

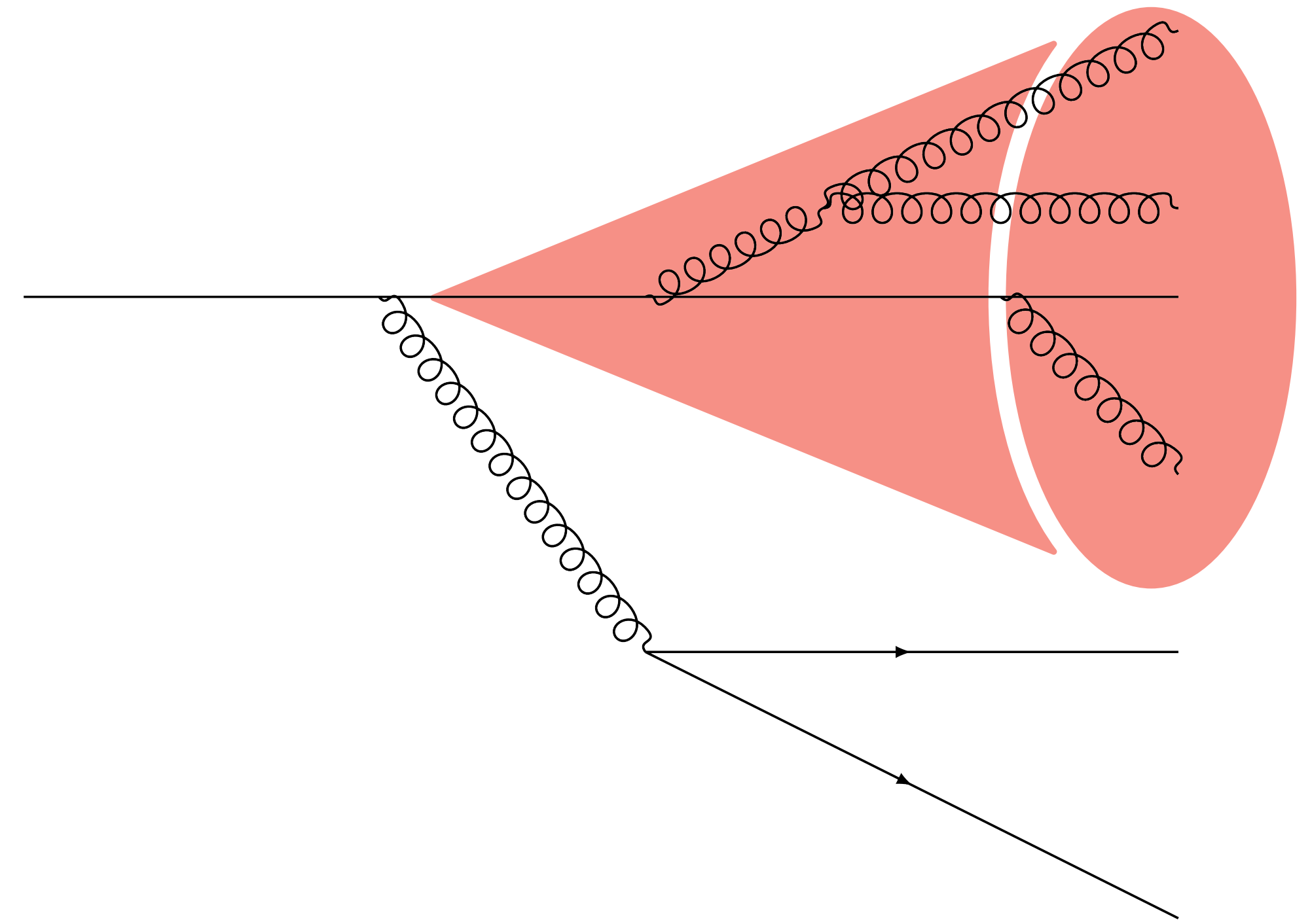
ALICE in Run 3: Jets and data taking

Jamboree 2023

Gijs van Weelden, 16.05.2023

Jets

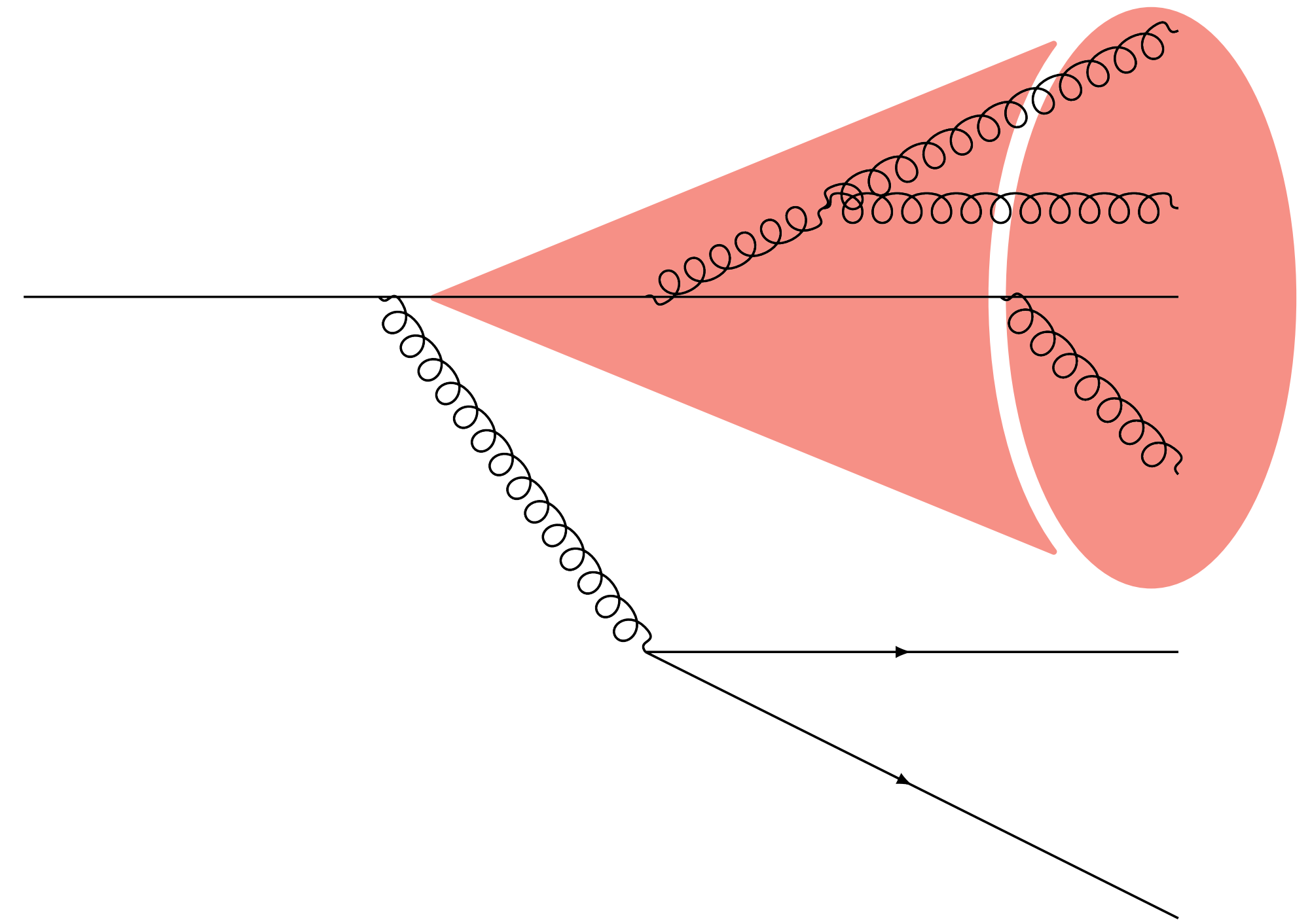
- Energetic spray of particles



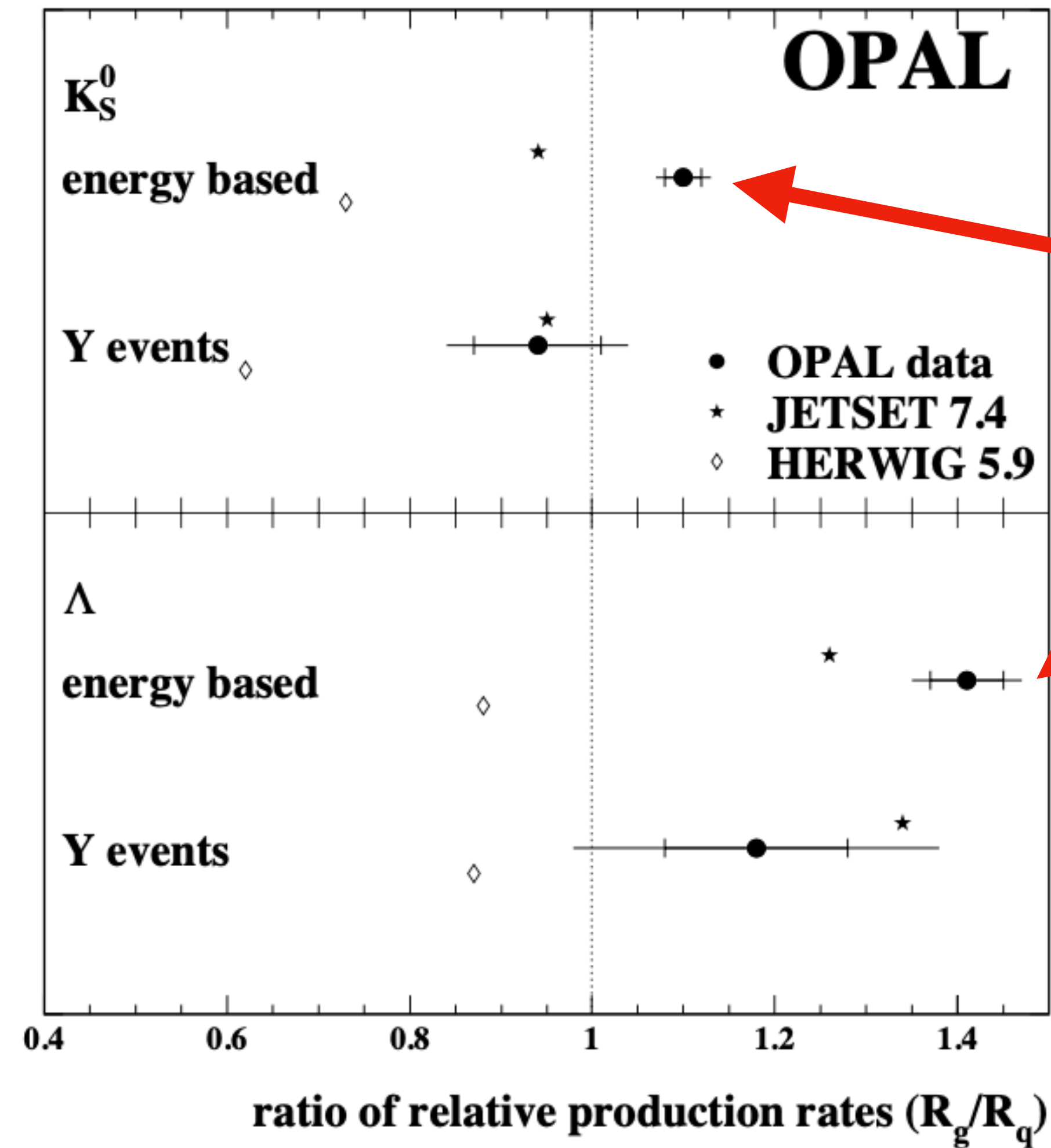
Jets

- Energetic spray of particles
- Longitudinal momentum fraction

$$z = \frac{\mathbf{p}_i \cdot \mathbf{p}_{\text{jet}}}{p_{\text{jet}}^2}$$

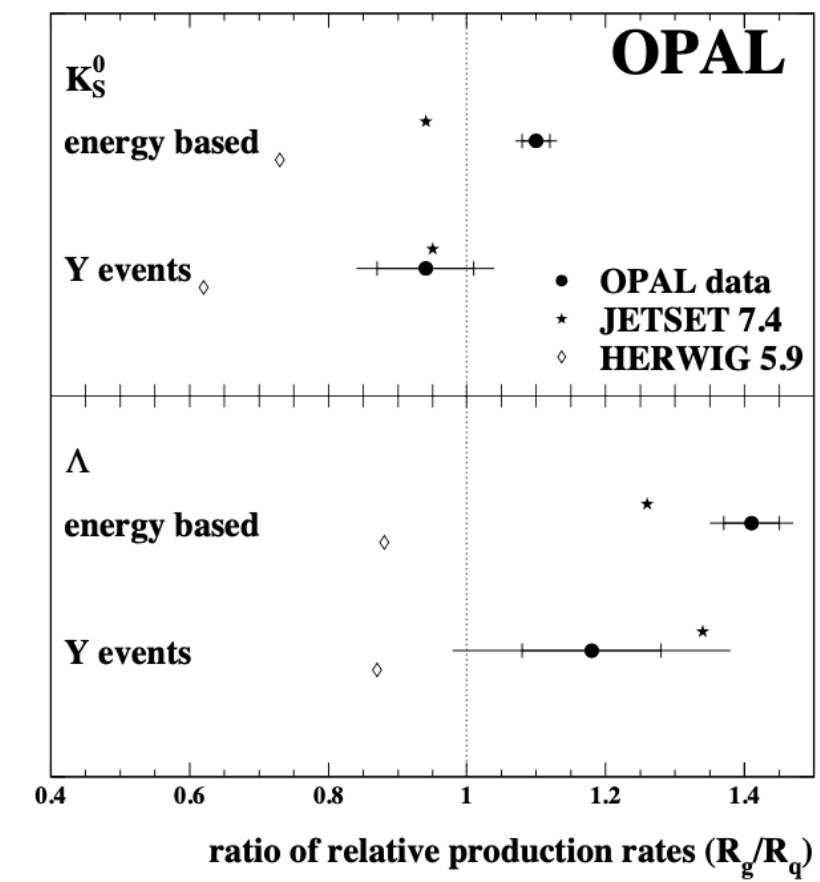


Motivation: gluon fragmentation

