TracerEVD for the IPPOG International Masterclasses

(ATLAS W exercise)

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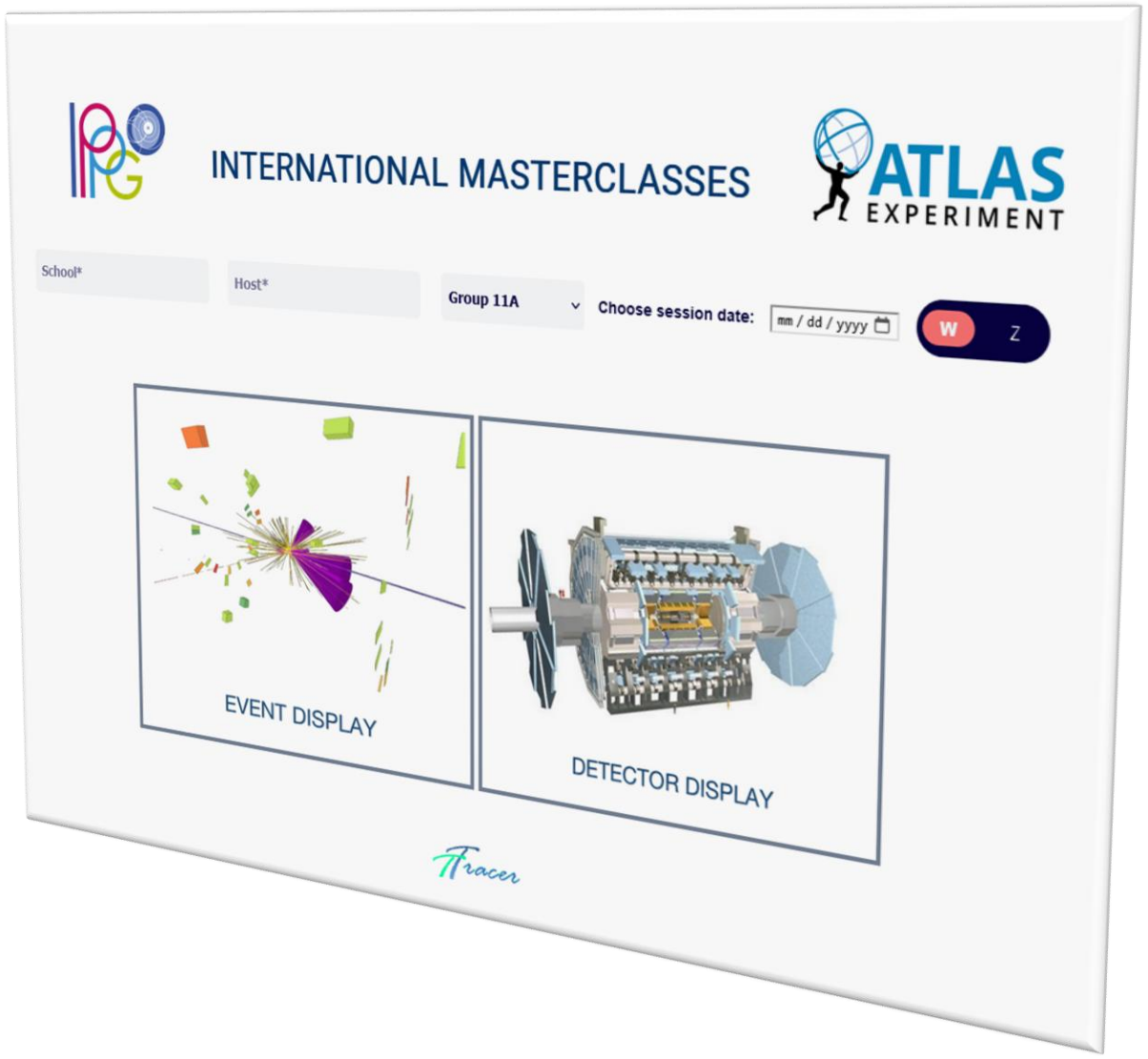
https://indico.cern.ch/event/1508488/

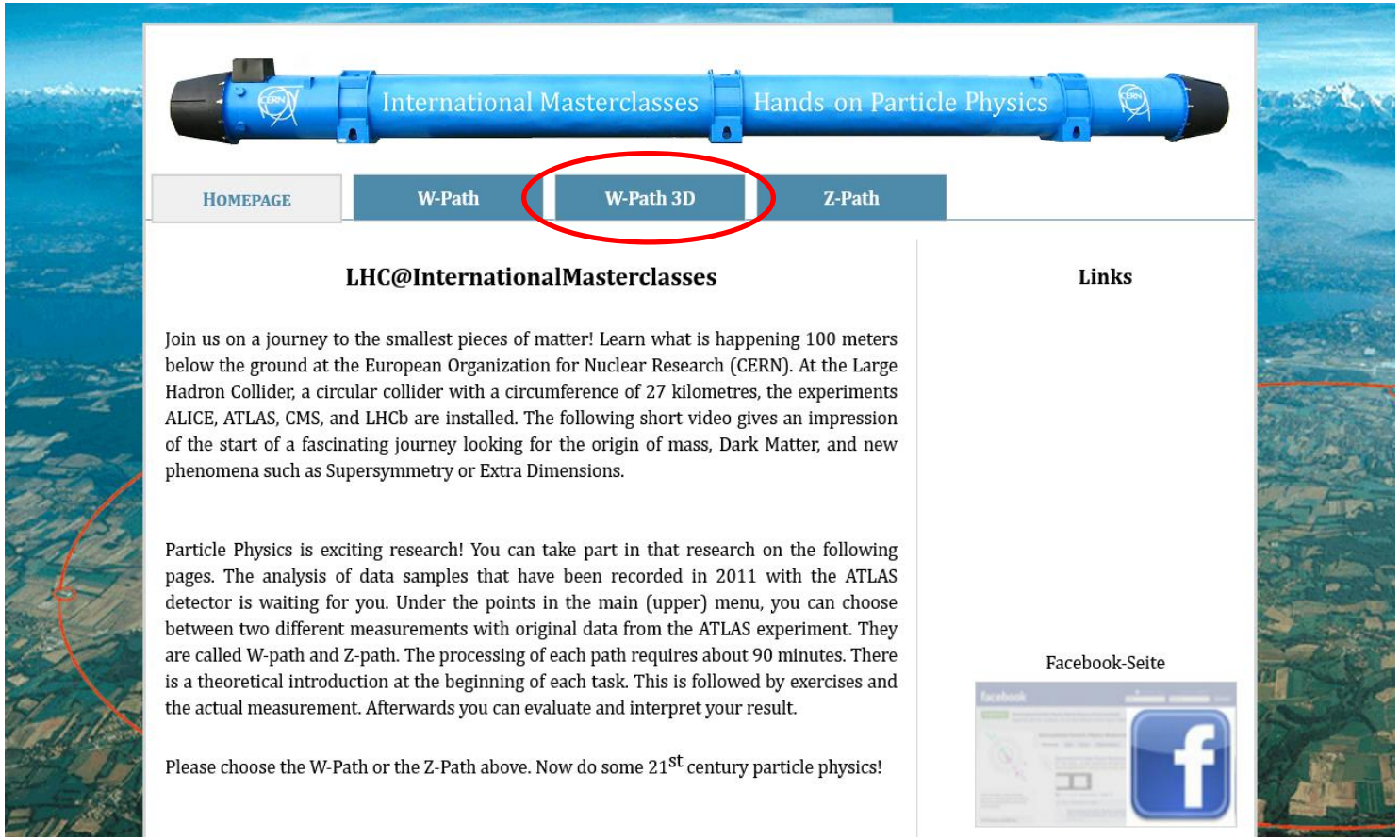
About

- Tracer EVD-MC is the browser-based 3-Dimensional event display for the ATLAS WW International masterclasses
- The application doesn't require installation and is compatible with most platforms, including portable devices



