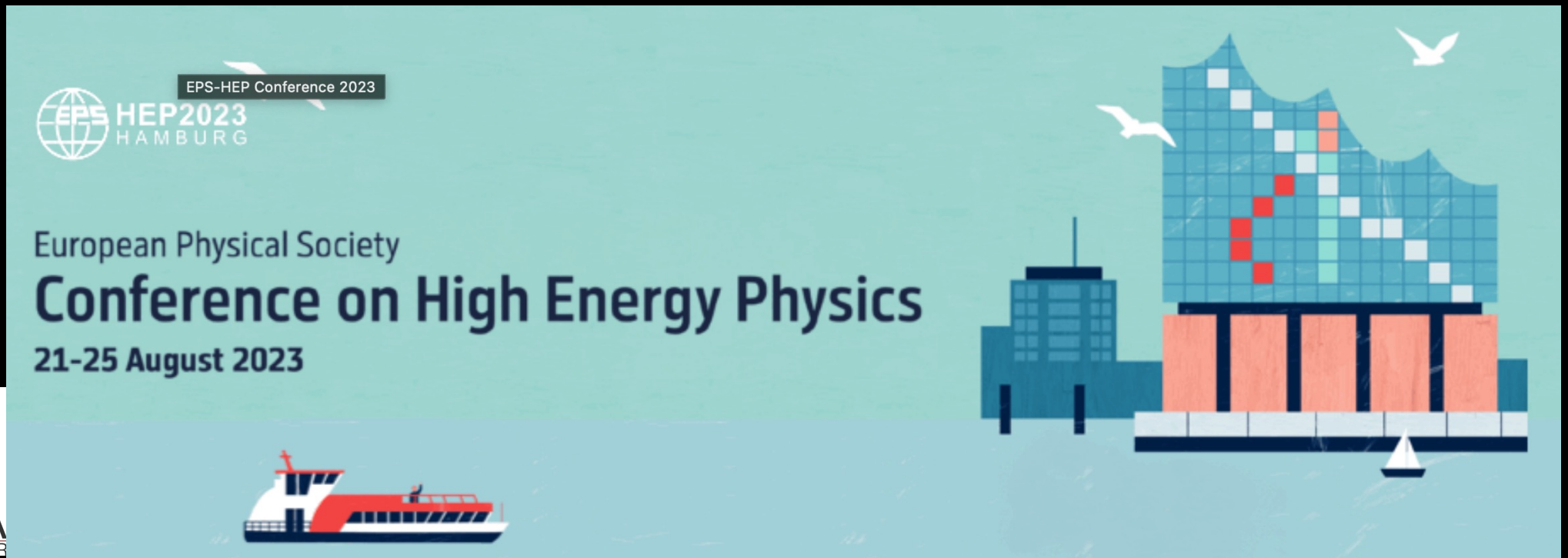
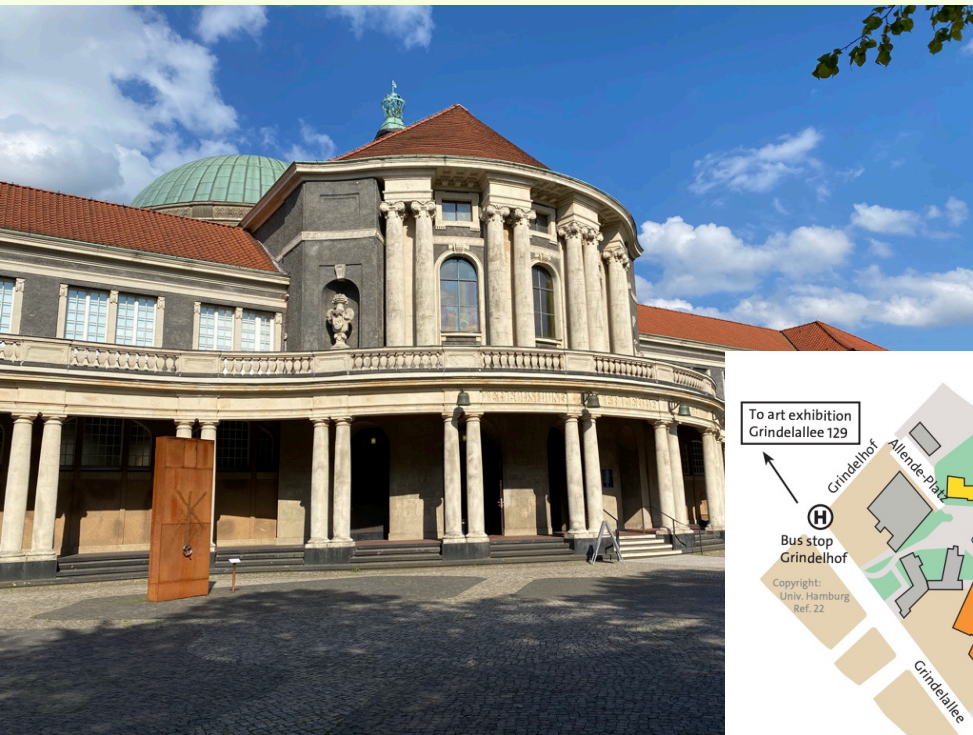


