

INTERNATIONAL MASTERCLASSES HANDS ON PARTICLE PHYSICS

Masterclass Report
26th IPPOG meeting
Uta Bilow, Ken Cecire
29.11.2023



IMC 24: The plan

9 Masterclass measurements

- ATLAS, CMS, LHCb, ALICE, Belle II, Particle Therapy, Pierre Auger, MINERvA, NOvA

5 Videoconference centers

- CERN, Fermilab, GSI, KEK, Malargue (Pierre Auger)

Videoconference situation

- Zoom videoconferences (no webinars)
- No dedicated online week at CERN, but we support online MCs

Circulars for preparation

- Bi-weekly in 2023, weekly in 2024
- [Archive](#)

Collect participation numbers

IMC24 dates

LHC Masterclasses



CERN program

- Feb 15 - March 27
- Girls Masterclasses on Feb 9 (Friday)

LHC and Neutrino Masterclasses



Fermilab program

- March 1 - 27

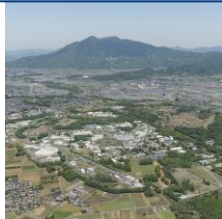
Particle Therapy Masterclasses



GSI program

- Feb 12, 24, 27, 28, March 4, 8, 15, 23
- Girls Masterclasses on Feb 12

Belle II Masterclasses



KEK program

- March 5, 13, 26
- Additional dates for India and Japan

Auger Masterclasses



Pierre Auger program

- March 1, 8, 12, 16, 19, 22

Process of registration

- Sep 22: Announcement of dates
- Oct 13: Survey for the best dates for ALICE and LHCb
- Oct 27: Announcement of schedule and registration procedure
- **Nov 10: Registration opened**
- Dec 8: Registration forms close, signing up by email is still possible;
Announcement of Intl. Day of Women and Girls in Science
- Dec 15: Release of schedules

IMC 24: Registration

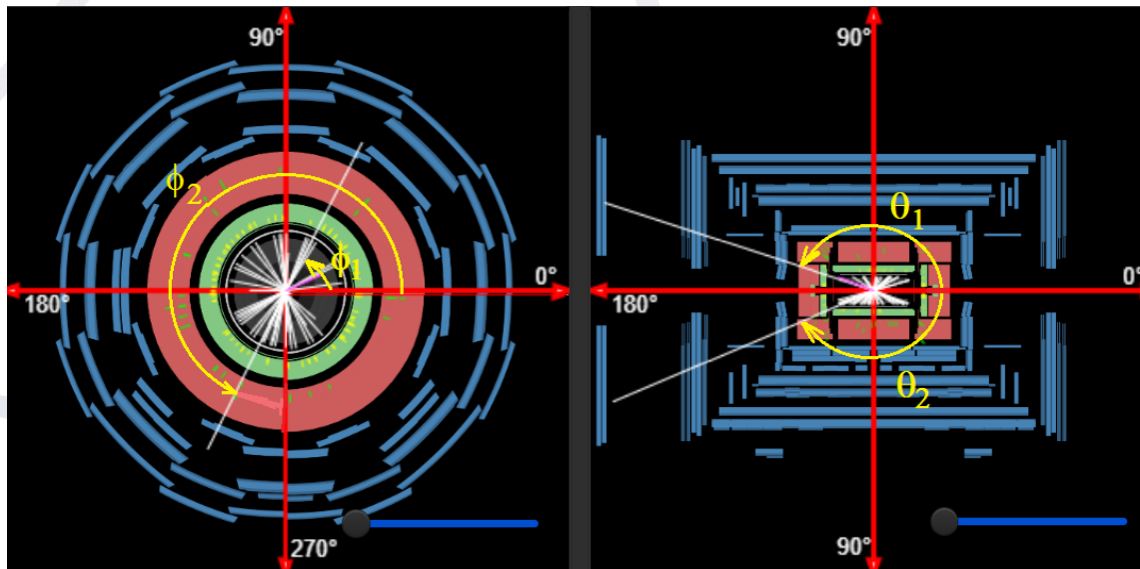
- Registrations started on Nov 10

	CERN						Fermilab				Auger	KEK	GSI
	ATLAS Z	ATLAS W	CMS	LHCb	ALICE S.P.	ALICE RAA	ATLAS Z	CMS	MINERvA	NOvA	Pierere Auger	Belle II	Particle Therapy
VC slots	120	30	70	40	40	5	many				30		35
registrations	74	19	55	30	30	2	2	2	1	1	13		29
IMC in 2023	99		56	26	30		11	29	8	2	12	16	30

World Wide Data Day 2023 (W2D2)

- Thu, November 9th
- for high school students, guided by physics teachers
- 43 participating classrooms from 12 countries
- simplified measurement with data from ATLAS and CMS
- 24-hour-span videoconference with 30 min calls to share and discuss results

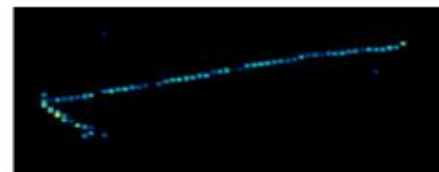
Very successful this year!