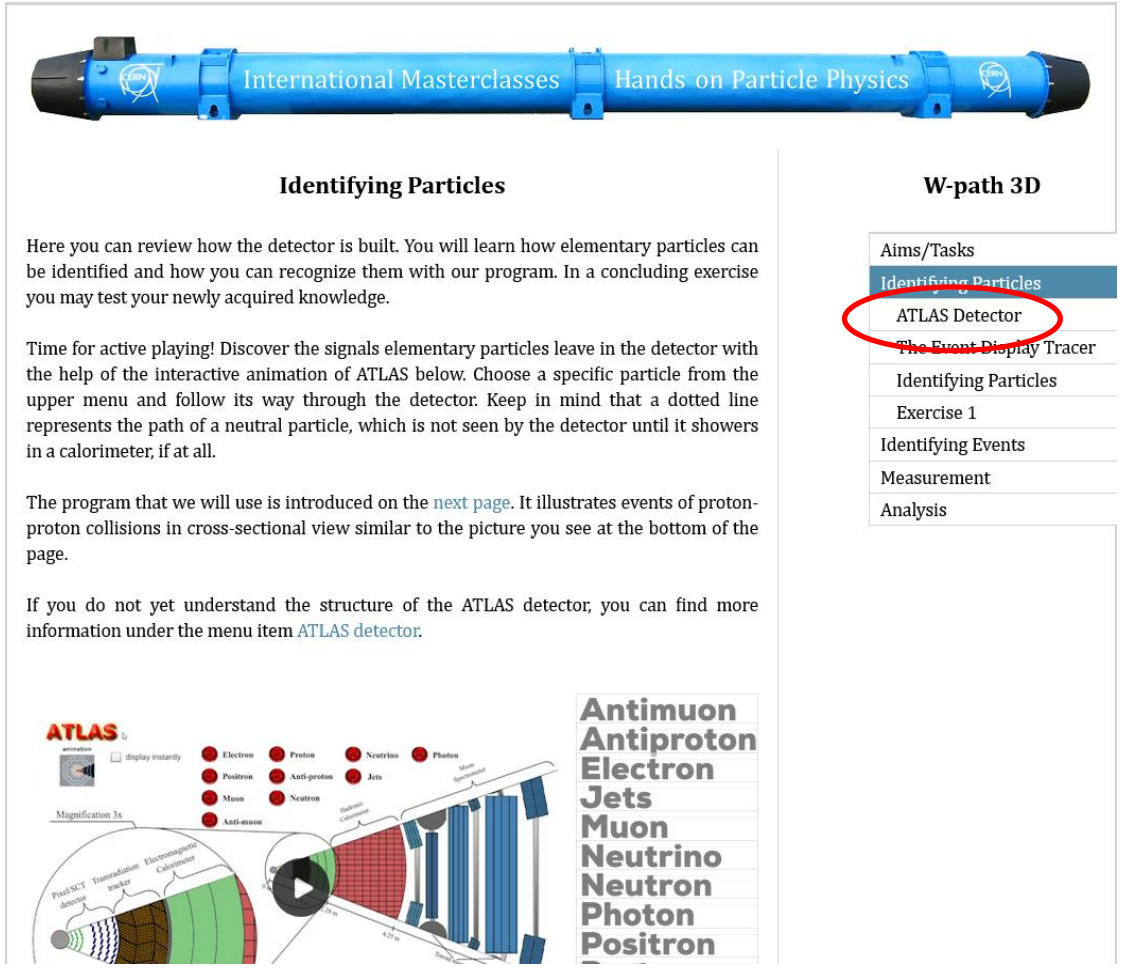
Masterclasses Website

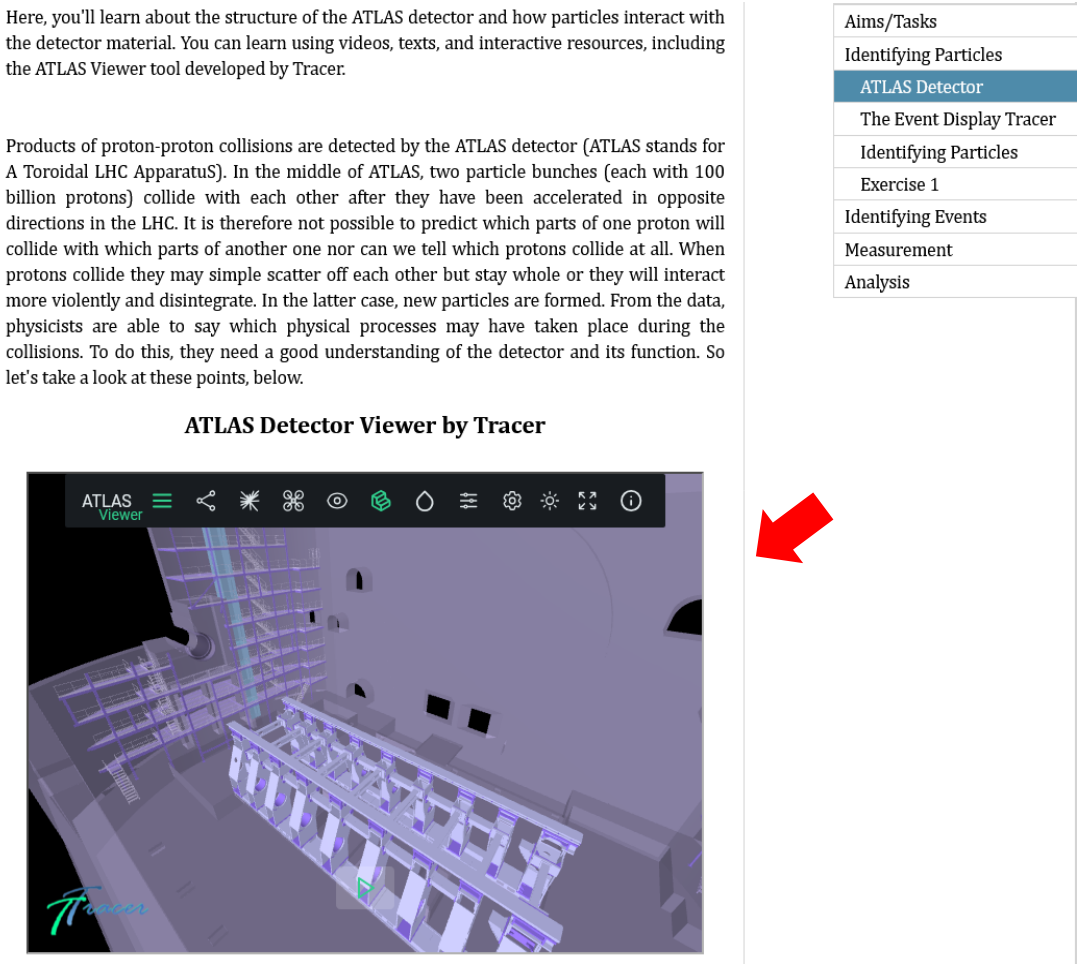
- Application is available through the official IPPOG Masterclasses website standalone additional tab (Thanks to Uta & Tim)
- The link is https://ippog-masterclasses-website.web.cern.ch



Masterclasses Website

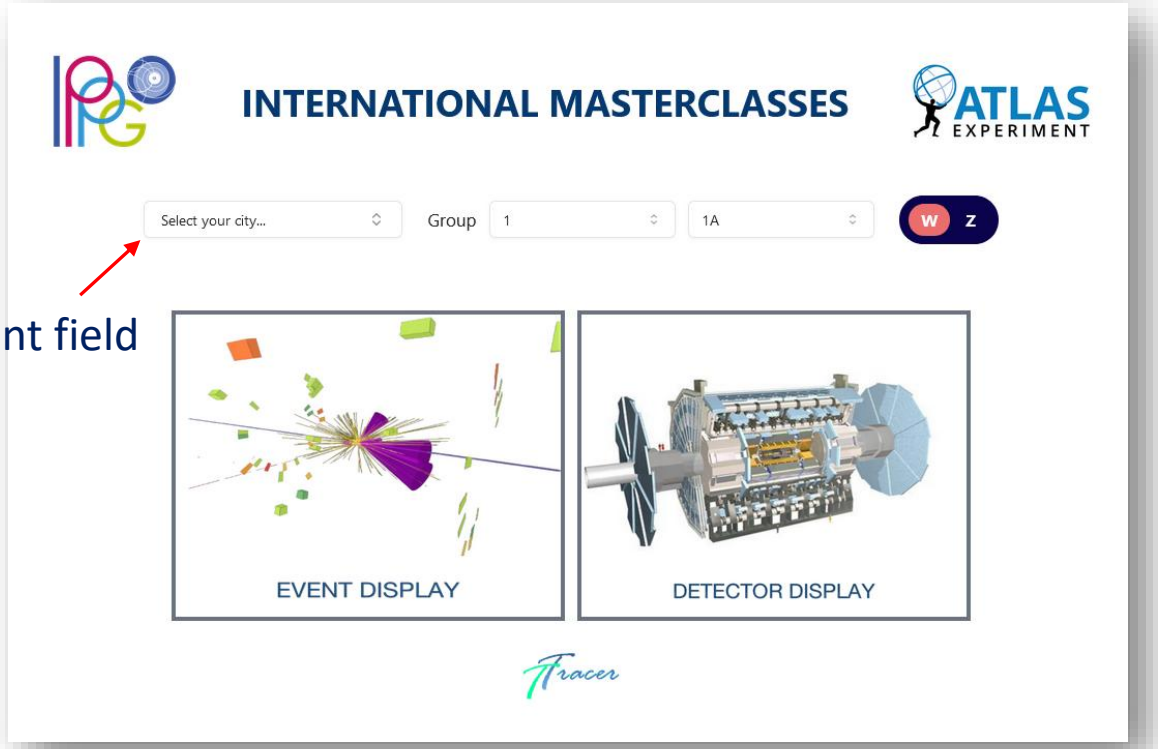
- We added Tracer 3D event Display functionalities and Screenshots
- The new ATLAS interactive 3D viewer is also available https://ippog-masterclasses-website.web.cern.ch



