

INTERNATIONAL BELLE II MASTERCLASSES HANDS ON PARTICLE PHYSICS



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Jennifer2 General Meeting @ KEK, June 2, 2024



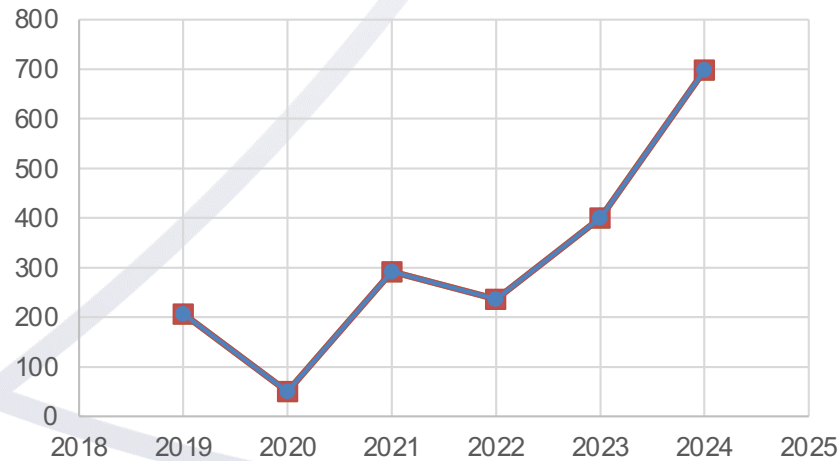
HISTORY OF BELLE II IMC

- 2019 – pilot run – spectroscopy (Blab application)
 - accepted in the IPPOG IMC program
- 2020 almost all events cancelled due to Covid
- 2021 majority of events online
- 2022 recovery - new exercise (Quark colors)
- 2023 Blab application – constant improvements
 - New data samples + updates in the processing
- 2024 rising number of participants

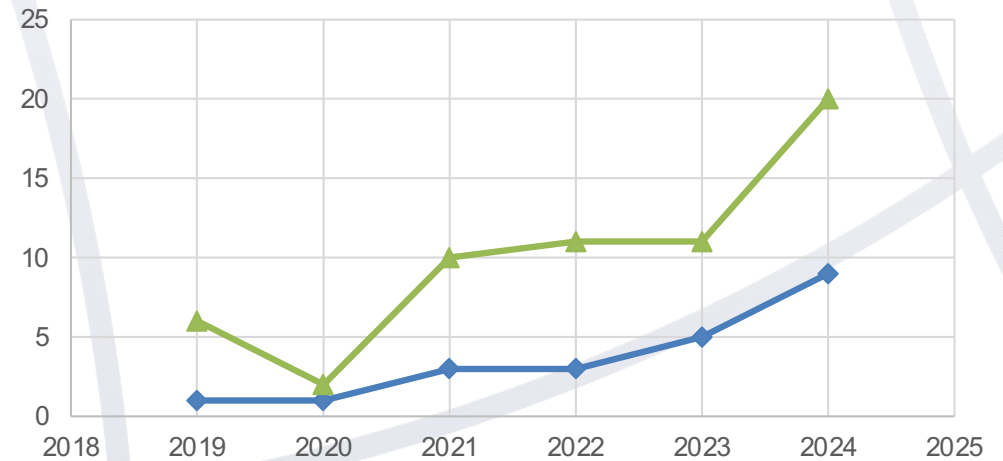
ATTENDANCE STATISTICS

| Year | Participants | Groups | Regions | Events |
|------|--------------|--------|---------|------------------------------|
| 2019 | 206 | 6 | 1 | 1 |
| 2020 | 50 | 2 | 1 | 1 * Covid19 |
| 2021 | 292 | 10 | 1 | 3 * Fully remote |
| 2022 | 236 | 11 | 1 | 3 * restrictions/ post Covid |
| 2023 | 400 | 11 | 3 | 5 |
| 2024 | 698 | 20 | 4 | 9 |