EPS-HEP 2023 reports

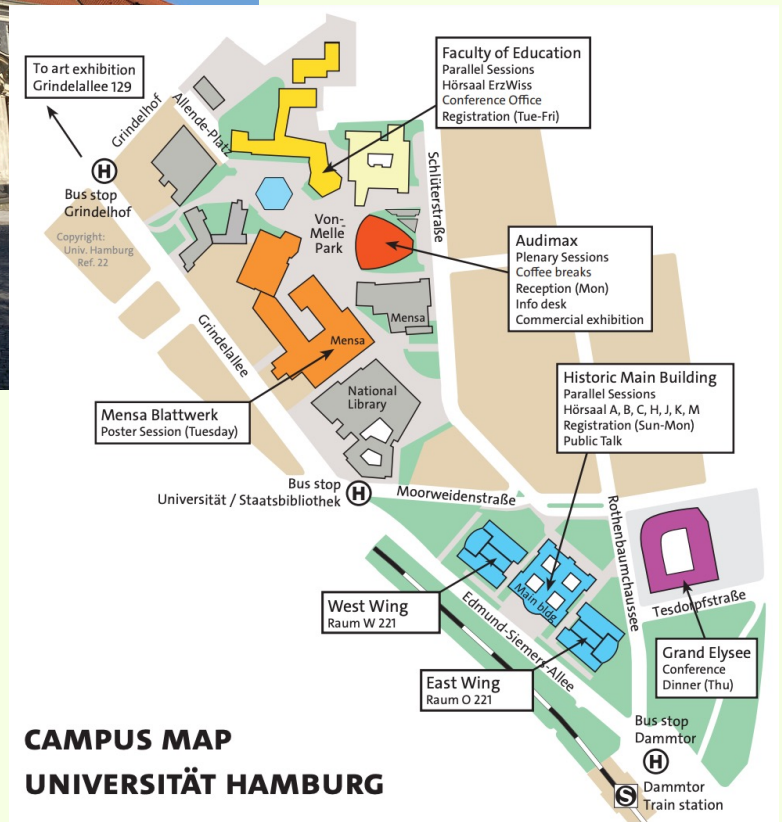


RIKEN (JRA)
Takuya Kumaoka

EPS-HEP 2023 (Hamburg)



Historic Main Building

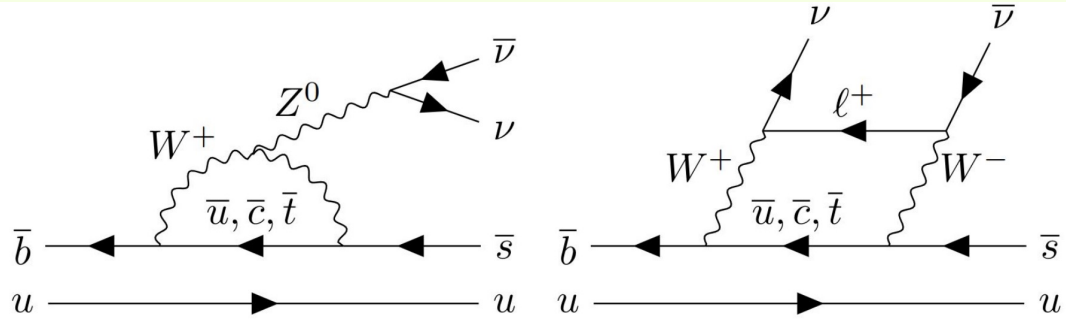


Topics:

- Astroparticle Physics and Gravitational Waves
- Gravitation and Cosmology
- Dark Matter
- Neutrino Physics
- Ultra-relativistic nuclear collisions
- QCD and Hadronic Physics
- Top and Electroweak Physics
- Flavour Physics and CP Violation
- Higgs Physics
- Searches for New Physics
- Quantum Field and String Theory
- Detector R&D and Data Handling
- Accelerators for HEP
- Outreach, Education and EDI

Belle-II news

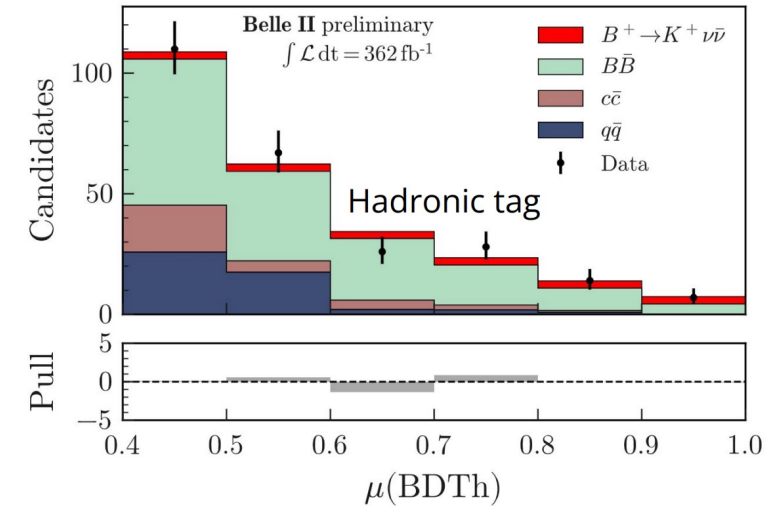
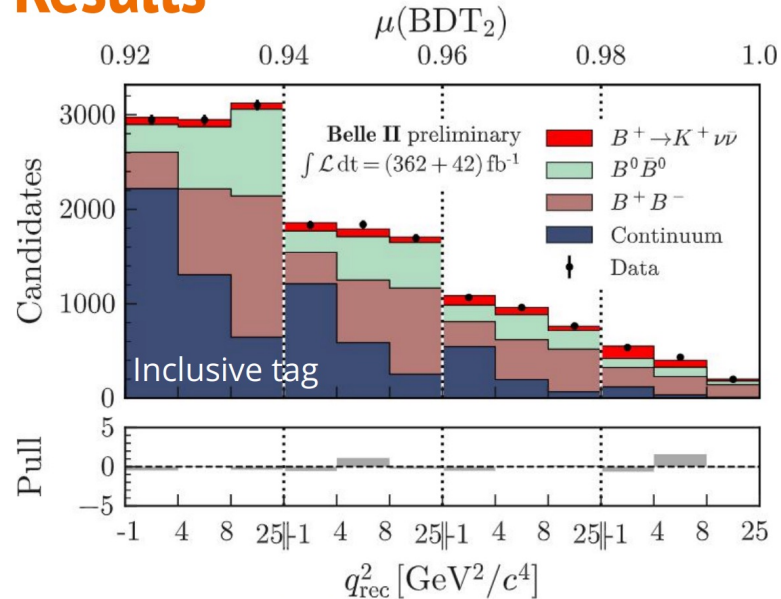
<https://indico.desy.de/event/34916/contributions/149769/attachments/84417/111854/Belle%20II%20highlights.pdf>



The $B \rightarrow K^+ \nu \bar{\nu}$ process is known with high accuracy in the SM:

$$B(B \rightarrow K^+ \nu \bar{\nu}) = (5.6 \pm 0.4) \times 10^{-6} \quad (\text{arXiv:2207.13371})$$