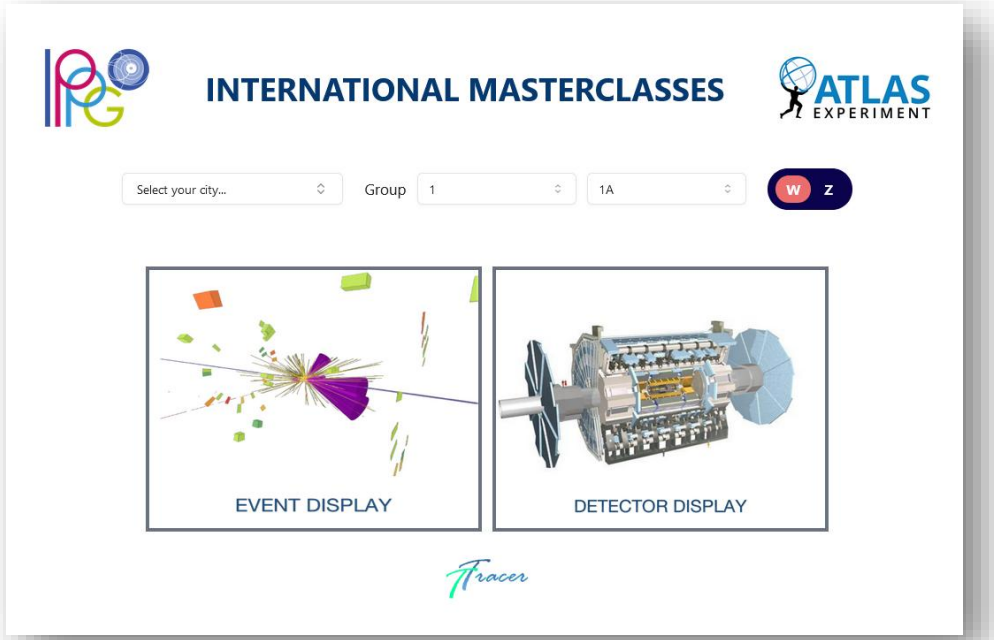


STEP#01: The Registration

- On the Masterclass session **Tracer-EVD**, the event display application should run by the link https://tracer-mc.web.cern.ch/
- After filling out all-important fields students can go to ATLAS viewer to learn the detector hardware or call the 3D event display to start analysing the events