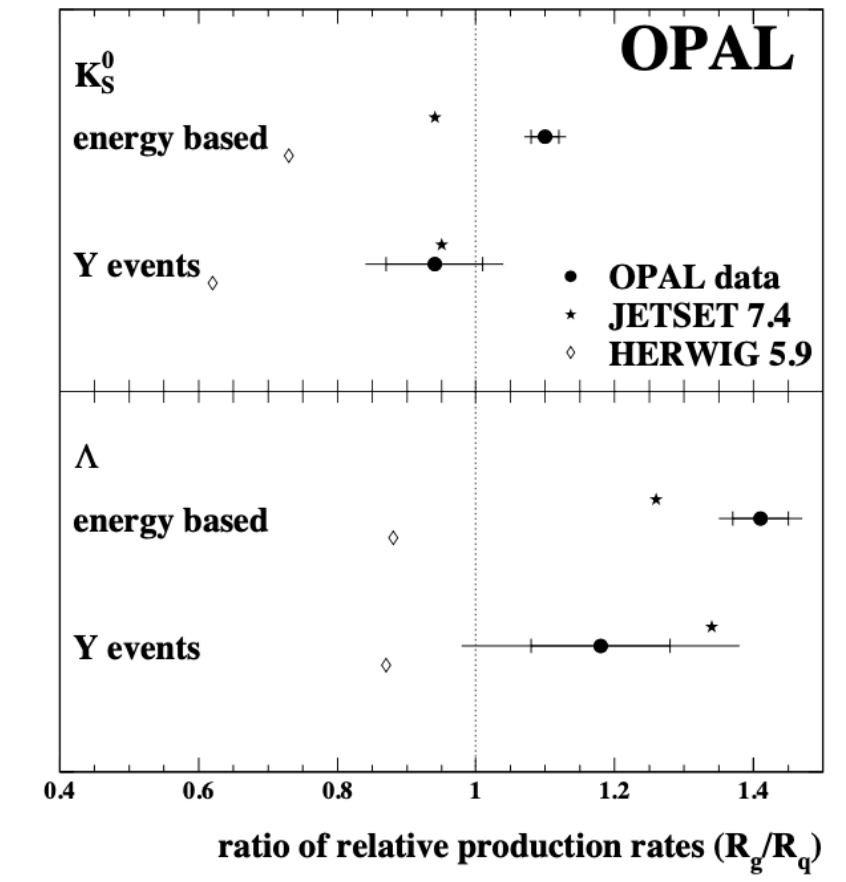


Enhanced baryon production in gluon jets

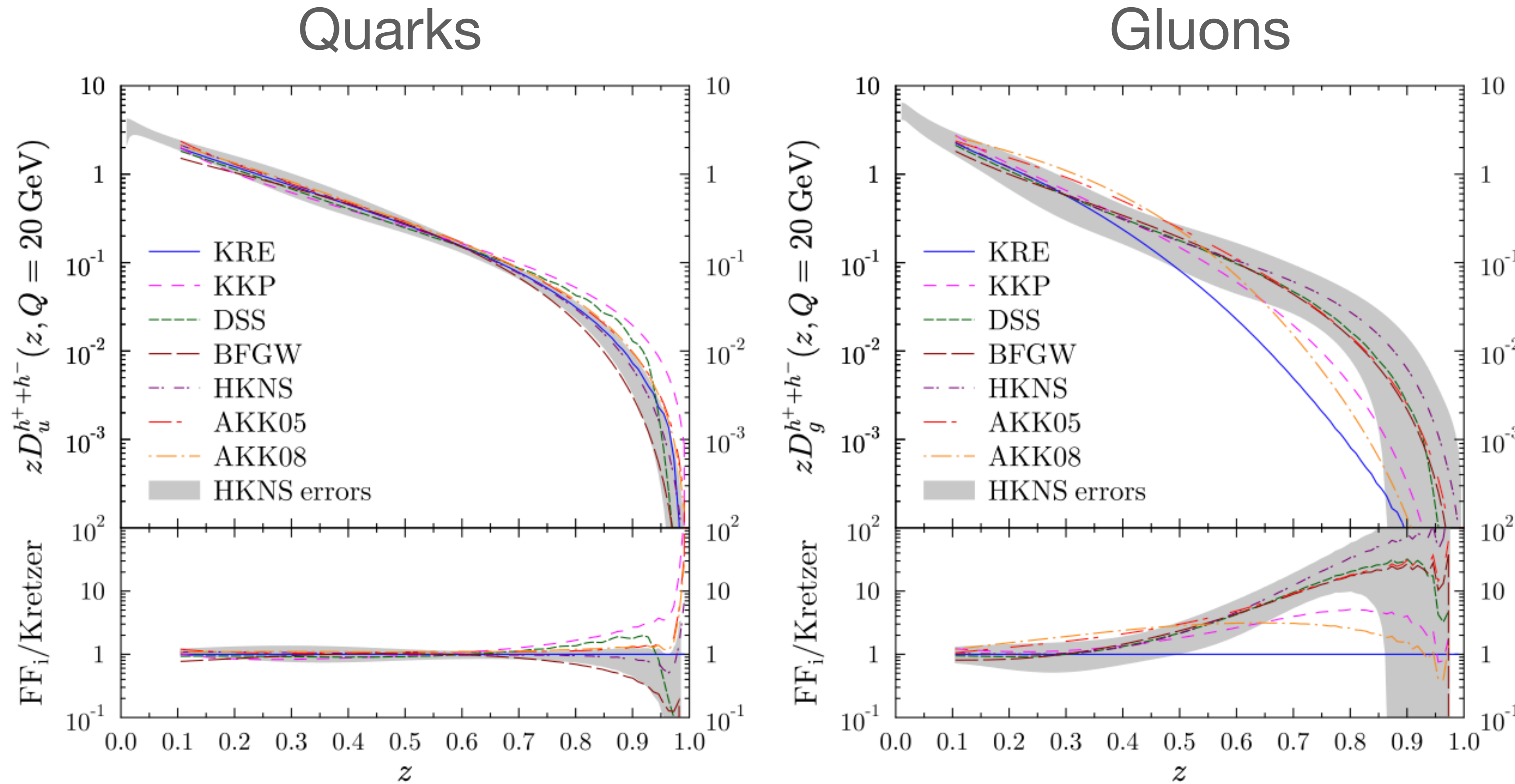
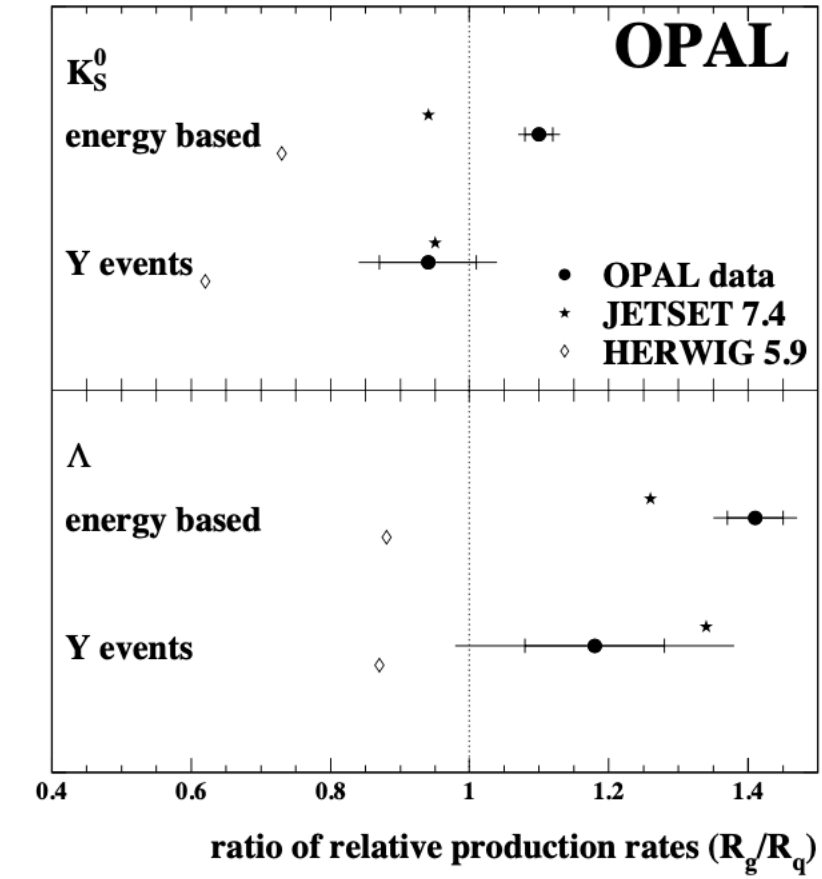
Motivation: gluon fragmentation



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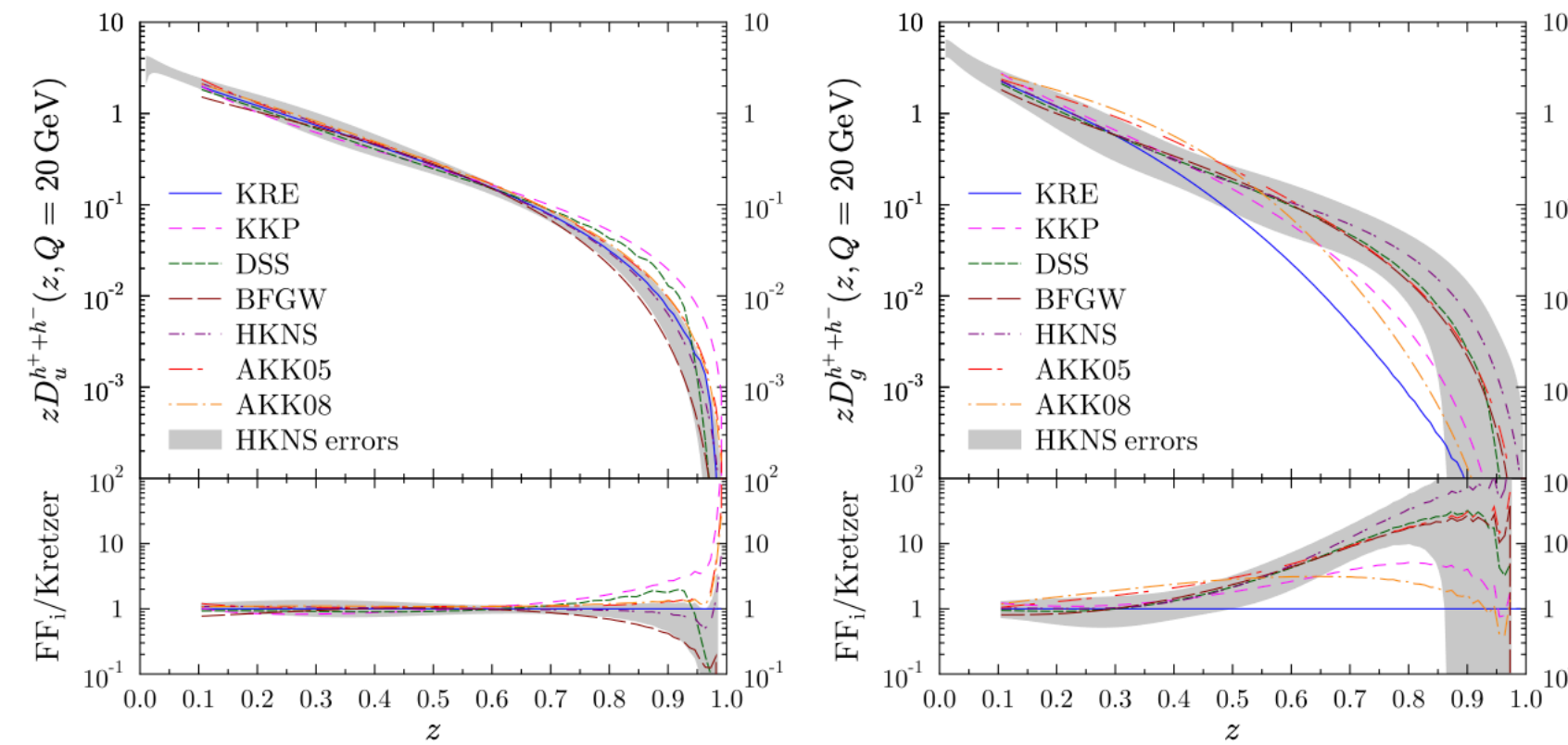
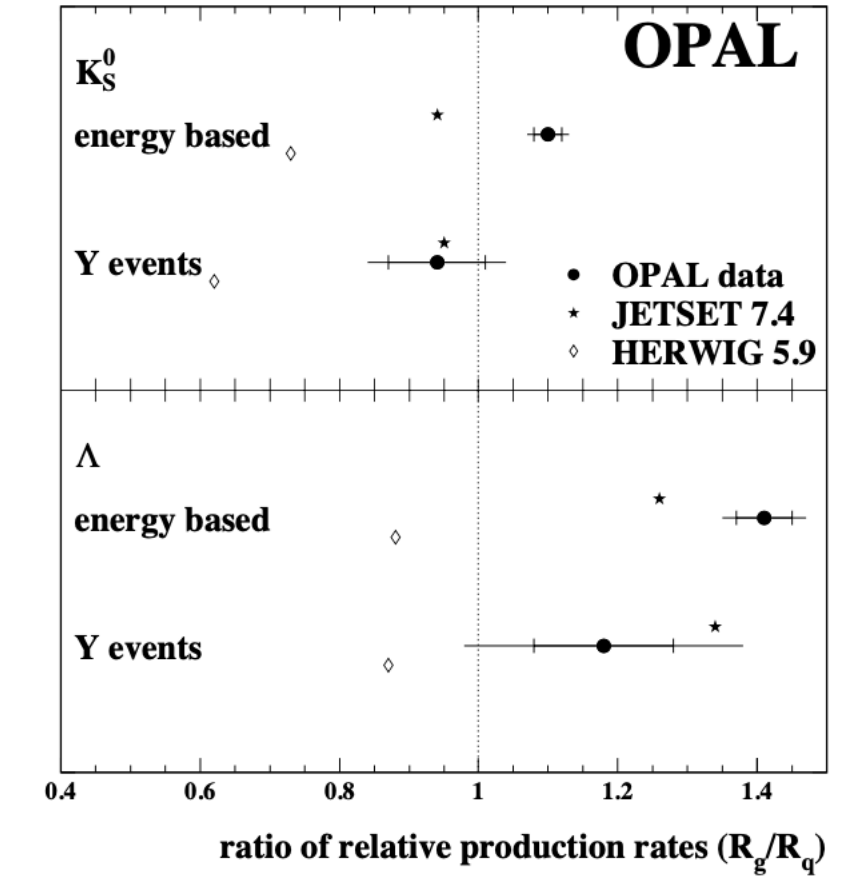


Motivation: gluon fragmentation

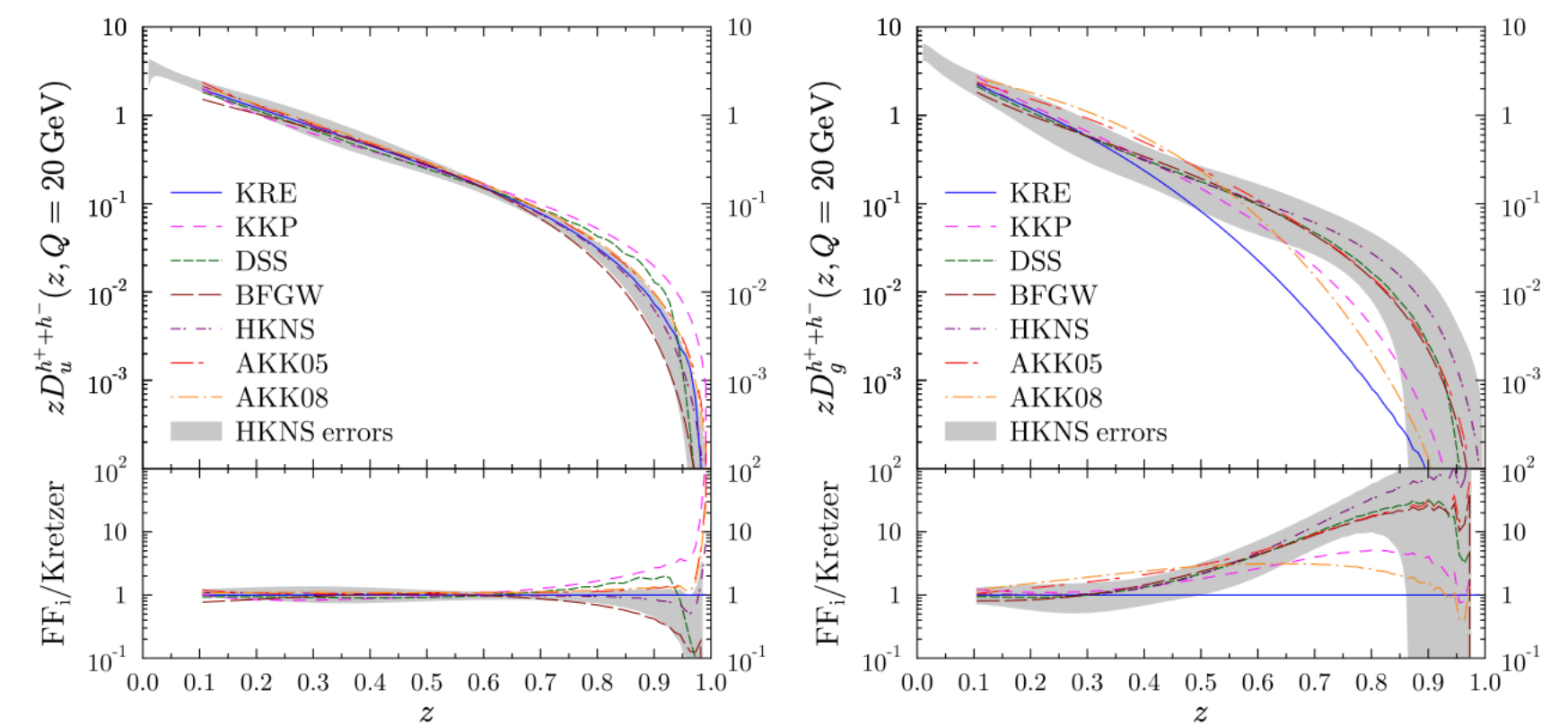
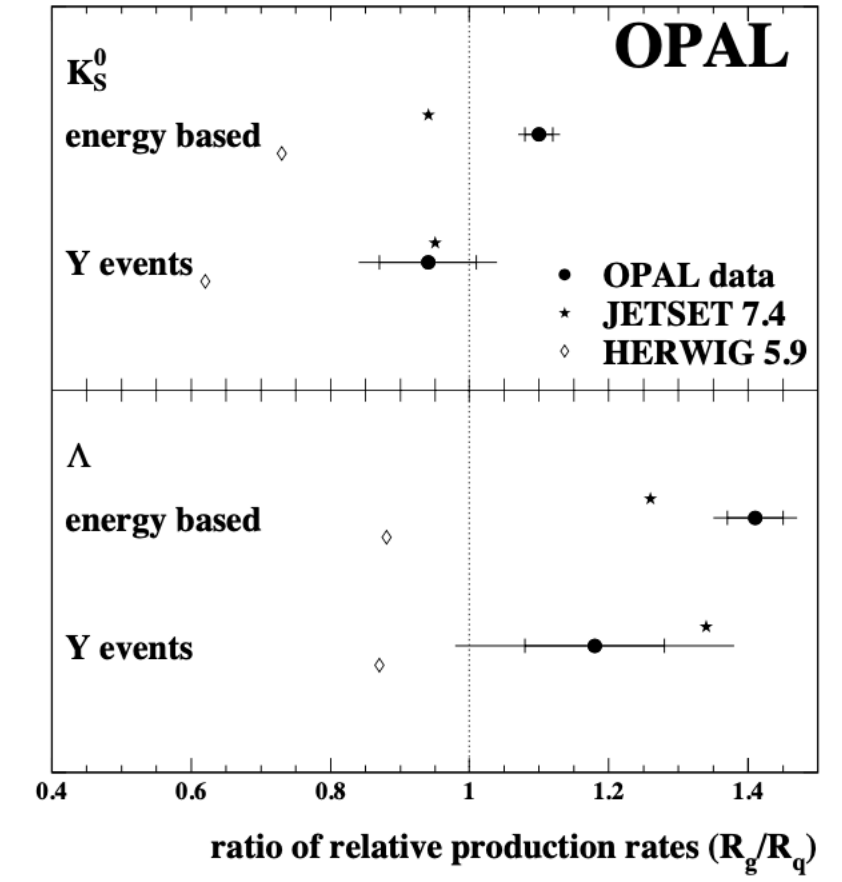