Results

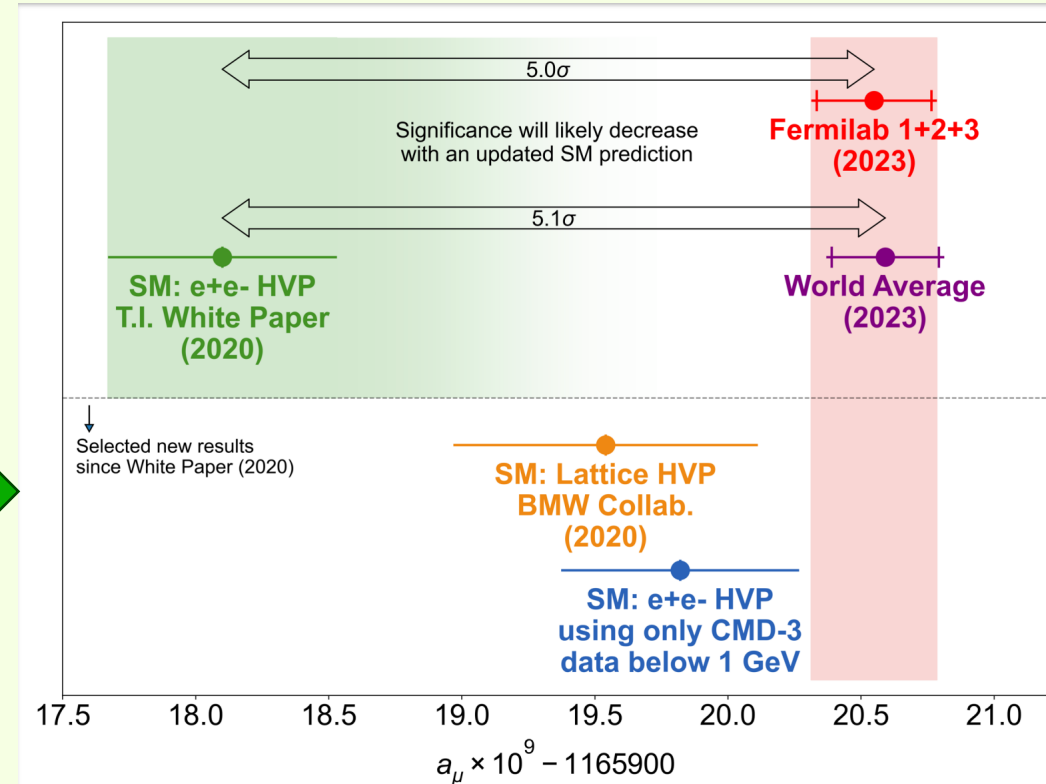
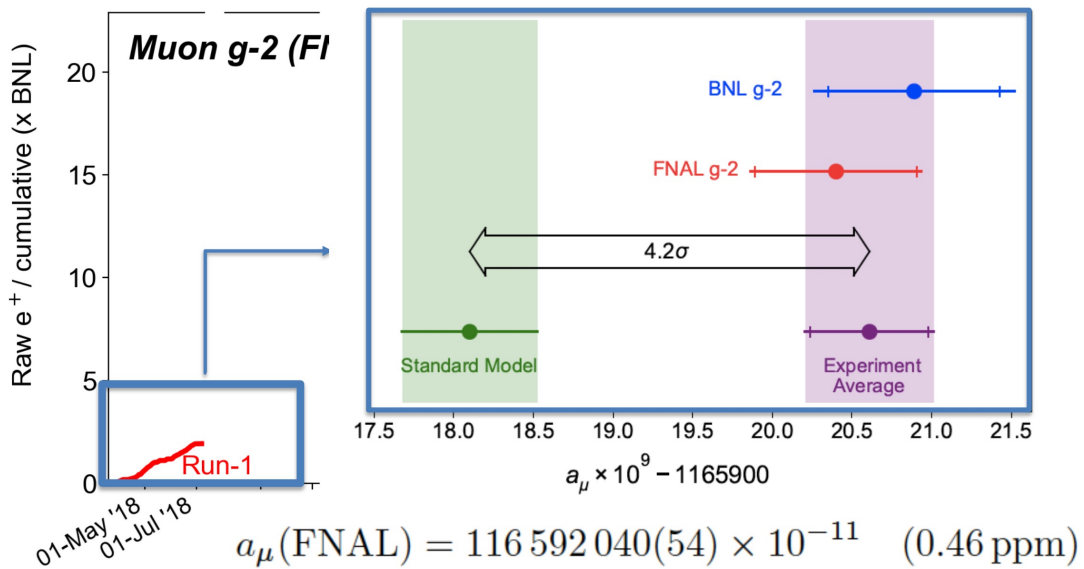
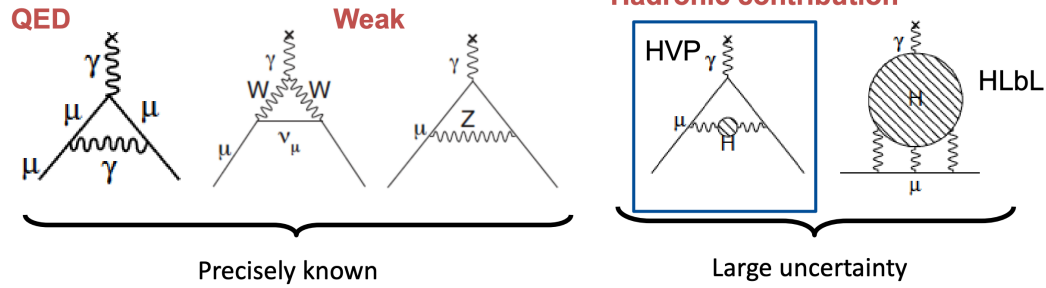