New developments: NOvA

NOvA Masterclass

- Piloted extensively in 2022 and 2023 with both teachers and students
- Students use coding to analyze data and uncover evidence of neutrino oscillations
- Regular offering in IMC 2024
- No combined results



Charged-Current
Interactions



Neutral Current
Interactions



New developments: CMS

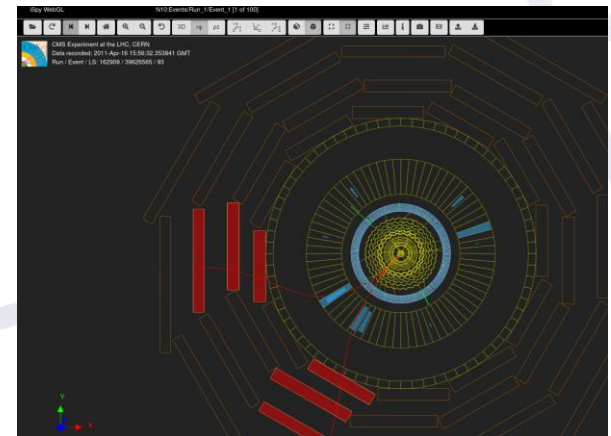
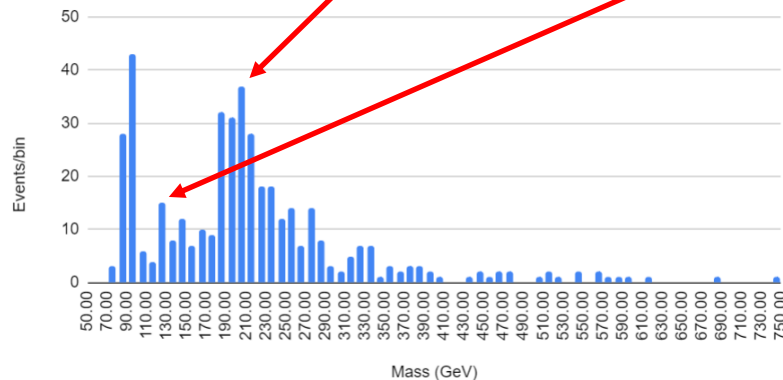
CMS

- Upgraded version of iSpy
- Enhanced 4l data (278 → 425 events)
- Pilot using google sheet instead of CIMA, only Fermilab!

Better definition

More events
around Higgs mass

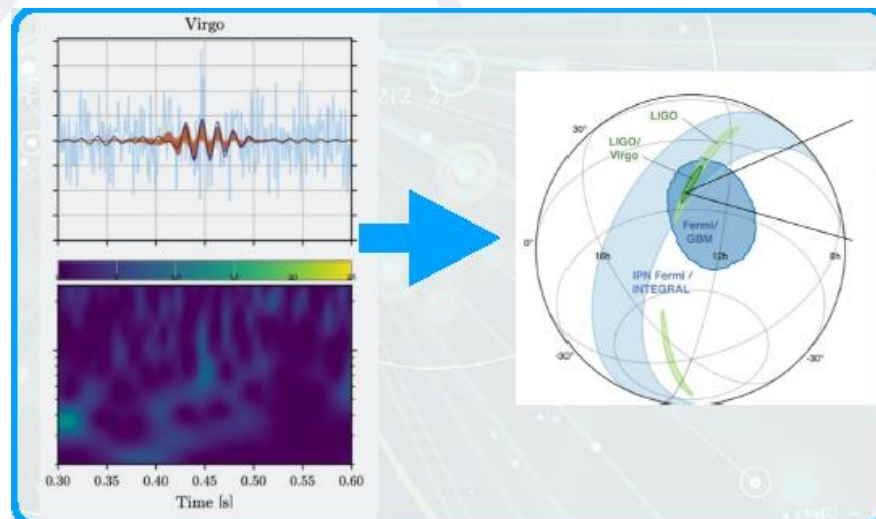
4-lepton mass histogram (enhanced)



New developments: GW Masterclas

Presentation by Gideon Koekoek and Manolis Chaniotakis

- Topics: data analysis and sky localisation
- Students match ringdown with known pattern
- Use timing from multiple detectors to determine direction in space



More from the SG Meeting

- New member Ezio Torassa („other consultant“)
- Other SG members are
 - Coordinators: Ken + Uta
 - one person from each measurement: Farid, Federico, Despina, Ralf, Rok, Yiota, Raul
 - other consultants (max. 3): Nicolas

Recent papers and presentations

- **Engaging teachers for informal education in modern physics.**
3rd African Conference on Fundamental and Applied Physics,
ACP2023