Number density of particles with momentum fraction z

Motivation: gluon fragmentation

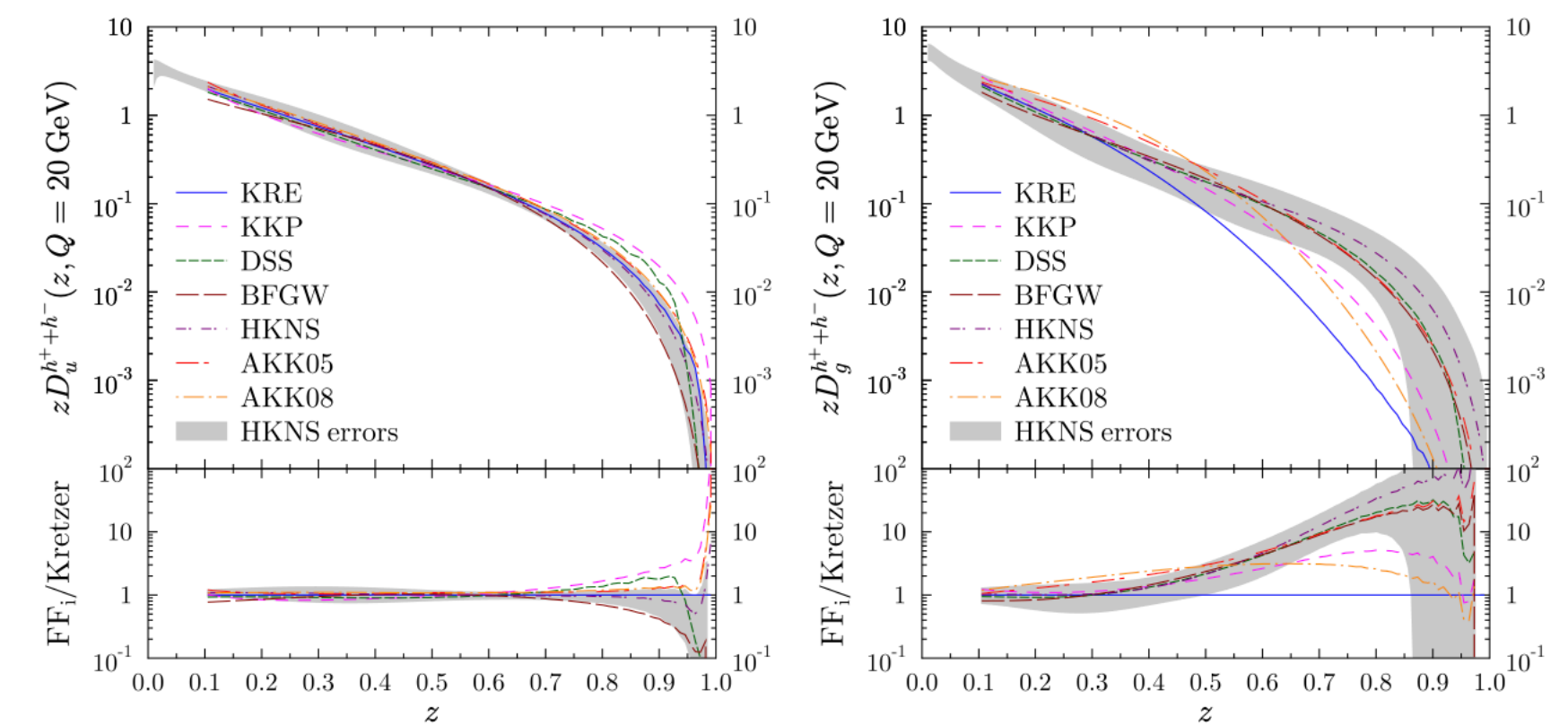
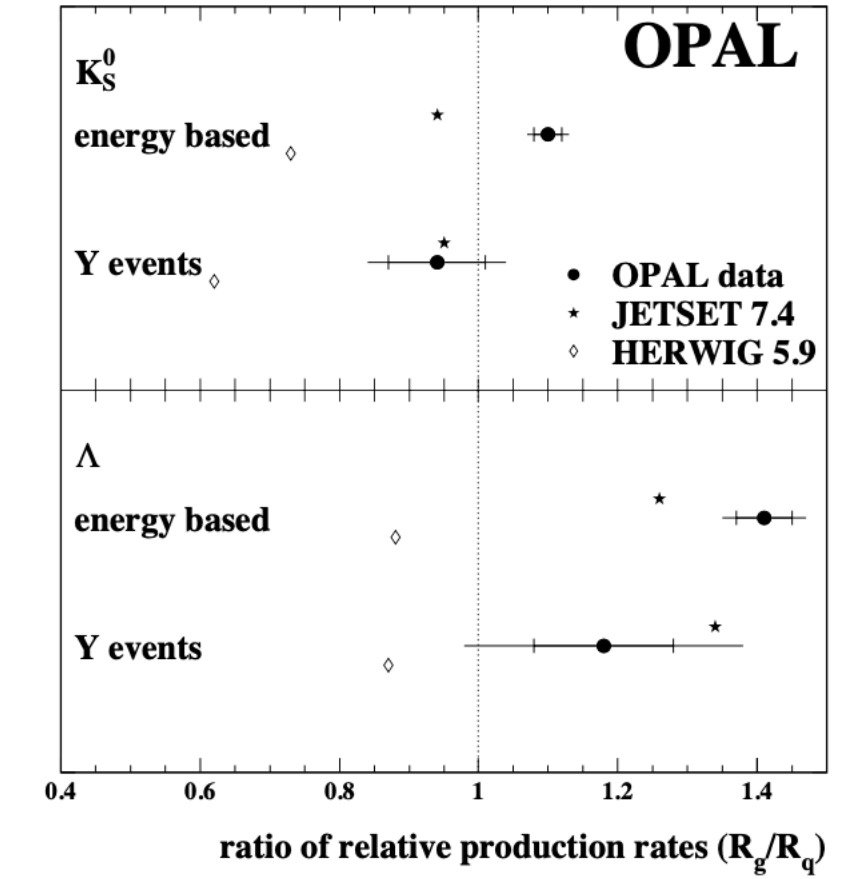


Motivation: gluon fragmentation



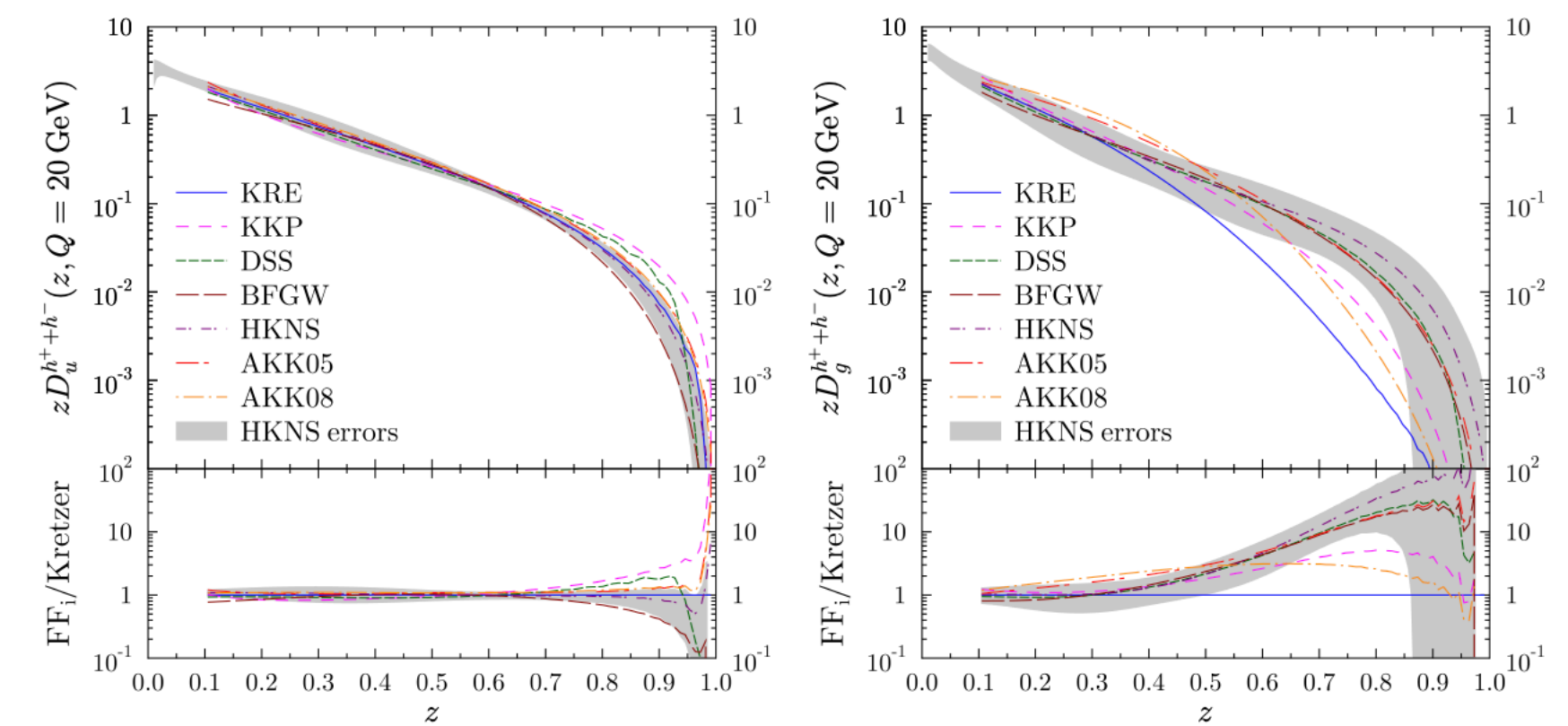
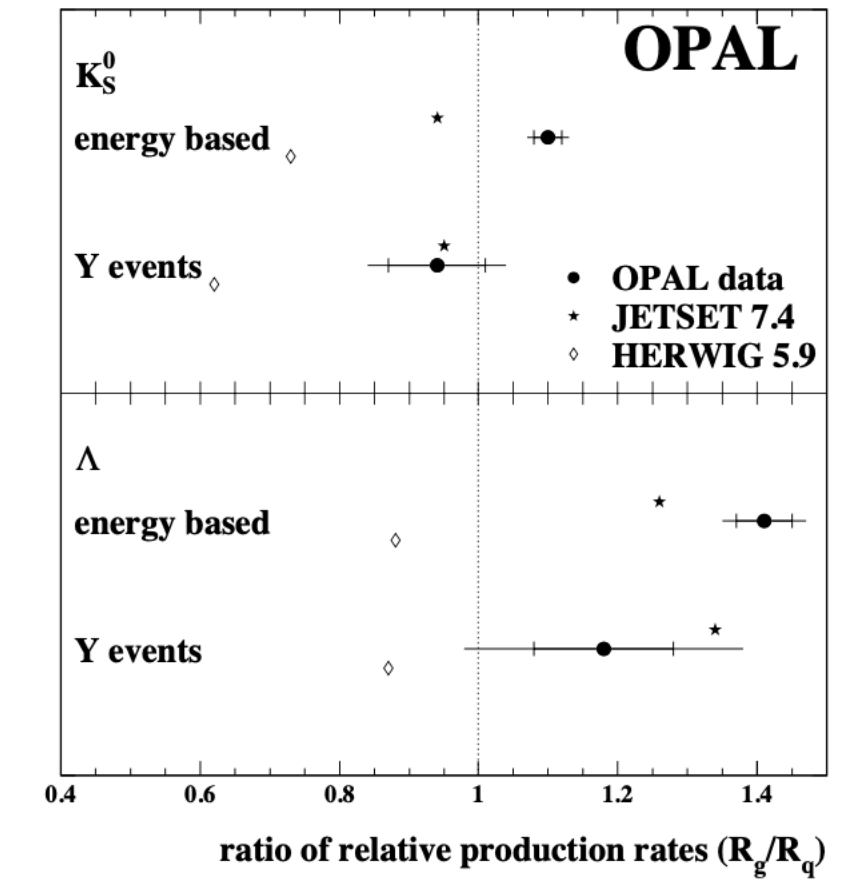
Motivation: gluon fragmentation