For inclusive analysis, **evidence for $B \rightarrow K \nu \bar{\nu}$ at 3.6σ , branching fraction within 3.0σ of standard model** (both considering total uncertainty)

g-2 topic

https://indico.desy.de/event/34916/contributions/150287/attachments/84171/111449/gv_eps220823_s_pdf.pdf

SM prediction: $a_\mu^{SM} = a_\mu^{QED} + a_\mu^{Had} + a_\mu^{Weak}$



5 σ from SM calculation

Other topics

1. Energy frontier

- Higgs: Add Run-3 data.
- SUSY: There is no excess.

2. Axion

- Solar Axion
- Photon coupling

3. Neutrino

- Neutrino mass
- Sterile neutrino
- Double beta decay

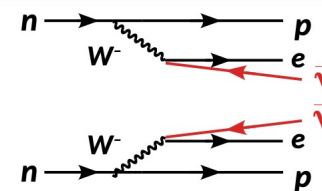
Known:

$$\left. \begin{array}{l} \theta_{12} \\ \theta_{13} \\ |\Delta m_{31}^2| \\ \Delta m_{21}^2 \end{array} \right\} \begin{array}{l} \text{Precision} \\ \text{between} \\ 2\% - 6\% \\ \text{(at } 1\sigma) \end{array}$$

Unknown:

$$\begin{array}{l} \delta_{CP}? \\ \text{sgn}(\Delta m_{31}^2)? \\ \theta_{23} \left\{ \begin{array}{l} \text{octant?} \\ \text{maximal?} \end{array} \right. \end{array}$$

Double beta decay ($2\nu\beta\beta$)



Dirac fermion

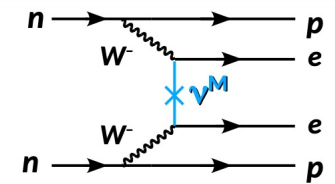
$$\nu \text{ \& \; } \bar{\nu}$$

We only observe

$$\nu_L \text{ and } \bar{\nu}_R$$



Neutrinoless double beta decay ($0\nu\beta\beta$)



