Developments in International Masterclasses

APS-DPF 2019

Richard Dower, Roxbury Latin School (ret.), rickdower@gmail.com
K. Cecire, University of Notre Dame, kcecire@nd.edu
Overview

What is a masterclass?
“Particle physicist for a day”
- Intro
- Tour
- Analyze authentic HEP data.
- Videoconference

International Masterclasses 2019 and beyond
- > 50 Countries
- > $10^4$ Students
- 4 LHC experiments
- 1 new Neutrino experiment
- More on the way
Masterclasses Expand

**New opportunities**
- World Wide Data Day (W2D2)
- Masterclasses for International Day of Women and Girls in Science (IDWGS)

**New measurements**
- MINERvA
- More neutrino masterclasses
- CMS upgrade
- Belle II
- Masterclasses from GSI
- More on the way
What it is

• Simple measurement: $\phi$ and $\theta$ of muons in events
• Can be done by teachers and students in school
• Worldwide combination of data
• 24-hour shift of videoconferences

Get involved

• Takes place in Oct or Nov each year (next: Oct 16, 2019)
• Inform physics teachers
• Contact Ken
What it is
• LHC masterclass measurements
• By and for girls
• Learn about particle physics
• Discuss women in science

Get involved
• Takes place in Feb each year
• Recruit students, teachers, tutors
• Women as role models
• Encourage young women with a friendly physics environment
• Contact Uta Bilow, uta.bilow@tu-dresden.de
CMS upgrade, Belle II

What they are

• CMS measurement adds a 4-lepton mass plot
  • Test this summer
  • Use in IMC 2020
• Belle II shows students how to code B-physics analysis
  • Tested in IMC 2019
  • Ready for IMC 2020

Get involved

• Take place in IMC
• Contact Zdenek Dolezal, zdenek.dolezal@cern.ch
Neutrino masterclasses

What it is
• First, MINERvA
  • Muon neutrinos interact with carbon target
  • Discover Fermi motion
  • Measure carbon nucleus to test interaction model
• Coming:
  • MicroBoone, more

Get involved
• Take place in IMC
• Contact Ken
What they are
• Medical Imaging (HIT)
• J/ψ (ALICE)
• GSI
  • videoconferences
  • innovations
Get involved
• Take place in IMC
• Contact Uta, Ken, or Yiota Fokka, yiota.foka@cern.ch
Interesting future

Challenges
• 4 centers for videoconferences and growing
  • CERN
  • Fermilab
  • TRIUMF
  • GSI
• Organization and Coordination
• Structure will expand

Opportunities
• Rich offerings develop all involved
• New offerings yield new methods
• Multiplying pathways to reach students and teachers