- Fits made to e^+e^- data



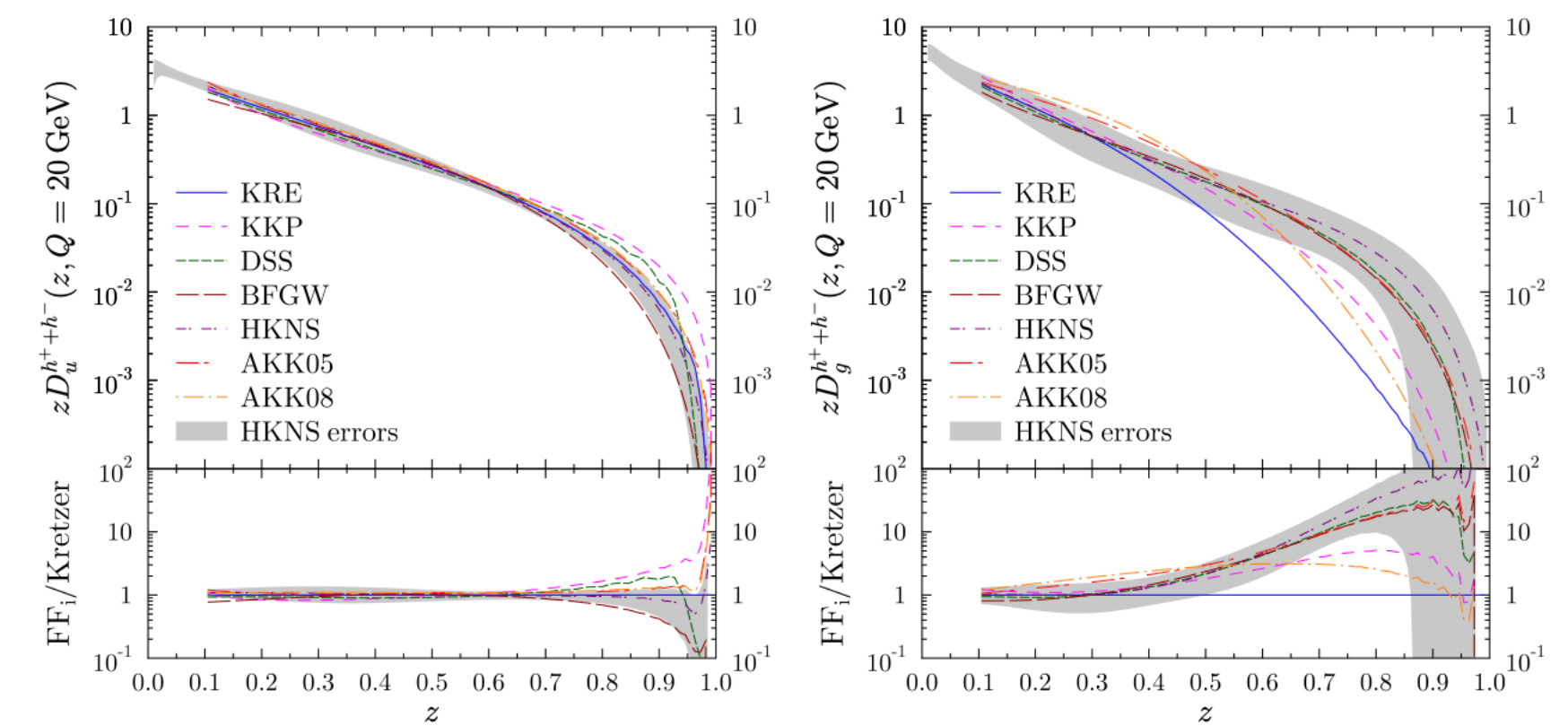
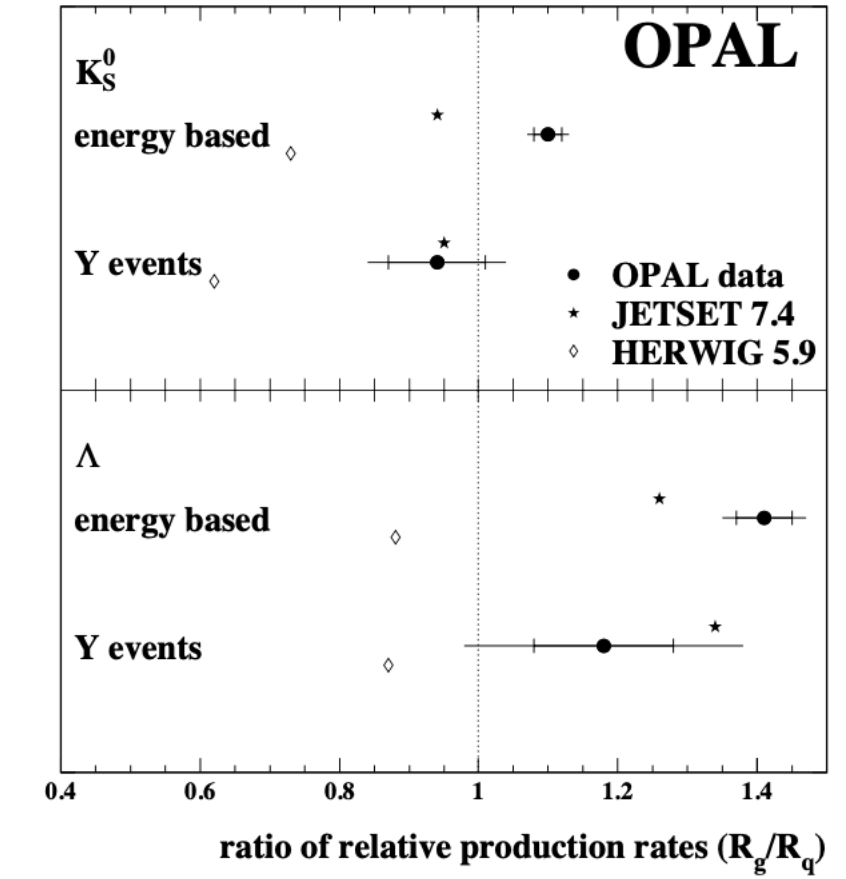
Motivation: gluon fragmentation

- Fits made to e^+e^- data
- LHC Run 3 pp data allows us to probe the gluons

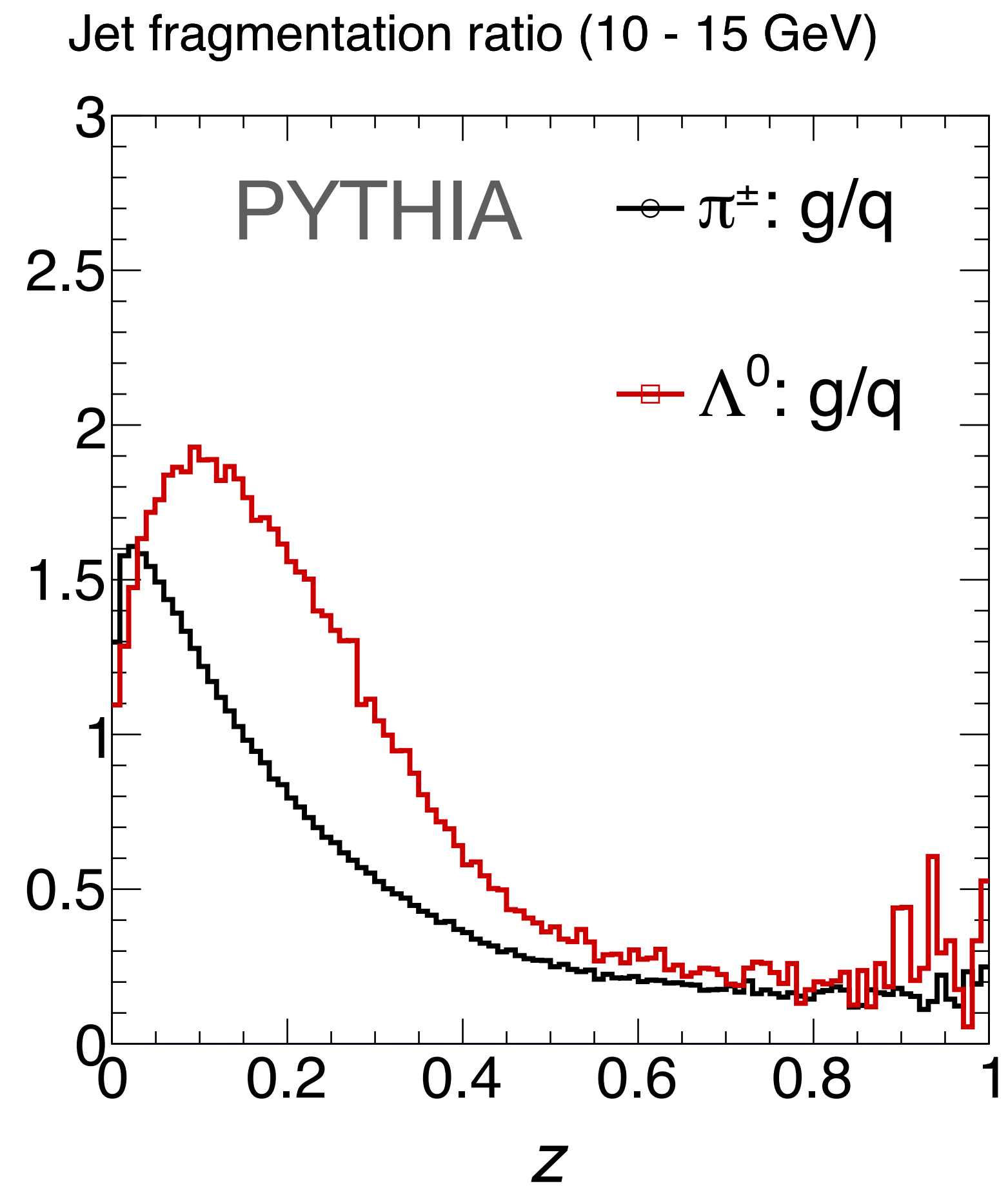


Motivation: gluon fragmentation

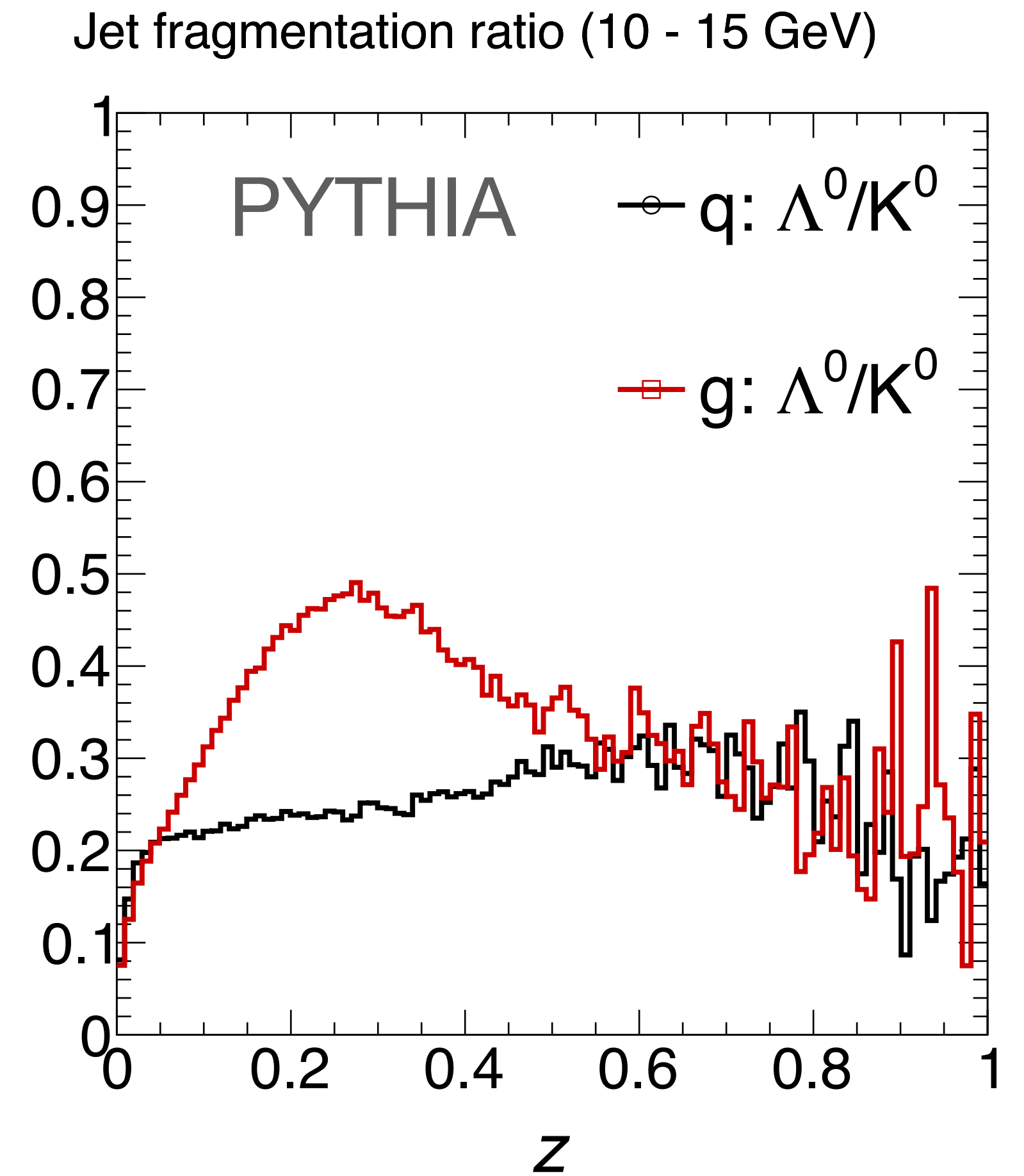
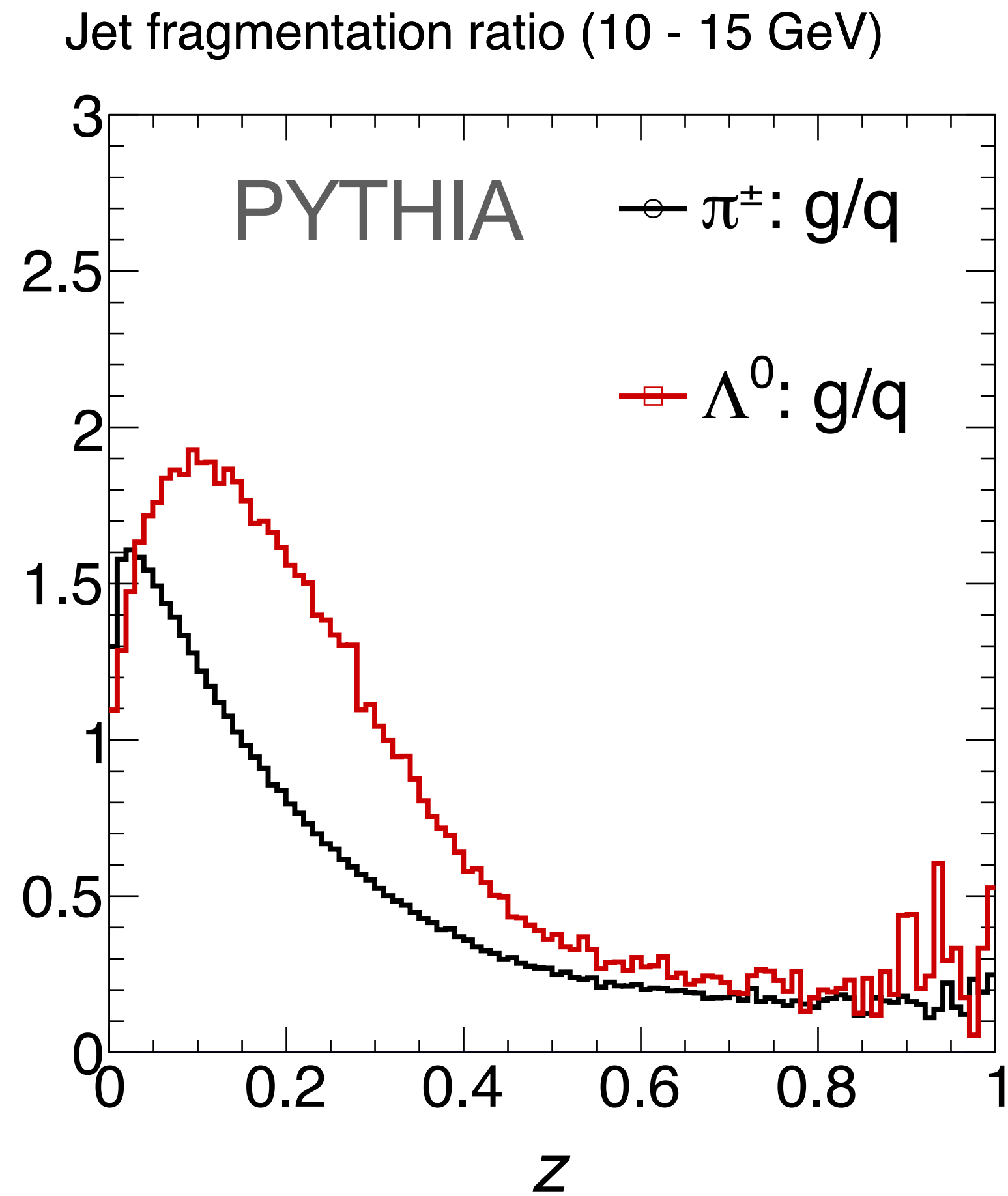
- Fits made to e^+e^- data
- LHC Run 3 pp data allows us to probe the gluons
- Baryon/meson ratios