Majorana fermion

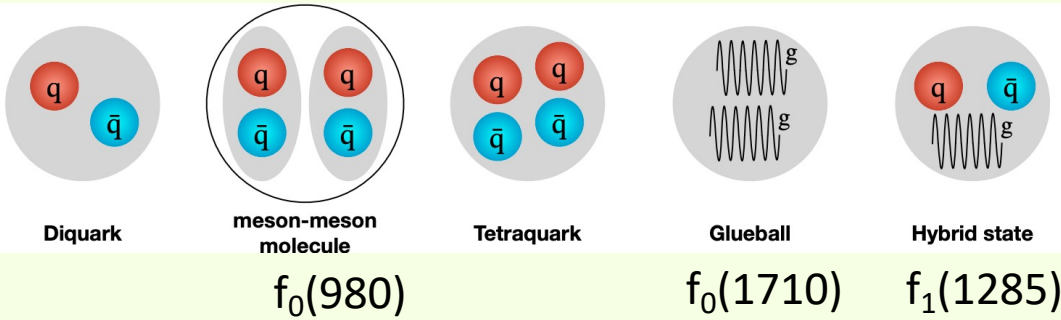
$$\nu$$

They are simply just

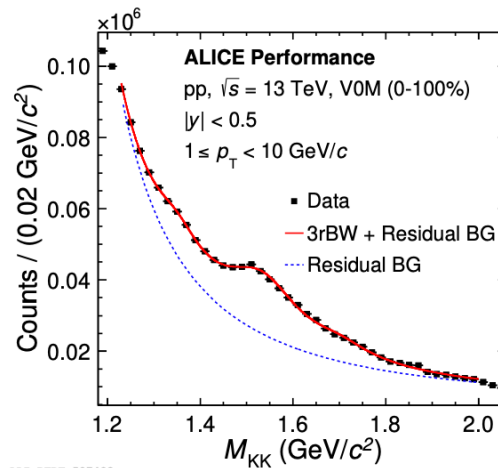
$$\nu_L \text{ and } \nu_R$$



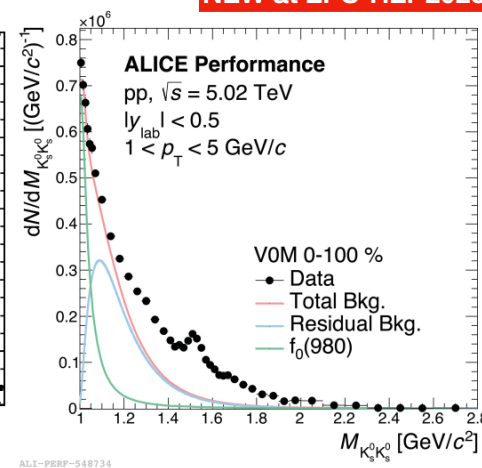
Exotic Resonance



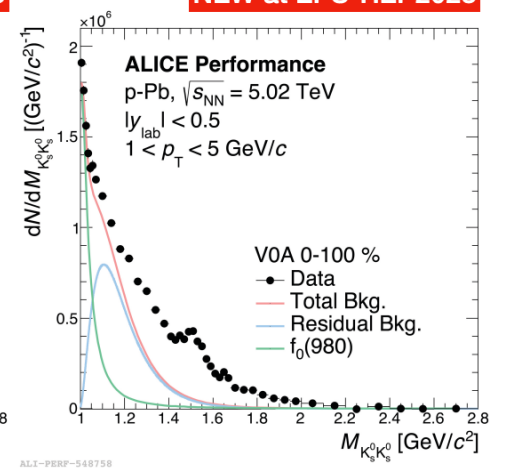
Glueball search: $f_0(1370)$, $f_2(1525)$, $f_0(1710)$



ALI-PERF-507408



ALI-PERF-548734



ALI-PERF-548758

- **Invariant mass distribution from $K_s^0 \bar{K}_s^0$ decay** in pp and p-Pb collisions at $\sqrt{s} = 5.02$ TeV.
 - Signal extraction has been performed, $f_0(1370)$, $f_2(1525)$, $f_0(1710)$
 - Fit considering interference between the resonances is under preparation.
- **Target:** R_{pA} measurement of $f_0(1710)$ - **enhancement expected** due to large gluon density

My talk topics

I made a presentation as ALICE member. This talk mixed 7 topics of Heavy flavor and jet about parton energy loss. The presentation time was 17+3 mins.