Number of participant at Belle2 Masterclasses



Number of groups/ events at Belle2 Masterclasses



BELLE II IMC IN 2024

Total **~630** participants – **58% more than in 2023**

- ❖ 9 events announced through IMC and Belle II collaboration channels
- ❖ **New participants from Armenia, Japan & India**
 - ❖ **Events: EU x4, US x2, JP x1, IN x2**



| Date | Institutes | Region | Participants |
|---------|------------|--------|--------------|
| Mar. 5 | 2 | EU | 44 |
| Mar. 13 | 3 | EU | 85 |
| Mar. 26 | 6 | EU | 301 |
| Feb. 23 | 1 | EU | 40 |
| Mar. 30 | 2 | JP | 30 |
| Mar. 5 | 2 | US | 98 |
| Mar. 21 | Quarknet | US | ? |
| May 2 | 2 | IN | 39 |
| May 10 | 12 | IN | ~60 |

- ❖ Feb.1: Instructor Tutorial @Belle II General Meeting
- ❖ Feb. 28: Question time
- ❖ Recorded instructions
- ❖ Video conference
 - ❖ live connection to Belle II Control room
 - ❖ Quiz: Belle II app and voting system – allows group ranking

| | INFN Pisa | INFN Padova | INFN Roma | INFN Torino | Uppsala Uni | CPP IN2P3 |
|--------|-----------|-------------|-----------|-------------|-------------|-----------|
| Points | 96 | 74 | 100 | 96 | 100 | 100 |
| Total | 716 | 620 | 740 | 758 | 771 | 800 |



BELLE II – 2024 EXERCISES



Two exercises – Free choice of the participating institution:

❖ Spectroscopy – enriched data samples -10 Mevents – at 8 sites

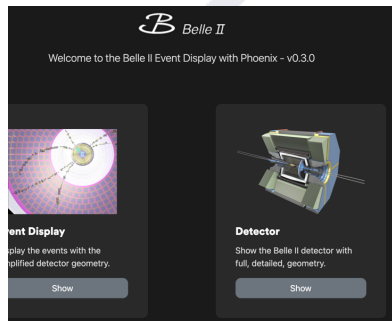
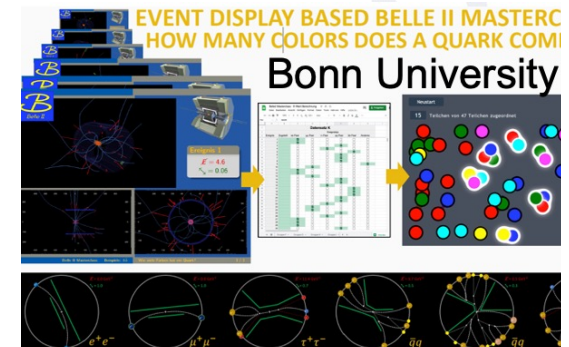
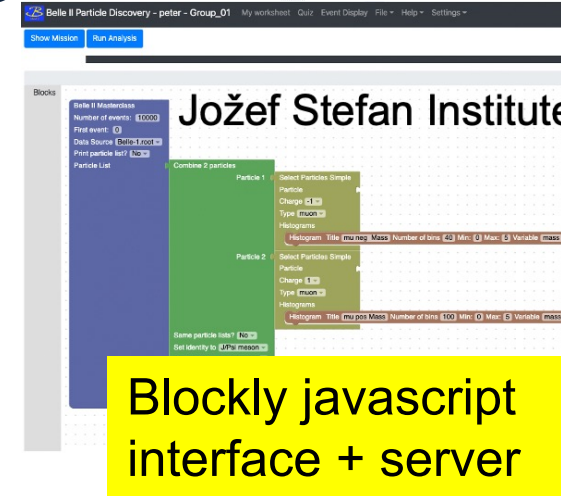
- <https://belle2.ijs.si/masterclass/> - runs on the server + client browser
→ improved advanced mode for Uni Students with additional likelihood cuts

❖ Measure quark colors - at 8 sites

- <https://belle2.ijs.si/public/home/quark-colors/>
- similar to LHC experiments : limited set of events

❖ Support materials:

- ❖ New Event display: <https://display.belle2.org/>
- ❖ Virtual reality
[https://store.steampowered.com/app/810020/Belle II in Virtual Reality/](https://store.steampowered.com/app/810020/Belle_II_in_Virtual_Reality/)



→ mixed video conferences:
Students presented different exercises to each other

❖ Plans: Increase participation and organize IMC in new regions (CN)



PLANS

1. Involve more groups (Belle 2 / non Belle2)
2. Improve documentation
3. Can we integrate the needs of the other experiments ?
4. Visibility at the conferences – outreach sessions