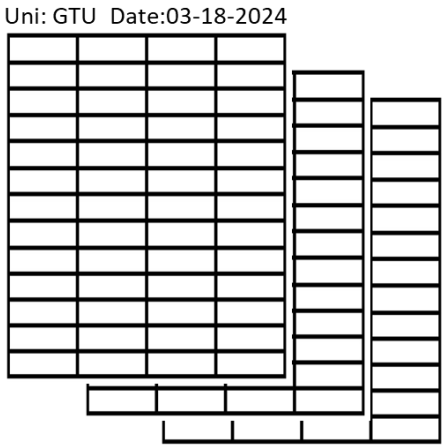


STEP#01: The Registration



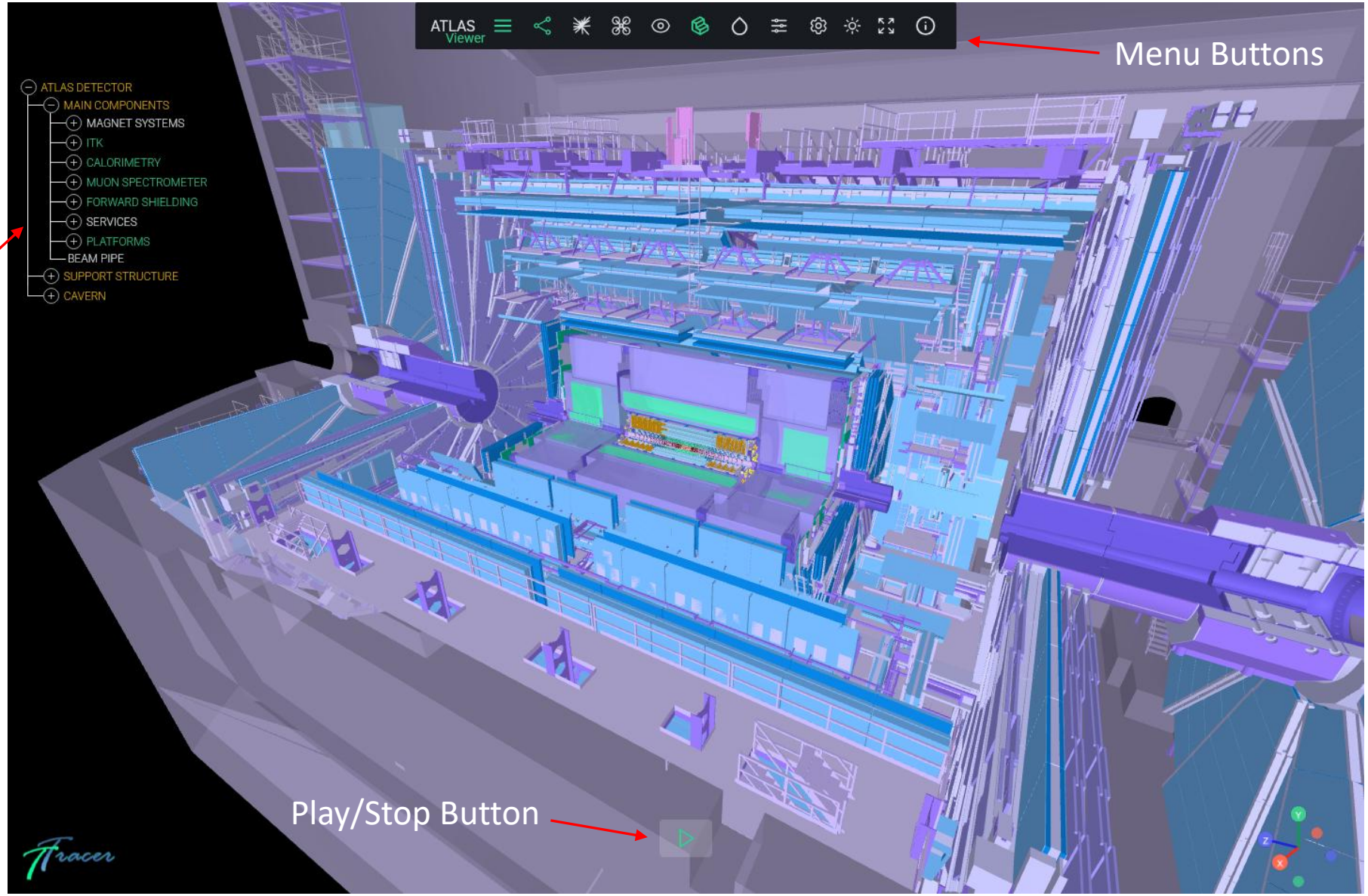
Registration

Masterclass Session



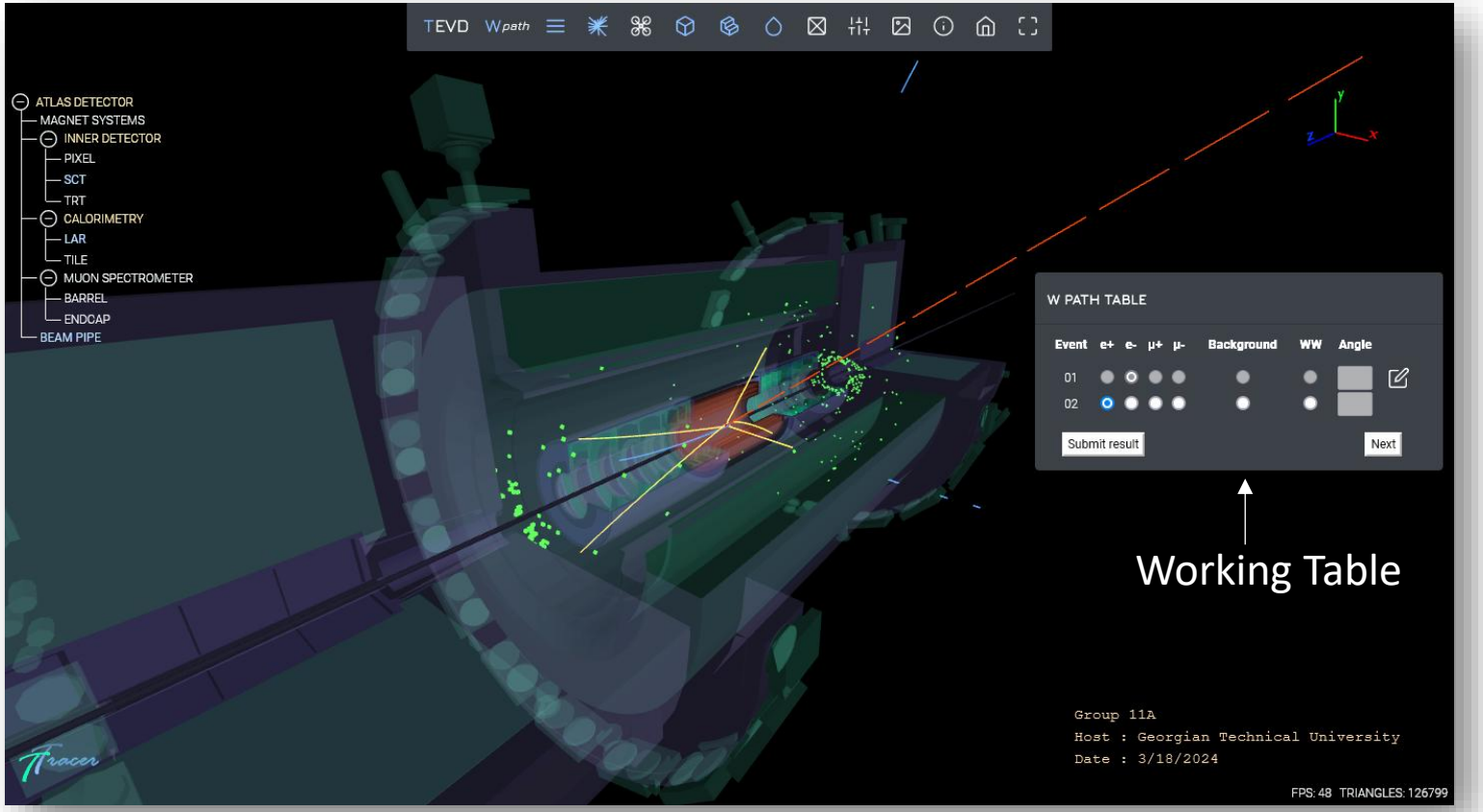
- City **name** + **date** create the unique table on the server where later all masterclasses results are accommodated
- Those tables are reachable by a separate link where the full history of the previous sessions is visible

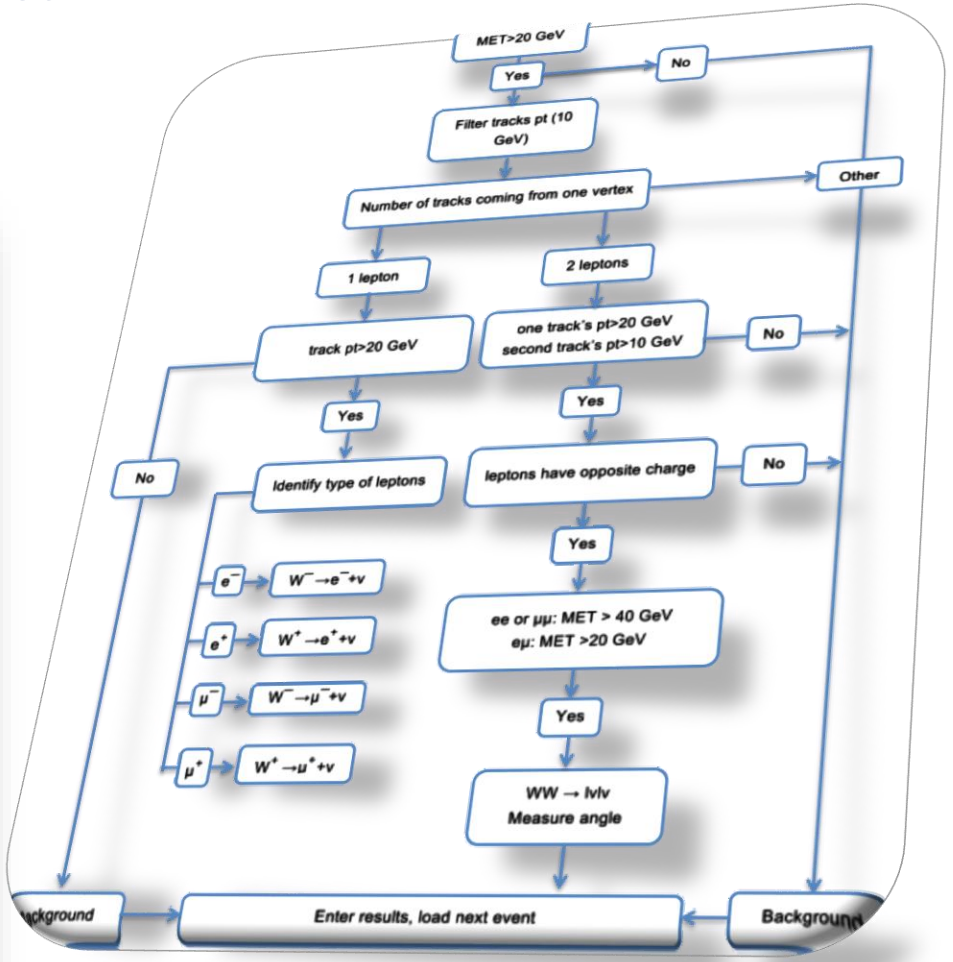
ATLAS Viewer



STEP#02: The Masterclass Session

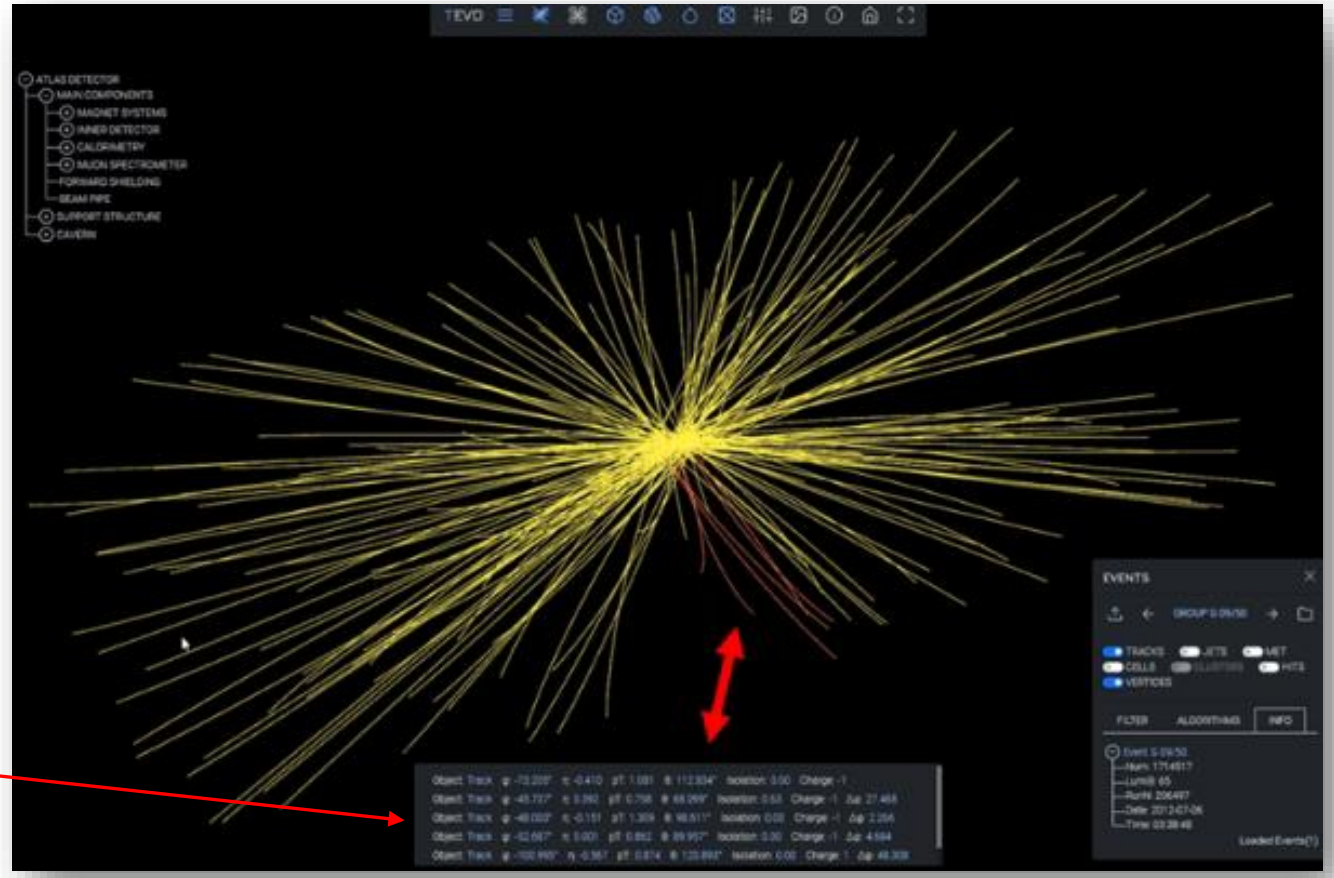
- Students follow the standard algorithm for event analyses and fill strings in the Working table