Heavy flavor

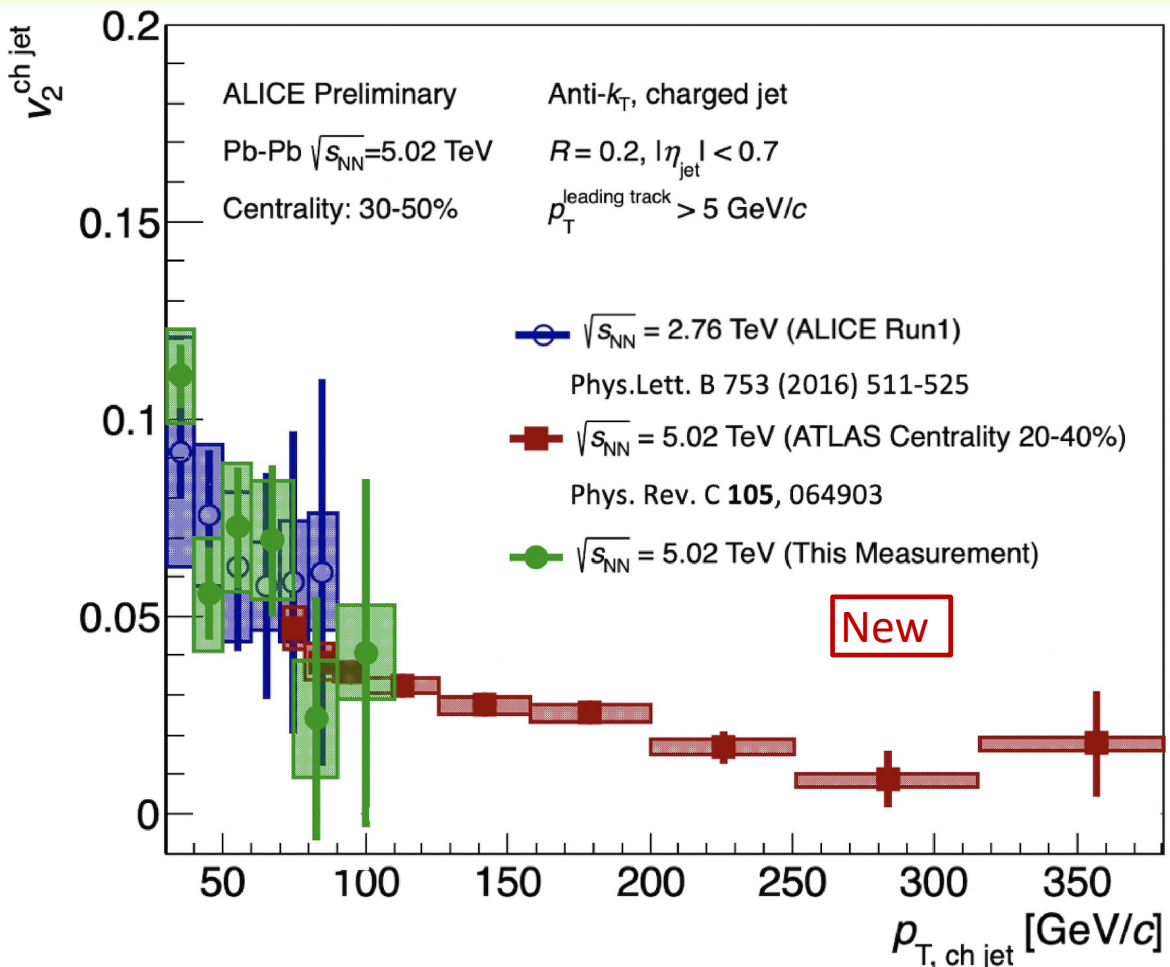
1. Prompt and non-prompt v_2 coefficient of D^0 mesons
2. Prompt/non-prompt D-meson and Λ_C^+ R_{AA}
3. Heavy-flavor decay electron R_{AA}
4. Angular correlations of heavy-flavor decay electrons

Jet

1. Background p_T estimation using event mixing process
- 2. Inclusive charged jet v_2**
3. Event-Shape Engineering

Inclusive charged jet v_2

Inclusive charged jet v_2 in Pb–Pb collisions (30-50%)



$$v_2 \propto \frac{N_{\text{in}} - N_{\text{out}}}{N_{\text{in}} + N_{\text{out}}}$$

$N_{\text{in}}, N_{\text{out}}$: jet yield at in-plane and at out-of-plane

- At low p_T , the charged jet v_2 show **high positive value**.
- As it becomes high p_T , the charged jet v_2 gets **close to zero**.
- The charged jet v_2 of this measurement is **consistent with ATLAS result** within uncertainty around 70-110 GeV/c.

ALI-PREL-548519