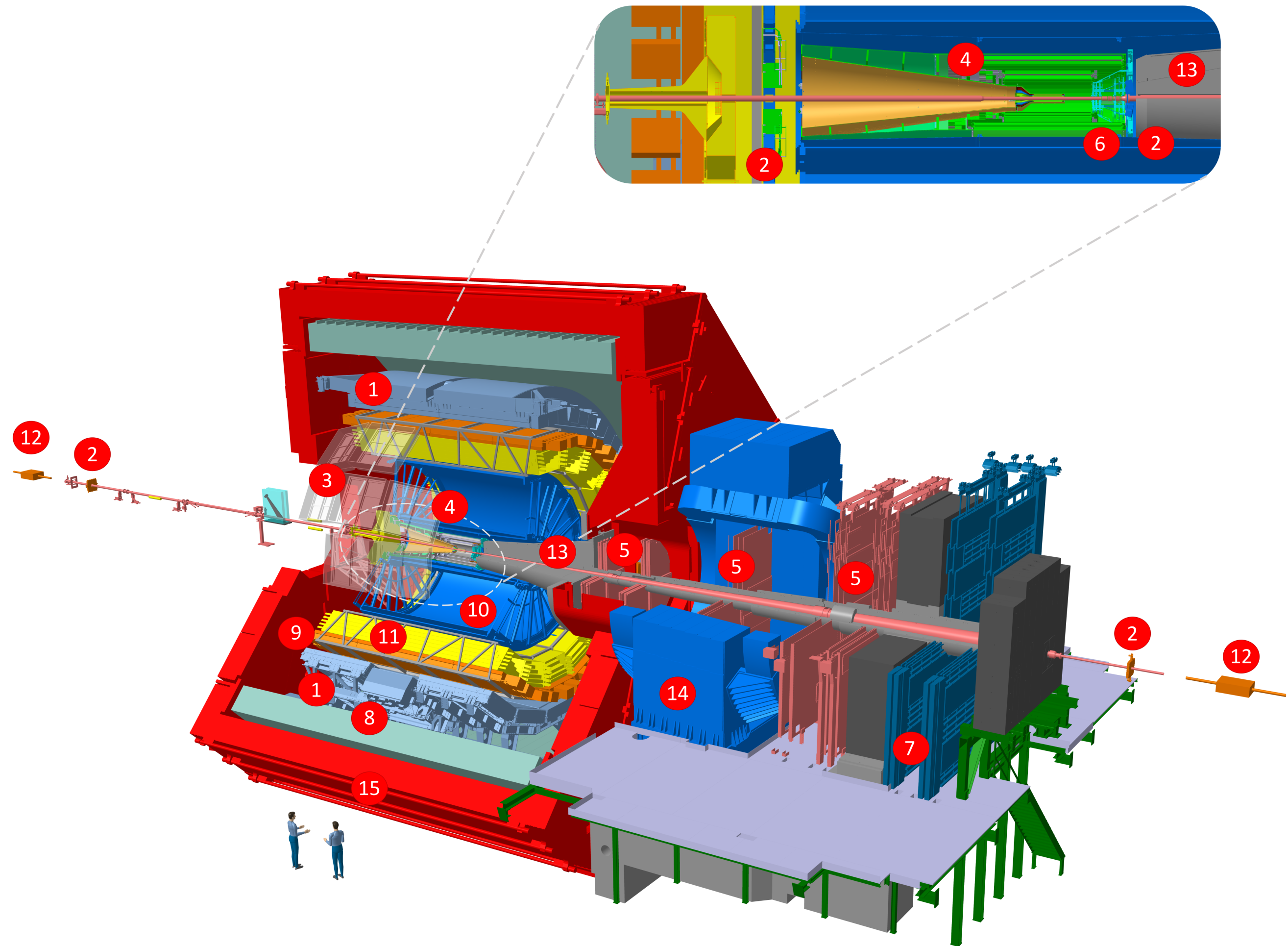
Jet fragmentation



Jet fragmentation



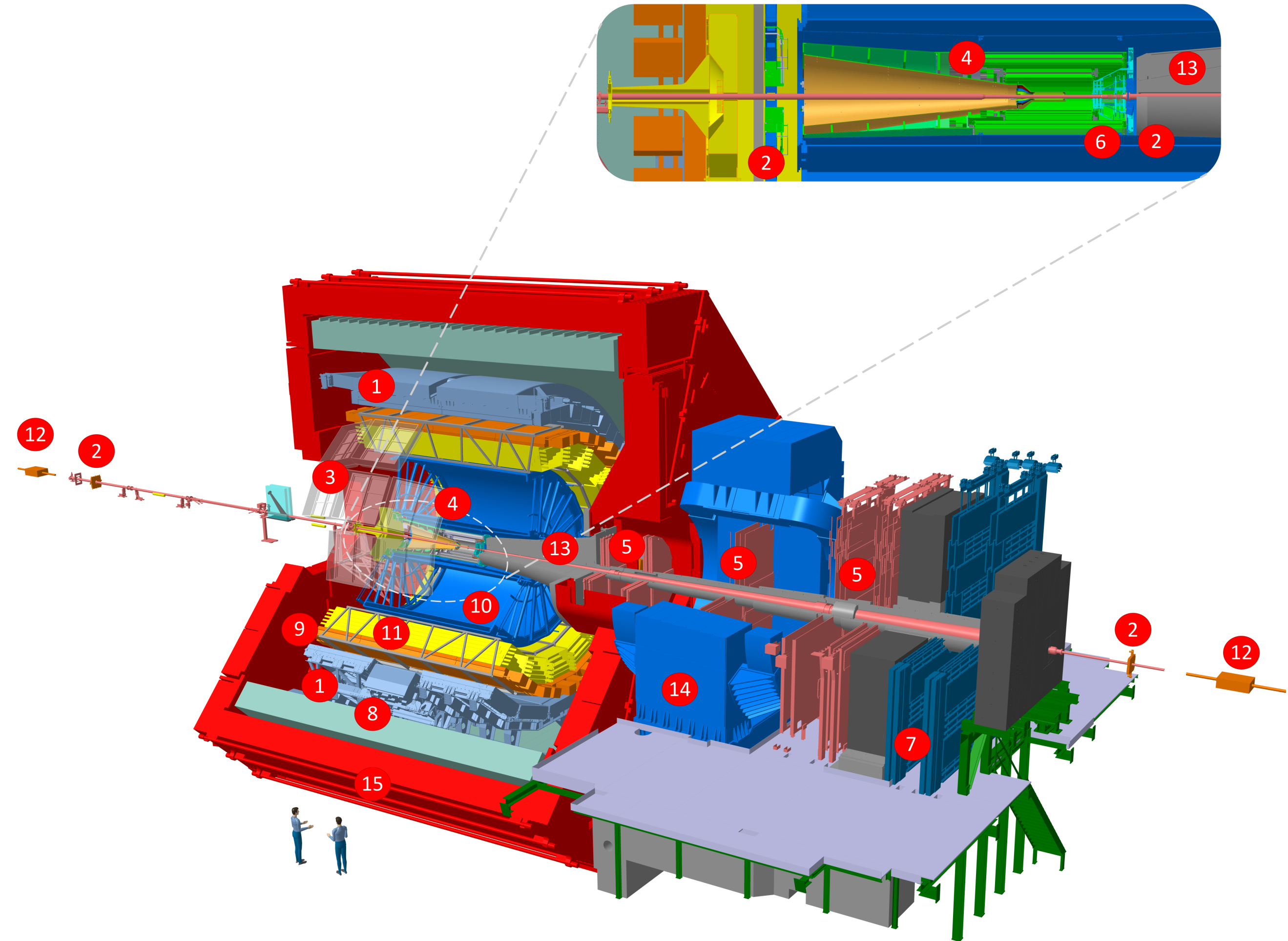
Moving to Run 3



ALICE

Moving to Run 3

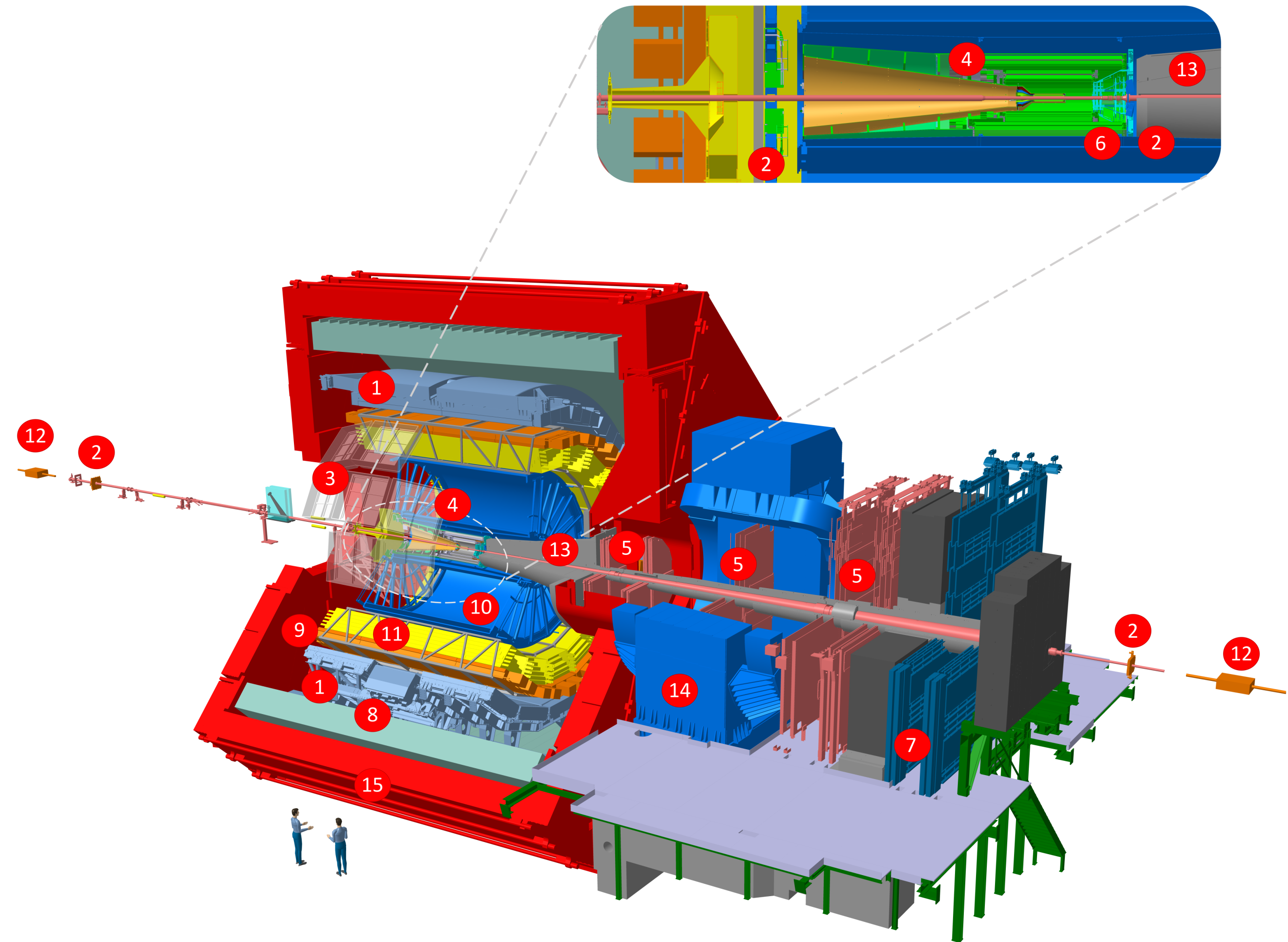
- Continuous readout for tracker



ALICE

Moving to Run 3

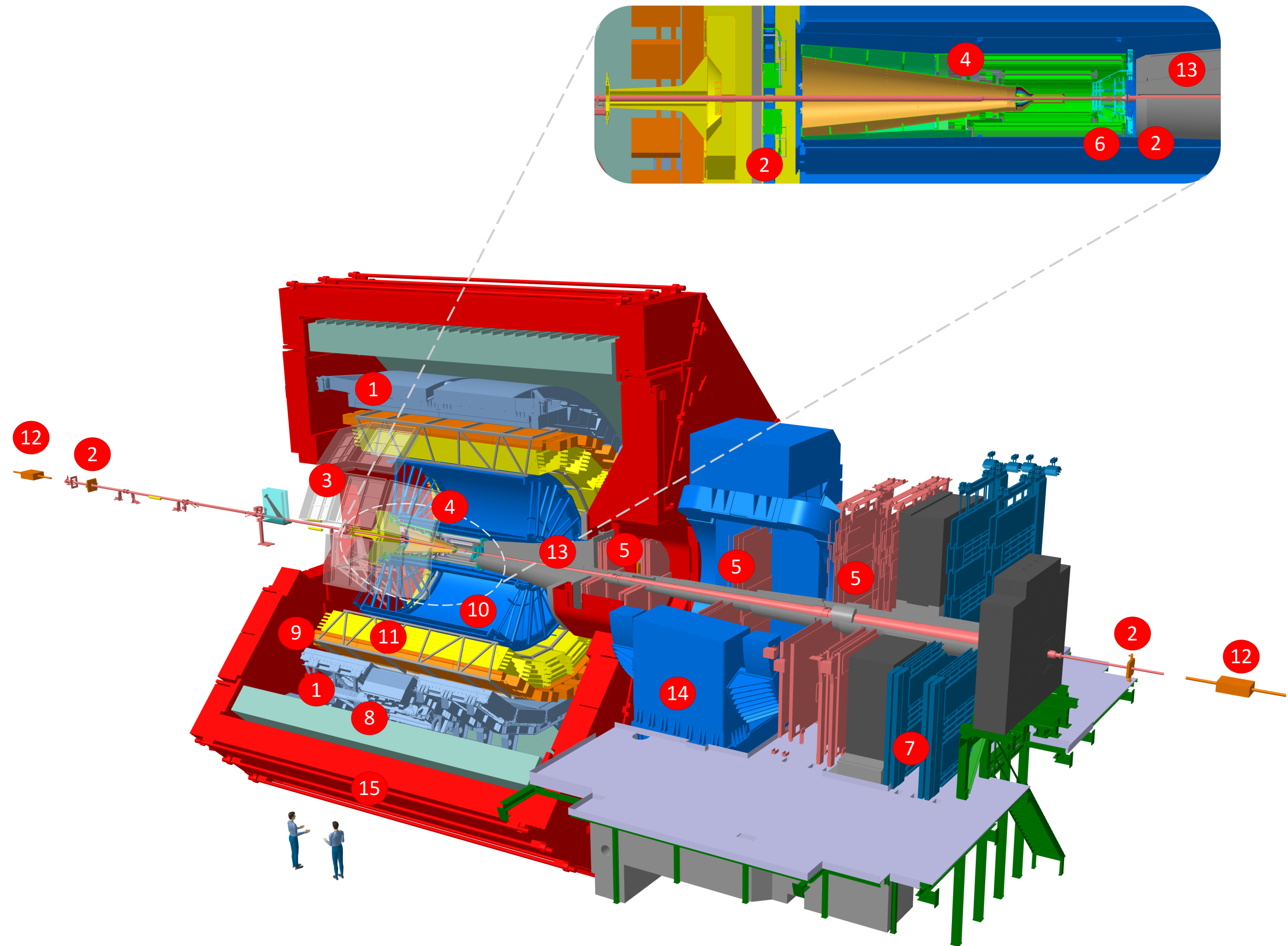
- Continuous readout for tracker
- Allows for much higher rates