STEP#02: The Masterclass Session

- Tracks-Jets-MET are selectable
- Detailed parameters are available in the status bar
- Cuts and event-sensitive parameters are available in the Events window



STEP#03: Filling the IPPOG Analyses Table

Results

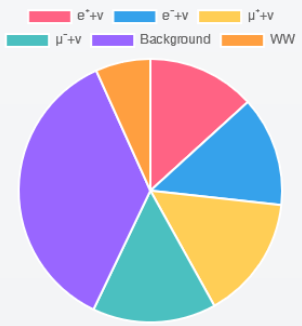
Home | All Results

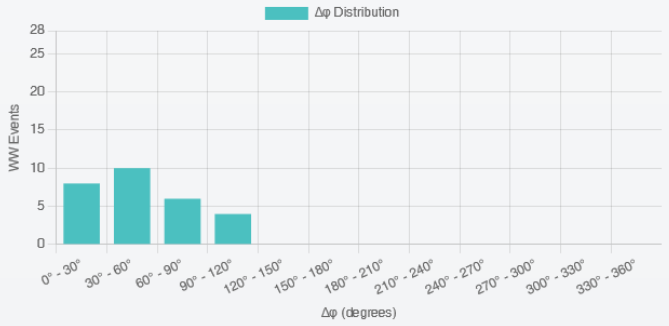
Valencia 11/17/2024

Search for groups

Download as Excel

Group Name	$e^+ + \nu$	$e^- + \nu$	$\mu^+ + \nu$	$\mu^- + \nu$	Background	WW	Δφ Angle
1A	4	4	4	4	10	2	20, 30
1B	5	5	5	5	12	0	
1C	4	4	4	4	9	2	45, 90
1D	6	6	6	6	14	3	45, 55, 95
1E	5	5	6	6	16	3	25, 45, 80
1F	3	4	4	4	10	2	15, 45
1G	5	5	5	5	13	3	20, 50, 100
1H	3	3	4	4	9	2	10, 70
1I	5	5	6	6	18	2	40, 60
Total	55	56	63	63	150	28	





Total #	$W \rightarrow ... + \nu$					
914	e^+	e^-	μ^+	μ^-	Background	WW
group A	8	2	6	5	29	0
group B	4	2	5	3	36	0
group C	9	12	0	0	28	6
group D	12	6	2	0	29	1
group E	8	6	2	0	30	4
group F	6	2	5	5	29	3
group G	10	6	5	4	24	1
group H	3	0	7	6	28	6
group I	2	2	1	3	2	0
group J	5	6	4	3	32	0
group K	4	6	7	3	30	0
group L	6	5	8	1	29	1
group M	8	4	5	7	26	0
group N	6	6	6	3	28	1
group O	3	2	3	4	34	4
group P	6	3	6	6	28	1
group Q	5	1	6	5	31	2
group R	5	4	3	3	31	3
group S	9	3	7	2	27	2
group T						
Total	119	78	88	63	531	35
$\Sigma\lvert W^+\rvert, \Sigma\lvert W^-\rvert$	$\lvert W^+\rvert$	207	$\lvert W^-\rvert$	141	$\lvert W^+\rvert + \lvert W^-\rvert$	348
Ratio	$\lvert W^+\rvert / \lvert W^-\rvert$			1.47	±	0.16

- Tracer Implementation in the Masterclasses

Masterclass Experience – Georgian Technical University

- Georgian Technical University, 1st of March 2024

International Masterclasses
Organized by International Particle Physics Outreach Group

Participant Universities:
AGH UST Krakow Poland
UAM/CSIC Madrid Spain
GTU Tbilisi Georgia

Organized by:
MINISTRY OF EDUCATION, SCIENCE AND YOUTH OF GEORGIA
Georgian Technical University
Faculty of Informatics and Control Systems
Nuclear Engineering Center

Friday 1 March 2024

TimeTable

10:30-11:00	Registration	
11:00-12:00	Open Ceremony	
12:00-12:50	Lecture 1 :	About the CERN and IPPOG Prof Alexander Sharmazanashvili Georgia
13:00-14:00	Lecture 2 :	High Energy Physics and LHC experiments Prof Hans-Peter Beck Switzerland
14:15-15:00	Lecture 3:	Detector Technologies Prof Alexander Sharmazanashvili Georgia
15:00-16:00	Lunch	
16:00-16:55	Lecture 4:	Tracer Application Dr Niko Tsutskiridze Georgia
17:00-17:55	Practical Session	IPPOG Exercises M.Nozadze, S. Vashakidze, V. Dolinski, A. Alikhanov
18:00-18:30	Practical Session	Quiz
18:30-19:00	Practical Session	Webinar training Salome Vashakidze
19:00-20:00	CERN Videoconference	Dr Tadej Novak CERN Switzerland
20:00	Award of the Certificates	

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77, Kostava Street
Georgian Technical University
Conference hall
IX Building 4th floor

Contact Person:
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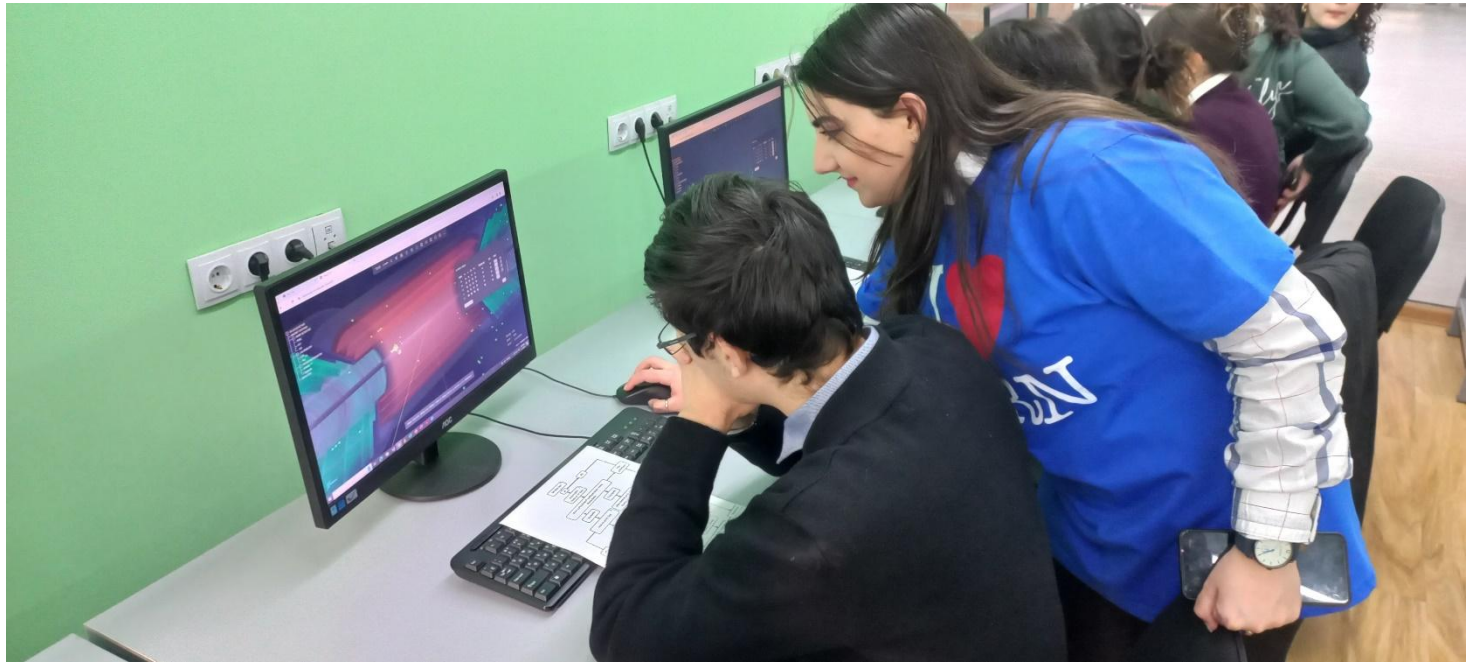
Partner Universities:

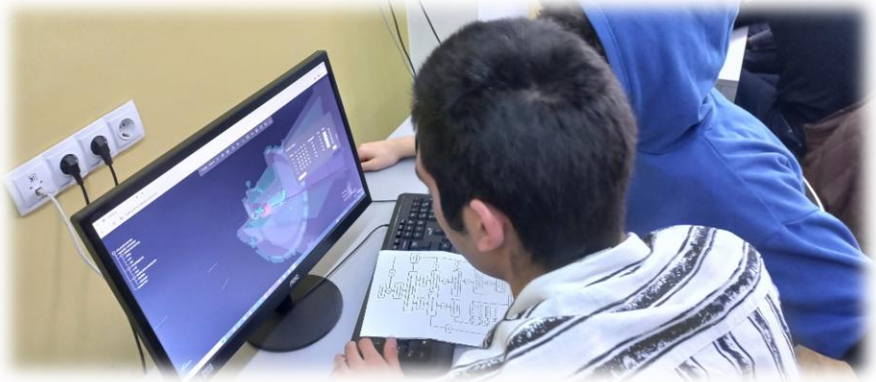
- Krakow University AGH UST, Poland
- Madrid University UAM/CSIC, Spain

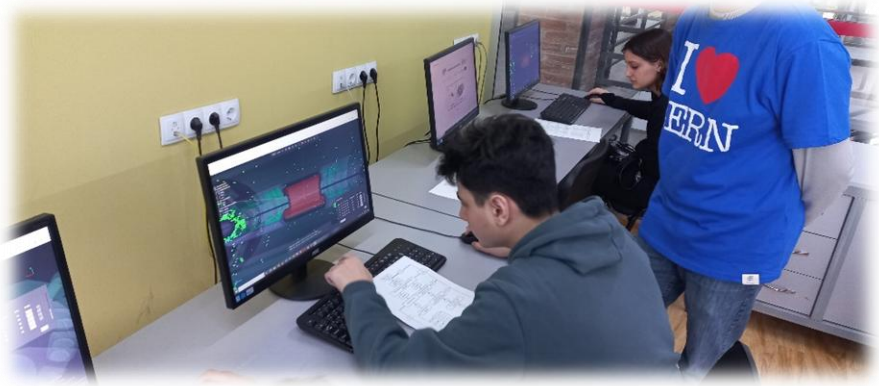
Participants: 36 students from 24 schools of Tbilisi region

Masterclass Experience – Georgian Technical University

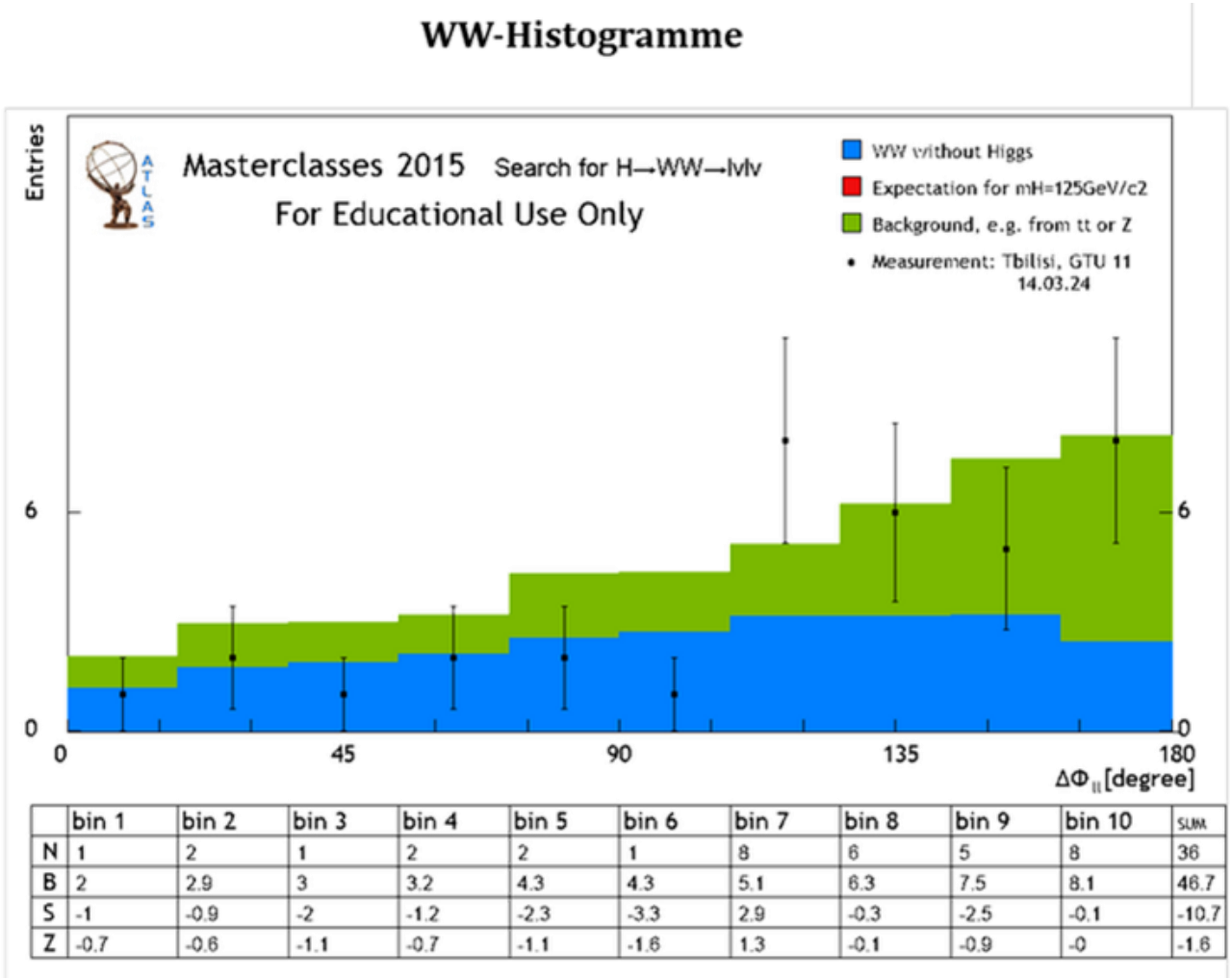


- Done on the 30 Workstations





Masterclass Experience – Georgian Technical University



	bin 1	bin 2	bin 3	bin 4	bin 5	bin 6	bin 7	bin 8	bin 9	bin 10	SUM
N	1	2	1	2	2	1	8	6	5	8	36
B	2	2.9	3	3.2	4.3	4.3	5.1	6.3	7.5	8.1	46.7
S	-1	-0.9	-2	-1.2	-2.3	-3.3	2.9	-0.3	-2.5	-0.1	-10.7
Z	-0.7	-0.6	-1.1	-0.7	-1.1	-1.6	1.3	-0.1	-0.9	-0	-1.6

Masterclass activities:

- Krakow - 1’109 events
- Madrid - 2’208 events
- Tbilisi - 914 events

Masterclass Experience – Kutaisi International University

- Kutaisi International University, 6th of March 2024

International Masterclasses
Organized by International Particle Physics Outreach Group

Participant Universities:
Brookhaven National Laboratory USA
University of Valencia Spain
National Laboratory Yerevan Armenia
KIU Kutaisi Georgia

Organized by:
MINISTRY OF EDUCATION, SCIENCE AND YOUTH OF GEORGIA
Georgian Technical University Faculty of Informatics and Control Systems
Nuclear Engineering Center

Wednesday 6 March 2024

TimeTable

10:30-11:00	Registration	
11:00-12:00	Open Ceremony	
12:00-12:50	Lecture 1 :	About the CERN and IPPOG Prof Alexander Sharmazanashvili Georgia
13:00-14:00	Lecture 2 :	High Energy Physics and LHC experiments Prof Dario Barberis Switzerland
14:15-15:00	Lecture 3:	Detector Technologies Prof Alexander Sharmazanashvili Georgia
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18:00-18:30	Practical Session	Quiz
18:30-19:00	Practical Session	Webinar training MSc Nino Zurashvili Georgia
19:00-20:00	CERN Videoconference	Dr Tadej Novak CERN Switzerland
20:00	Award of the Certificates	

