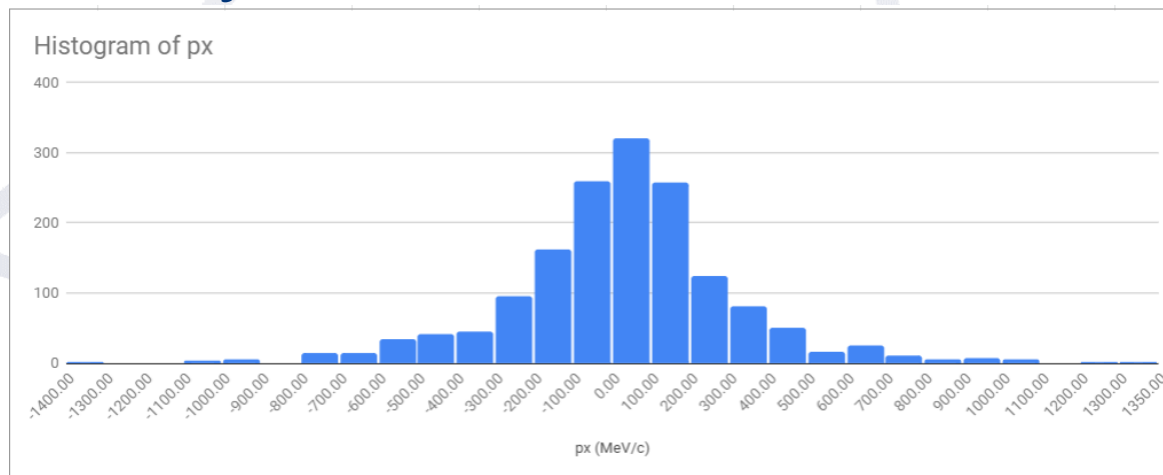
90 responses



Personally, I am very interested in physics and I have to say the masterclass was an awesome experience. Feeling like you are part of a real experiment is very satisfying for someone who wants to focus his future on that.

MINERvA Success

- Students made good analyses.
- Videocons in ROC West went well.
- Students, teachers and tutors are generally satisfied.
- May need to add to measurement.



Calculated:			
Std Dev =	301.43	MeV/c	
delta-x =	0.33	fm (Heisenberg)	
delta-x =	1.00	fm (Fermi Gas)	
Visual:			
Std Dev =	150.00		
delta-x =	0.67		
delta-x =	2.00		

Next Steps

- Expand and deepen MINERvA:
 - Develop real website this year.
 - Engage more institutes.
 - Refine measurement.
 - Outreach to schools in Chicago
- Finish MicroBooNE development; roll out
- Open paths for new neutrino masterclasses.

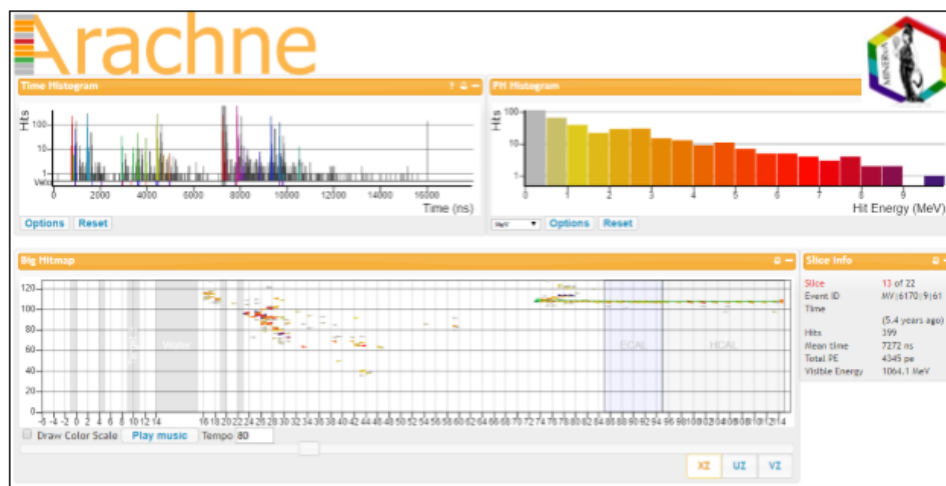
The QuarkNet Neutrino Data Workshop is designed to enable QuarkNet teachers to learn more about neutrino physics and bring practical activities to their students. Specs and contents can be customized as needed or upon request.

Specs:

- For HS physics teachers
- Two-day duration
- QuarkNet staff or fellow facilitates.
- Teachers do activities as students and then reflect and plan as professionals.

Contents:

- Introductory talk and Data Activities from the Portfolio
- Muon lifetime from MINERvA neutrino detector
- MINERvA Neutrino Masterclass measurement
- Fermilab virtual visit



Arachne event display for the Fermilab MINERvA experiment designed to study neutrino interactions with nuclei.

To arrange a Neutrino Data Workshop or learn more, ask your QuarkNet staff contact. To learn more about National Workshop opportunities for QuarkNet centers, go to the QuarkNet website and search on “opportunities.”