ALICE

Moving to Run 3

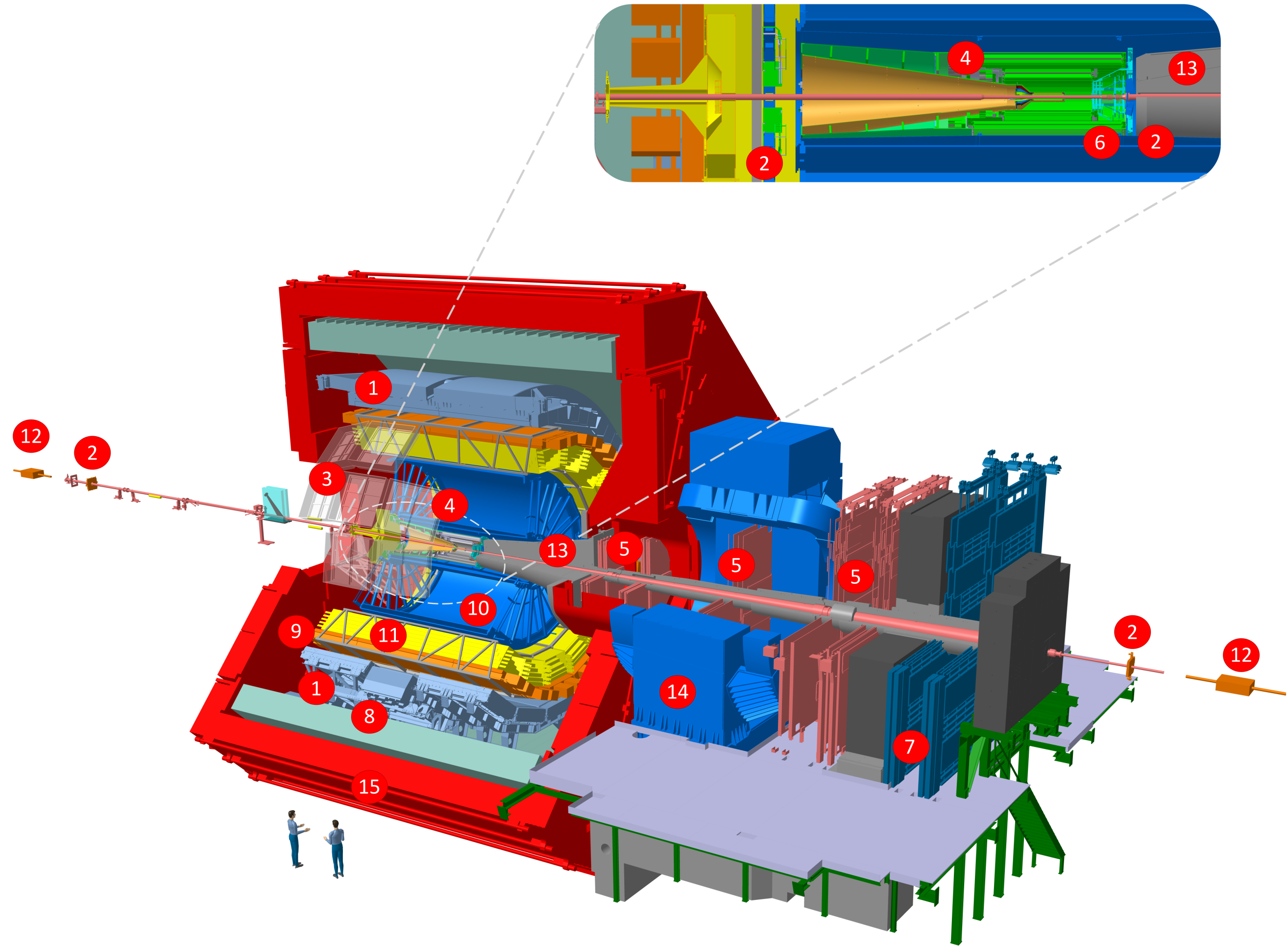
- Continuous readout for tracker
 - Allows for much higher rates
- New software framework



ALICE

Moving to Run 3

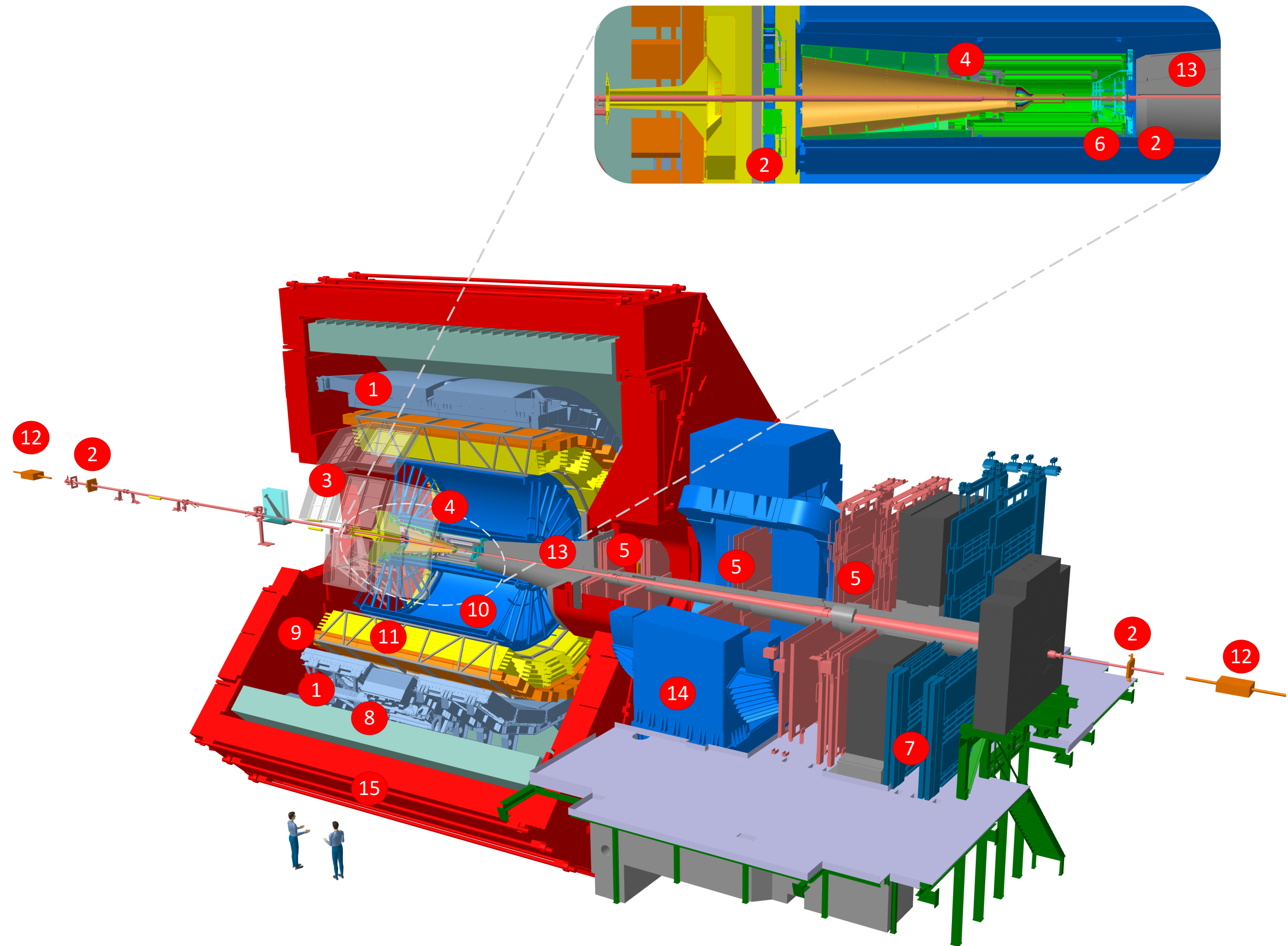
- Continuous readout for tracker
 - Allows for much higher rates
- New software framework
 - O2Physics



ALICE

Moving to Run 3

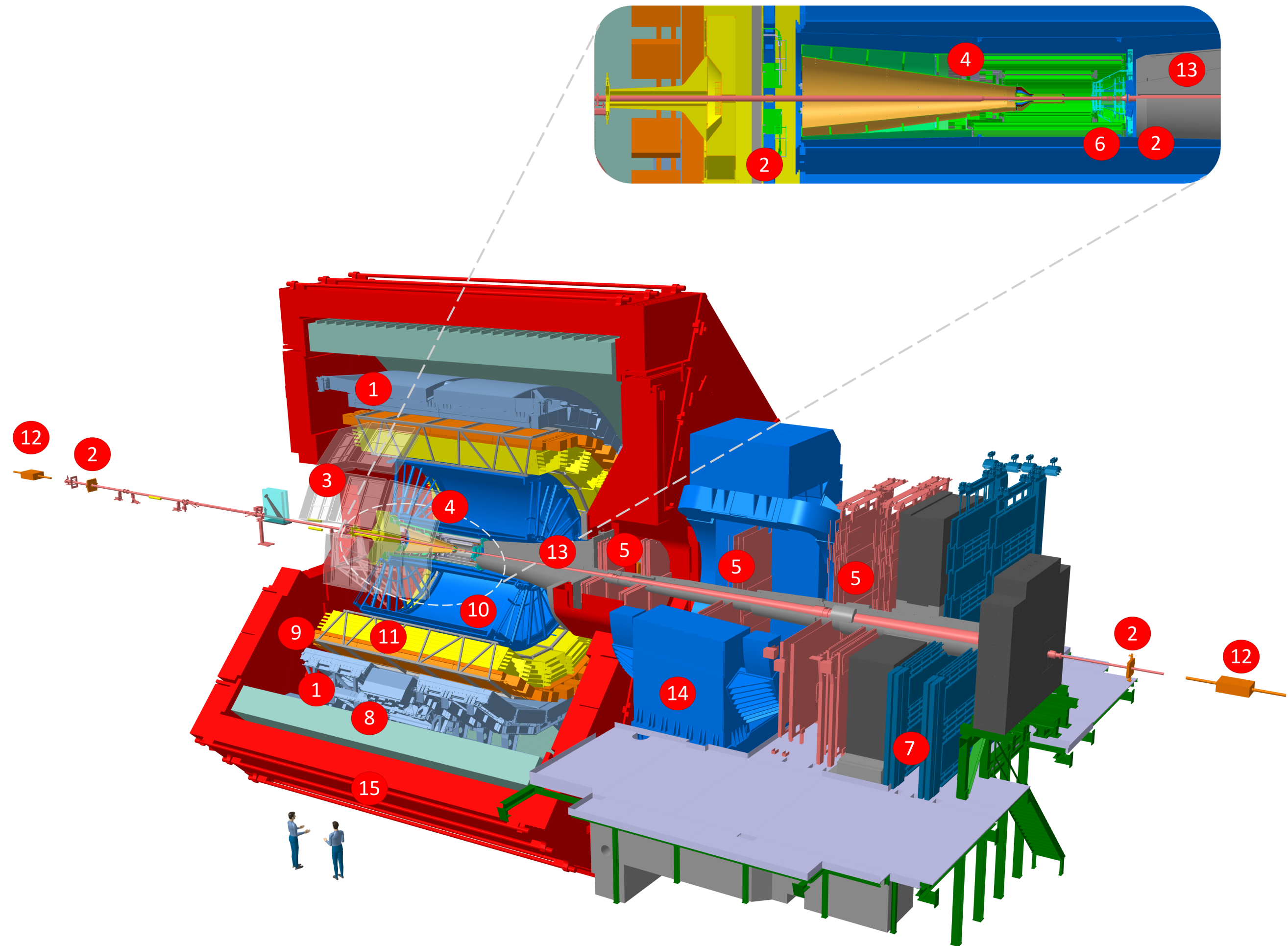
- Continuous readout for tracker
 - Allows for much higher rates
- New software framework
 - O2Physics
- EMCAL



ALICE

Moving to Run 3

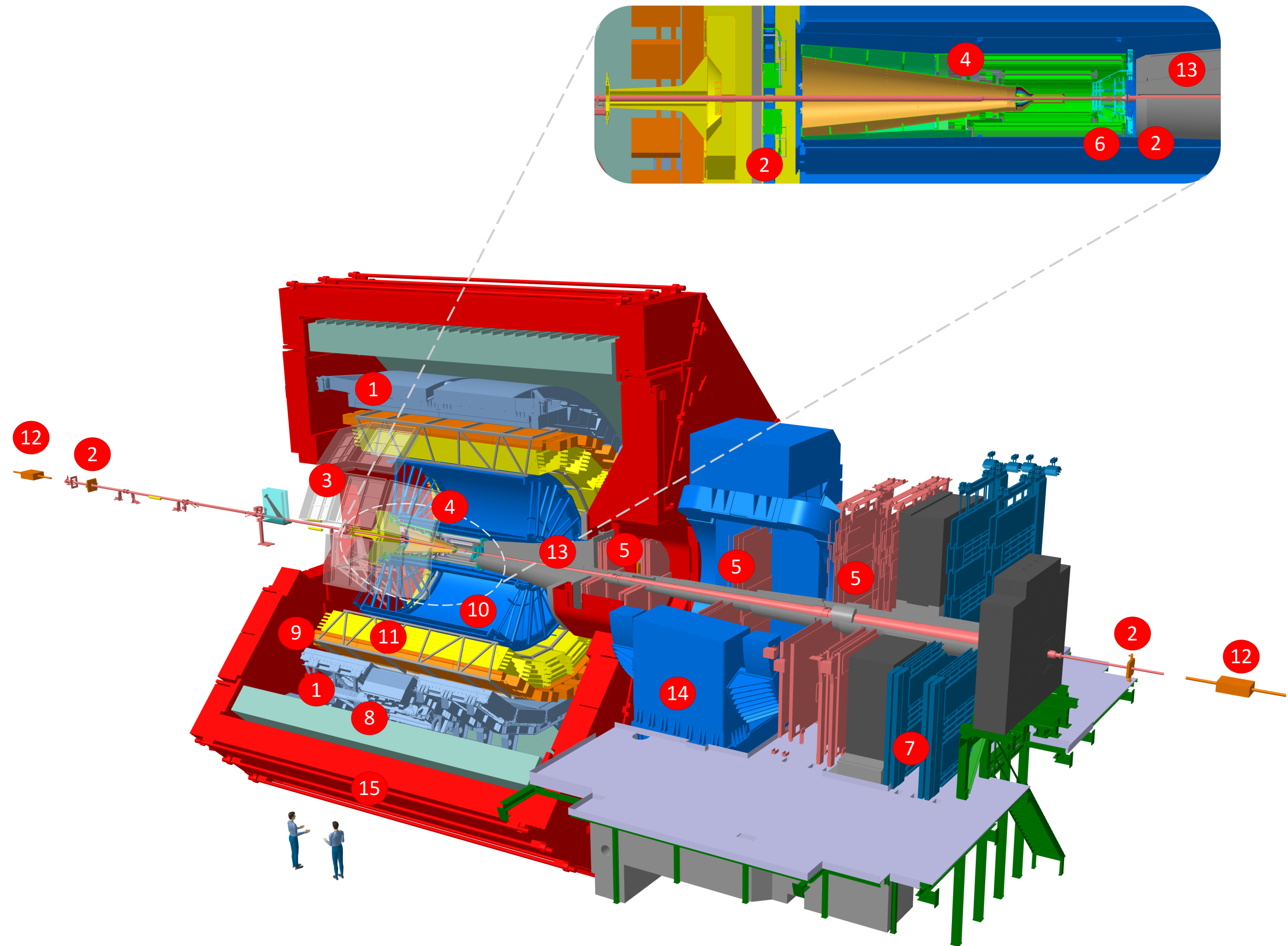
- Continuous readout for tracker
 - Allows for much higher rates
- New software framework
 - O2Physics
- EMCAL
 - Neutral energy deposits