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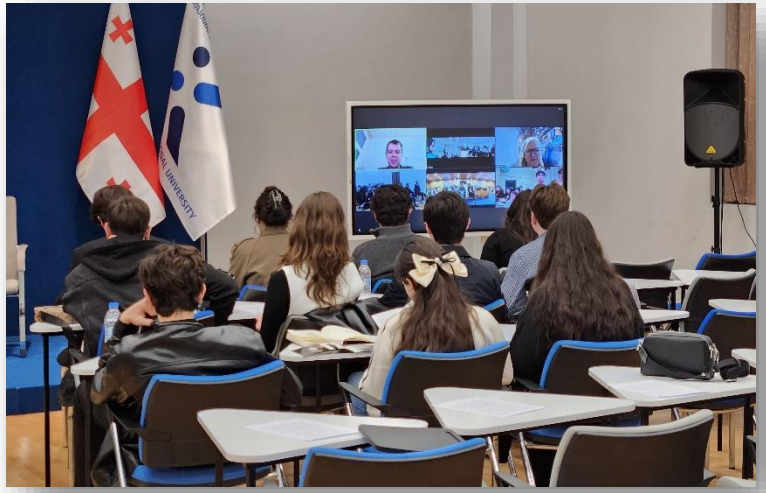
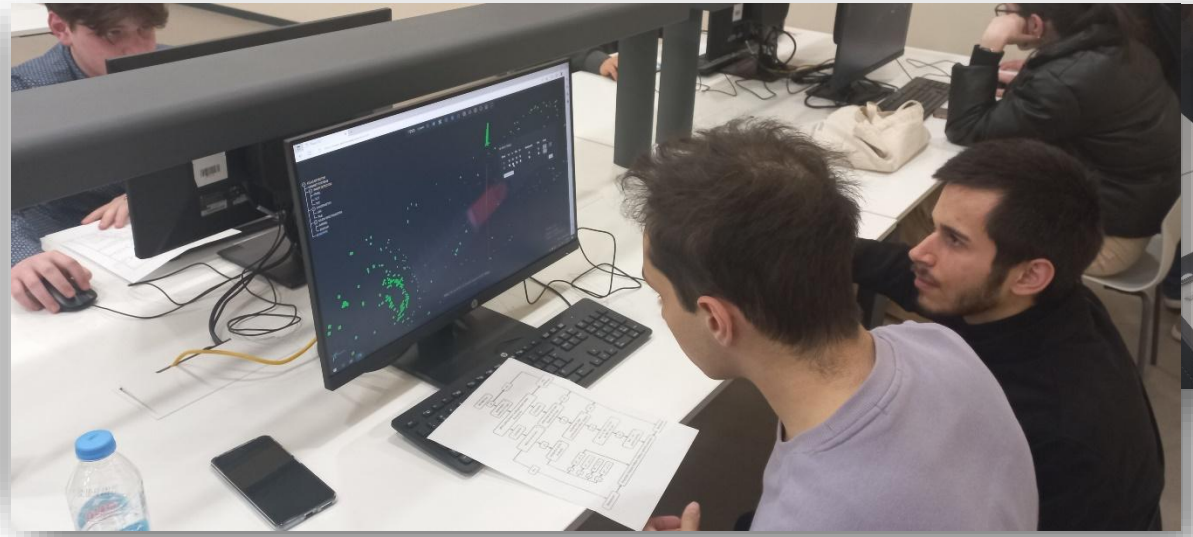
Partner Universities:

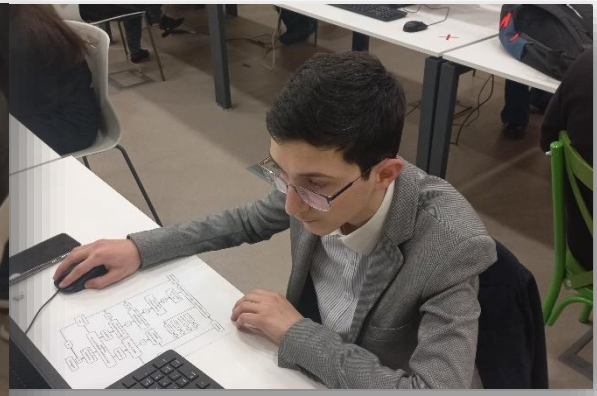
- Brookhaven National Laboratory, USA
- University of Valencia, Spain
- Yerevan National Laboratory, Armenia

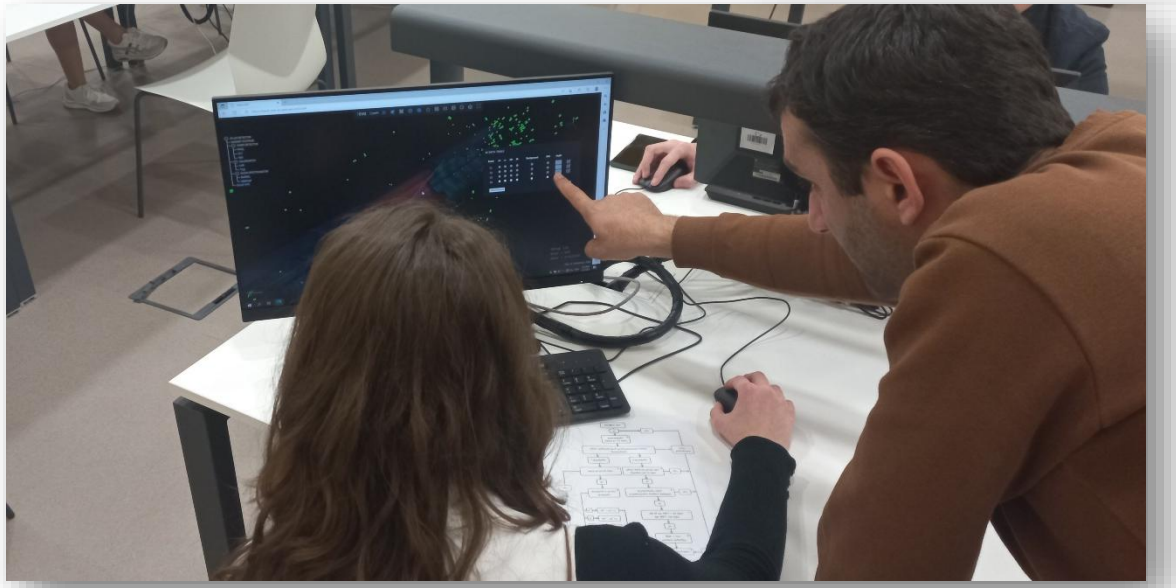
Participants: 29 students from 11 Schools of the Kutaisi region, West Georgia