ALICE

Moving to Run 3

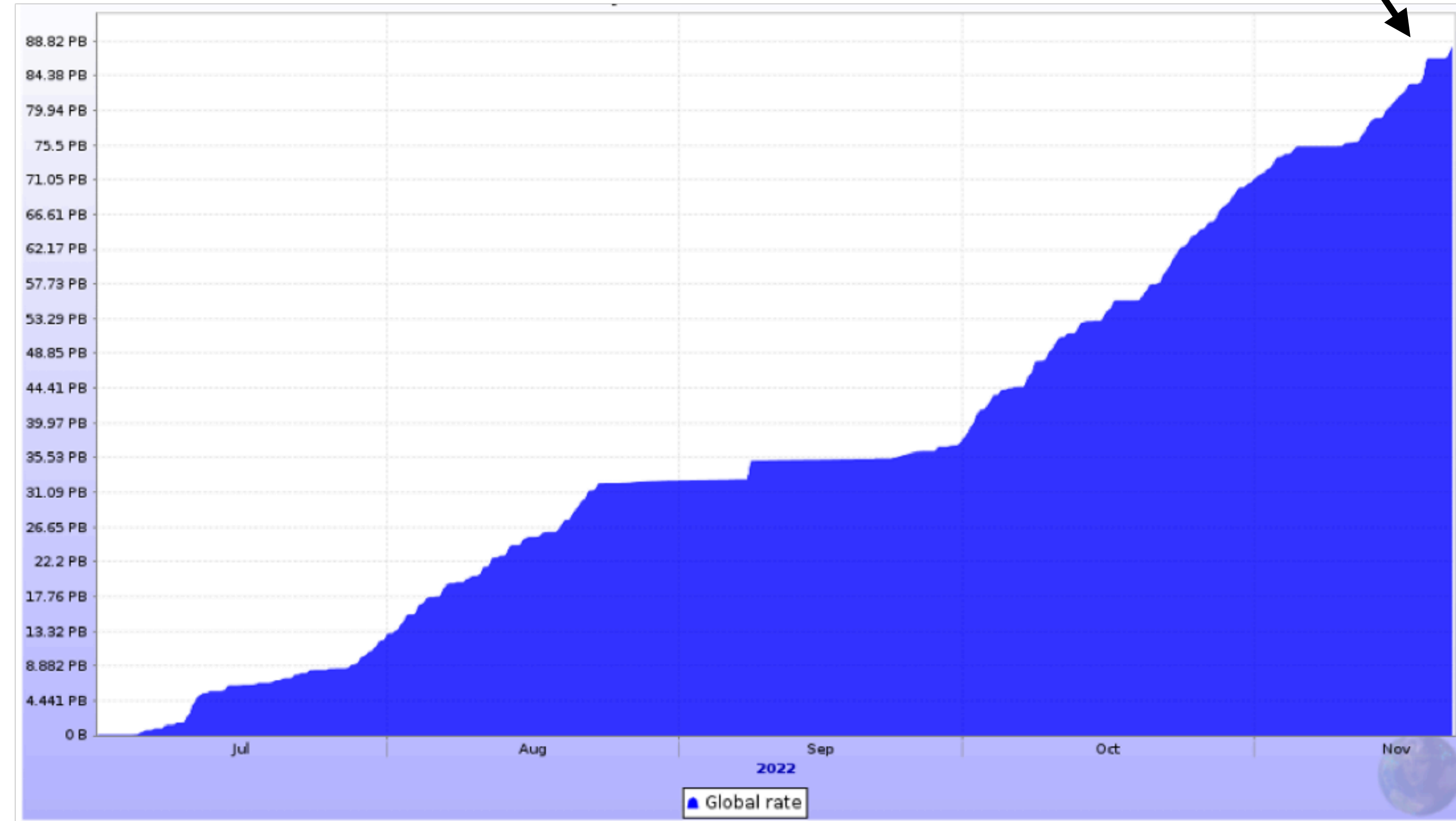
- Continuous readout for tracker
 - Allows for much higher rates
- New software framework
 - O2Physics
- EMCAL
 - Neutral energy deposits
 - Triggered detector