Masterclass Experience – Kutaisi International University



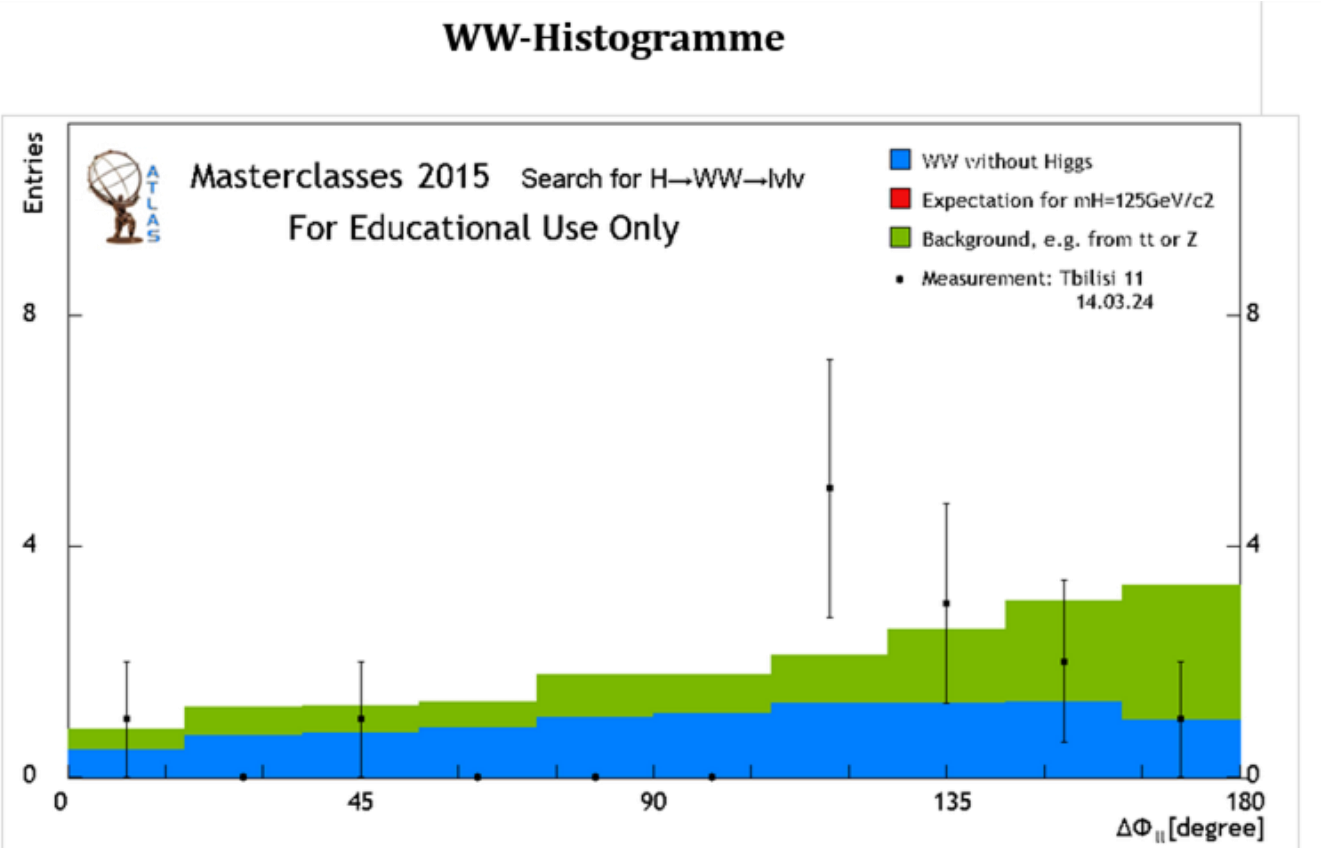






- Done on the 45 Workstations

Masterclass Experience – Kutaisi International University



	bin 1	bin 2	bin 3	bin 4	bin 5	bin 6	bin 7	bin 8	bin 9	bin 10	SUM
N	1	0	1	0	0	0	5	3	2	1	13
B	0.8	1.2	1.2	1.3	1.8	1.8	2.1	2.5	3	3.3	19
S	0.2	-1.2	-0.2	-1.3	-1.8	-1.8	2.9	0.5	-1	-2.3	-6
Z	0.2	-1.1	-0.2	-1.1	-1.3	-1.3	2	0.3	-0.6	-1.3	-1.4

Masterclass Activity:

- Brookhaven - 346 events
- Valencia - 1’920 events
- Yerevan - 0 events
- Kutaisi - 876 events

Masterclass Experience – Telavi State University

- Telavi State University, 18th of March 2024

International Masterclasses
Organized by International Particle Physics Outreach Group

Participant Universities:
University of Roma, Rome Italy
TU Dresden, Dresden Germany
University of Bonn, Bonn Germany
Telavi State University, Telavi Georgia

Organized by:
MINISTRY OF EDUCATION, SCIENCE AND YOUTH OF GEORGIA
Telavi State University
Georgian Technical University Faculty of Informatics and Control Systems
Nuclear Engineering Center

Monday 18 March 2024

TimeTable

10:30-11:00	Registration	
11:00-12:00	Open Ceremony	
12:00-12:50	Lecture 1 :	About the CERN and IPPOG Prof Alexander Sharmazanashvili Georgia
13:00-14:00	Lecture 2 :	High Energy Physics and LHC experiments Prof Hans-Peter Beck Switzerland
14:15-15:00	Lecture 3:	Detector Technologies Prof Alexander Sharmazanashvili Georgia
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20:00	Award of the Certificates	

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Partner Universities:

- Rome University, Italy
- Technical University of Dresden, Germany
- Bonn University, Germany

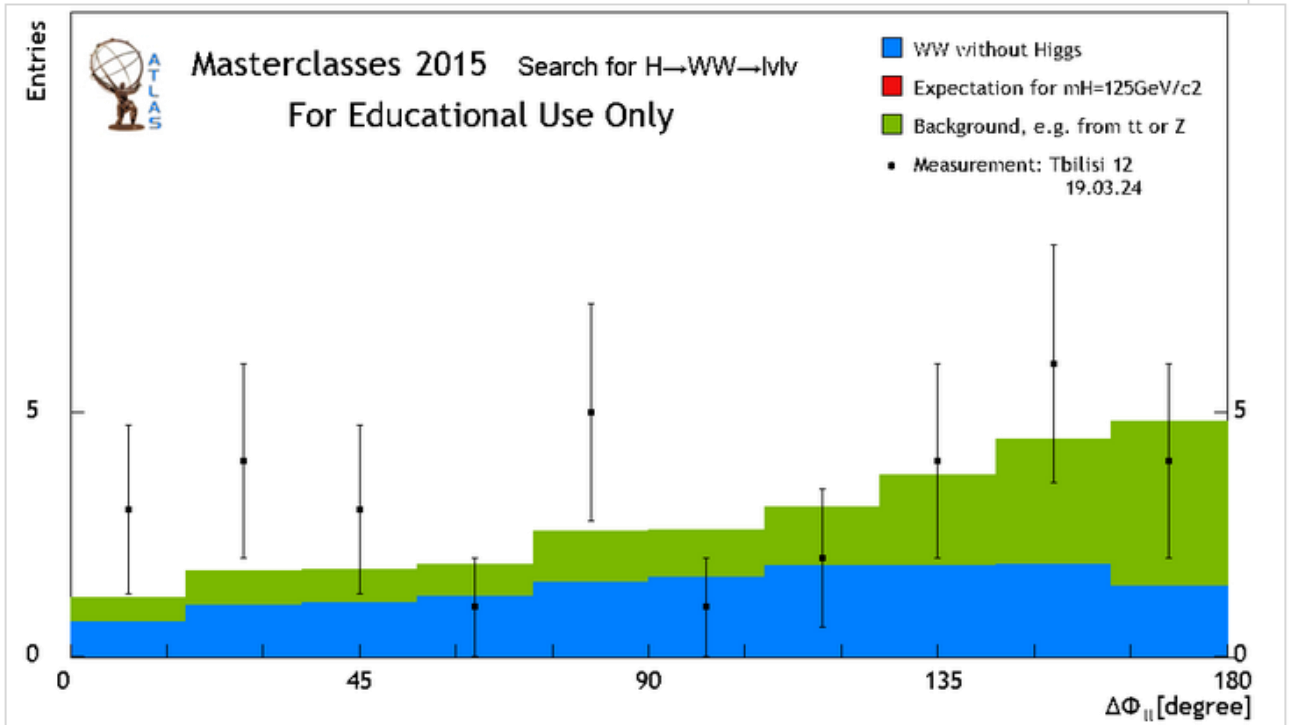
Participants: 40 students from 16 schools of the Telavi region, East of Georgia

Masterclass Experience – Telavi State University

- Done on the 40 Workstations

Masterclass Experience – Telavi State University

WW-Histogramme



	bin 1	bin 2	bin 3	bin 4	bin 5	bin 6	bin 7	bin 8	bin 9	bin 10	SUM
N	3	4	3	1	5	1	2	4	6	4	33
B	1.2	1.7	1.8	1.9	2.6	2.6	3	3.7	4.4	4.8	27.7
S	1.8	2.3	1.2	-0.9	2.4	-1.6	-1	0.3	1.6	-0.8	5.3
Z	1.6	1.7	0.9	-0.6	1.5	-1	-0.6	0.2	0.7	-0.4	1

Masterclass Activity:

- Rome - 1’421 events
- Dresden - 716 events
- Bonn - 131 events
- Telavi - 1’956 events

- What we learned from Masterclasses

Feedbacks from the Masterclasses

II. Hardware issue

- Host university accommodate masterclass sessions in the library computers.
- Those computers were moderate with CPU/GPU parameters but were weak with amount of the RAM, about 2Mb
- As a result, Tracer was halted after the analyses about 22 events, and students were restarting the session from the beginning
- Slightly numbers were improving after the hidden geometries in the scenes

III. Manual work at the end

- Final results should be filled in the Physics analyses manually from the tables generated by the Tracer.

Feedbacks from the Masterclasses

Important Advantages of the Tracer

1. Events analyses are easy and fast. About 20 minutes are needed to proceed with all 50 events in the group. Therefore, in the future, with Tracer it is possible to proceed with more events in the masterclass sessions
2. With 3D scenes events are more visible and understandable for the students
3. Realistic representation of the detector components increases the cognitive ability of the application and makes it more enjoyable for the students
4. Compatibility with the majority of the platforms makes Tracer as a universal event display tool
5. No requirements in installation make Tracer an easy and reliable tool for use
6. Compatibility with portable devices makes it possible to extend the participant list in the classes without the involvement of extra workstations
7. A number of reliable parallel working sessions testified in the masterclasses is 50

Check more Applications here https://tracer.web.cern.ch

Comments are welcome
Lasha.sharmazanashvili@cern.ch

Thanks!