ALICE

ALICE data taking

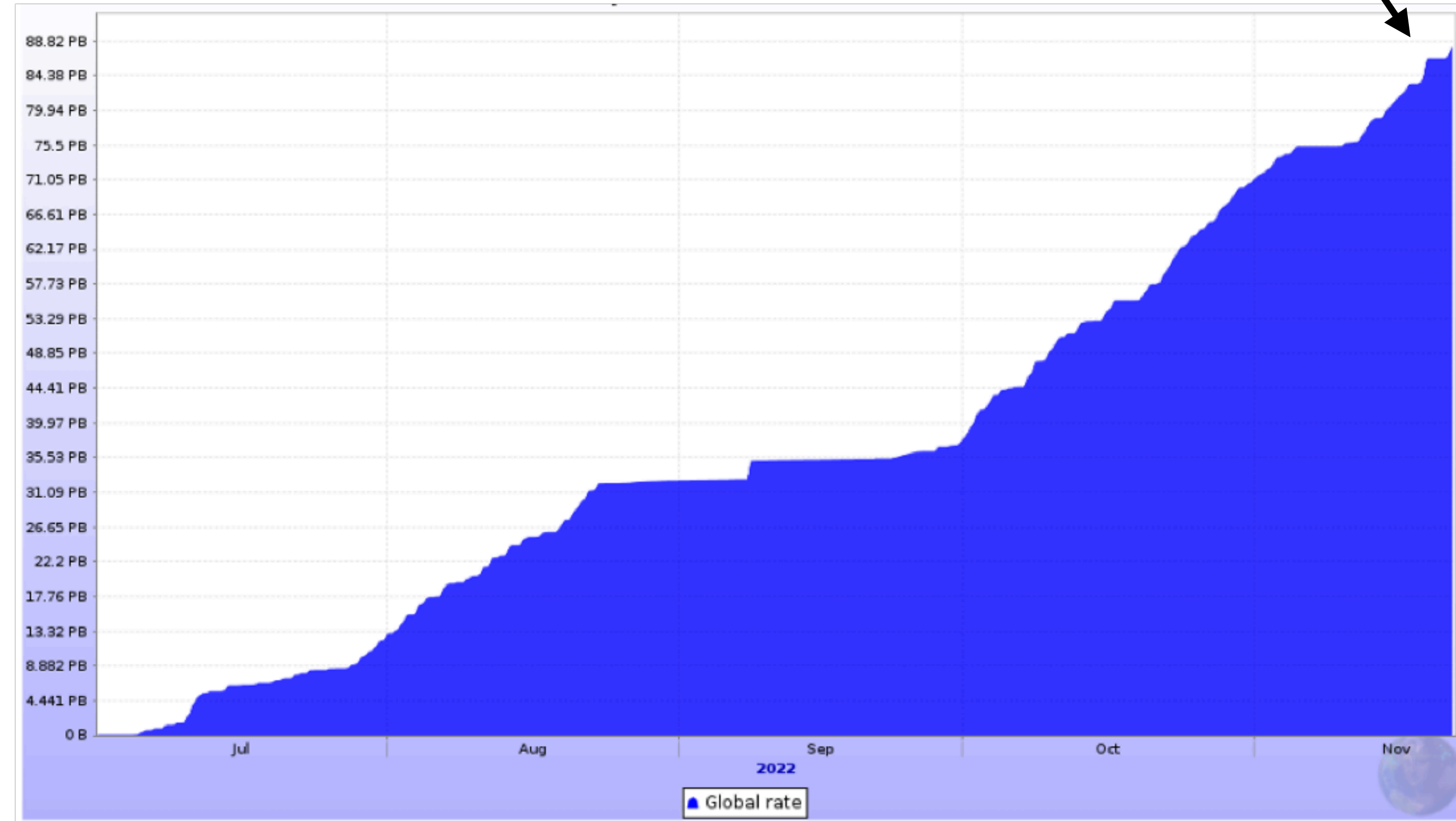
90 PB



ALICE data taking

- ≥ 500 kHz interaction rate

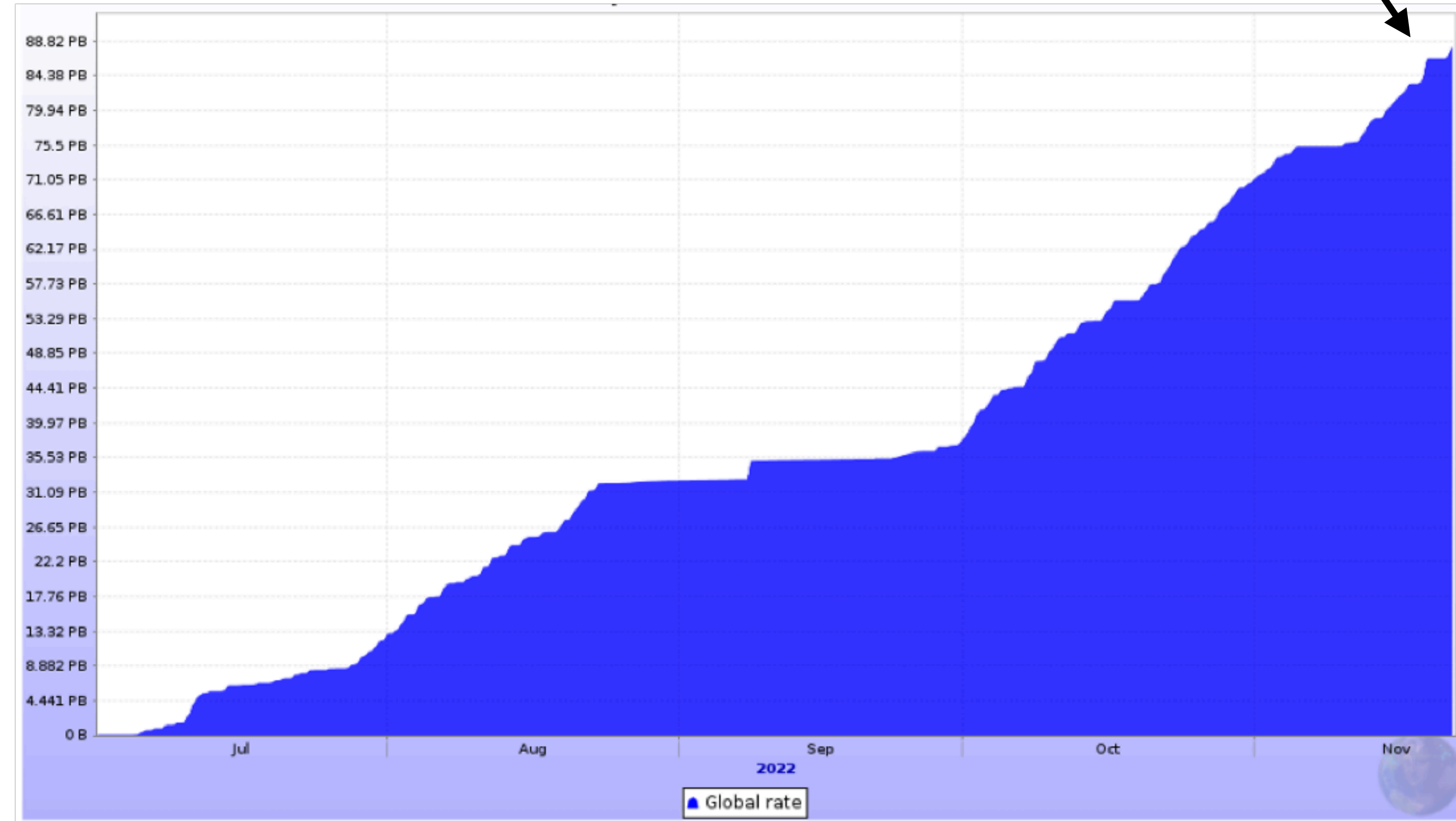
90 PB



ALICE data taking

- ≥ 500 kHz interaction rate
- 10^{12} events ~ 90 PB

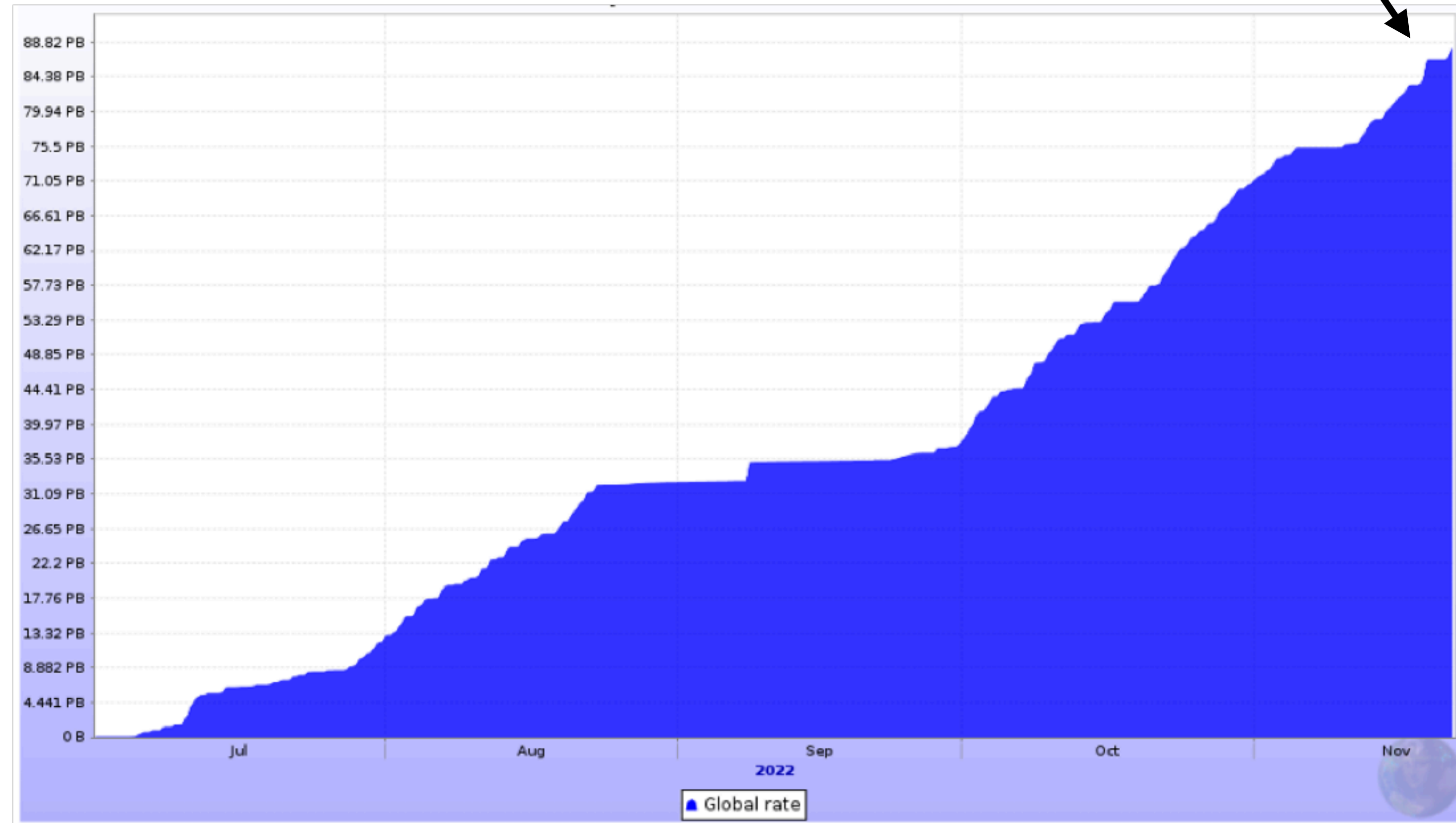
90 PB



ALICE data taking

- ≥ 500 kHz interaction rate
- 10^{12} events ~ 90 PB
- ~ 500 Hz to tape

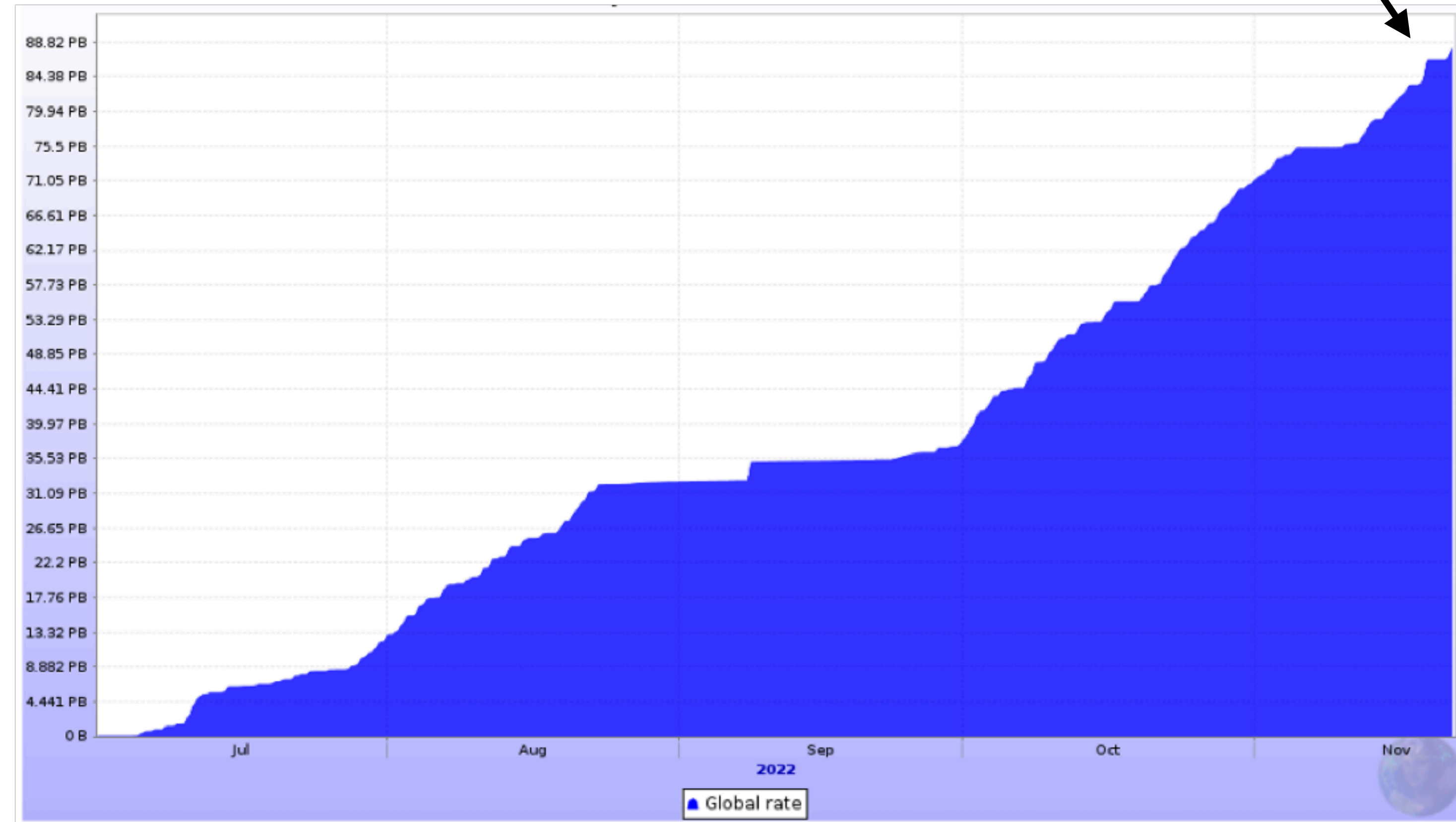
90 PB



ALICE data taking

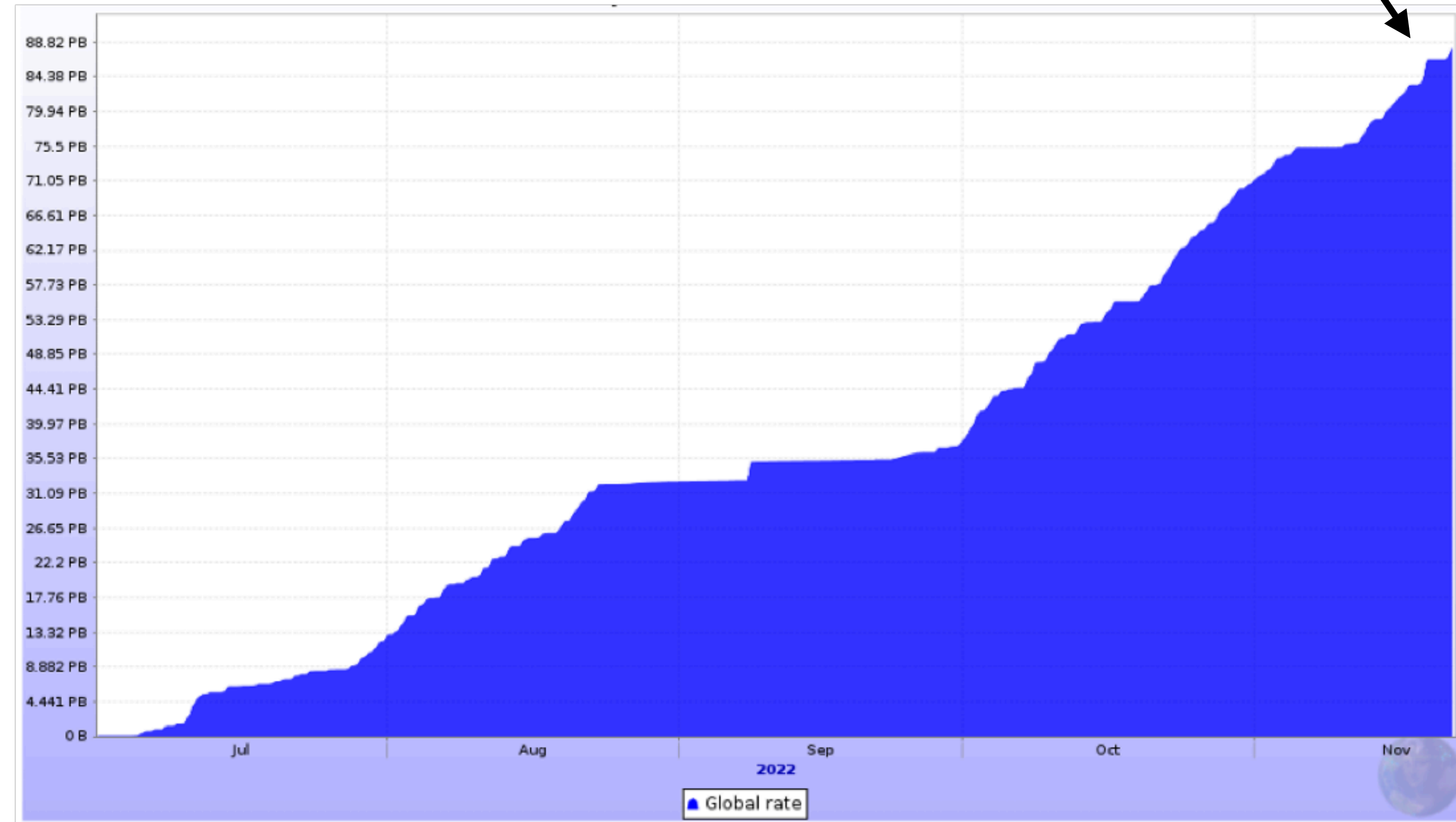
- ≥ 500 kHz interaction rate
- 10^{12} events ~ 90 PB
- ~ 500 Hz to tape
- Select data in a smart way to keep the interesting physics

90 PB



ALICE data taking

- ≥ 500 kHz interaction rate
- 10^{12} events ~ 90 PB
- ~ 500 Hz to tape
- Select data in a smart way to keep the interesting physics
 - Software decisions



Software triggers

- Select data in a smart way to keep the interesting physics

Software triggers

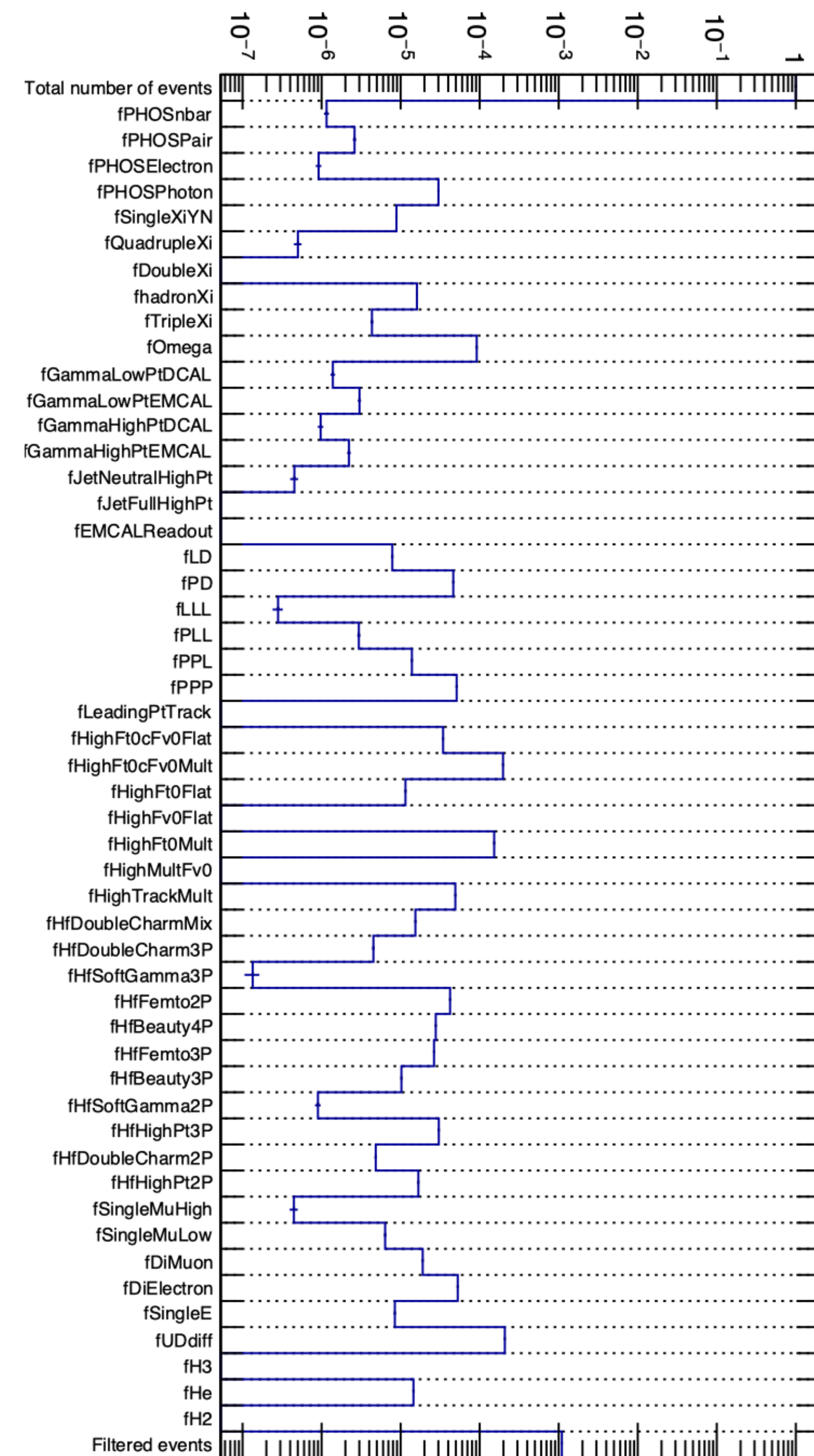
- Select data in a smart way to keep the interesting physics
- Hardware: fast

Software triggers

- Select data in a smart way to keep the interesting physics
- Hardware: fast
- Software: smart

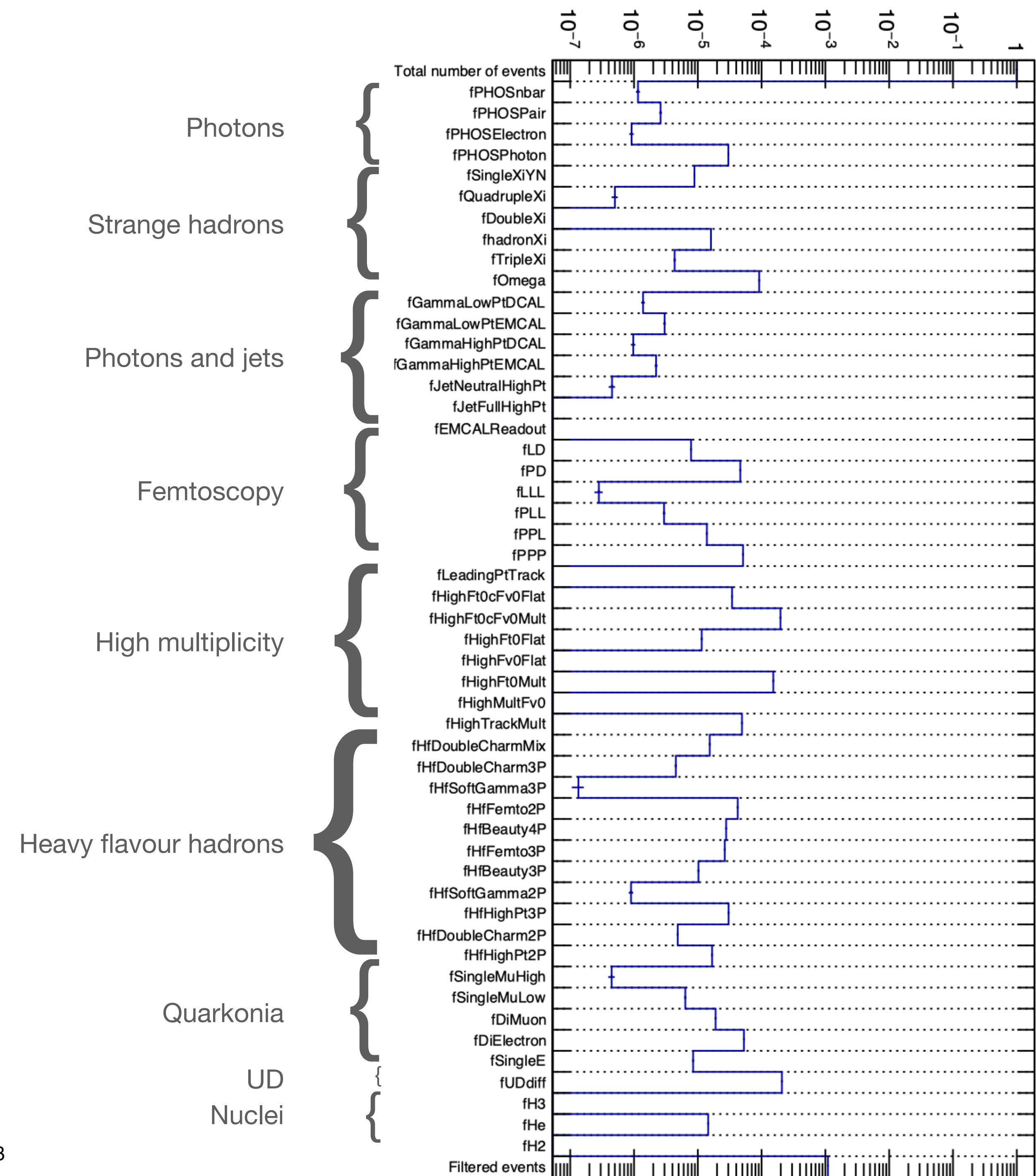
Software triggers

- Select data in a smart way to keep the interesting physics
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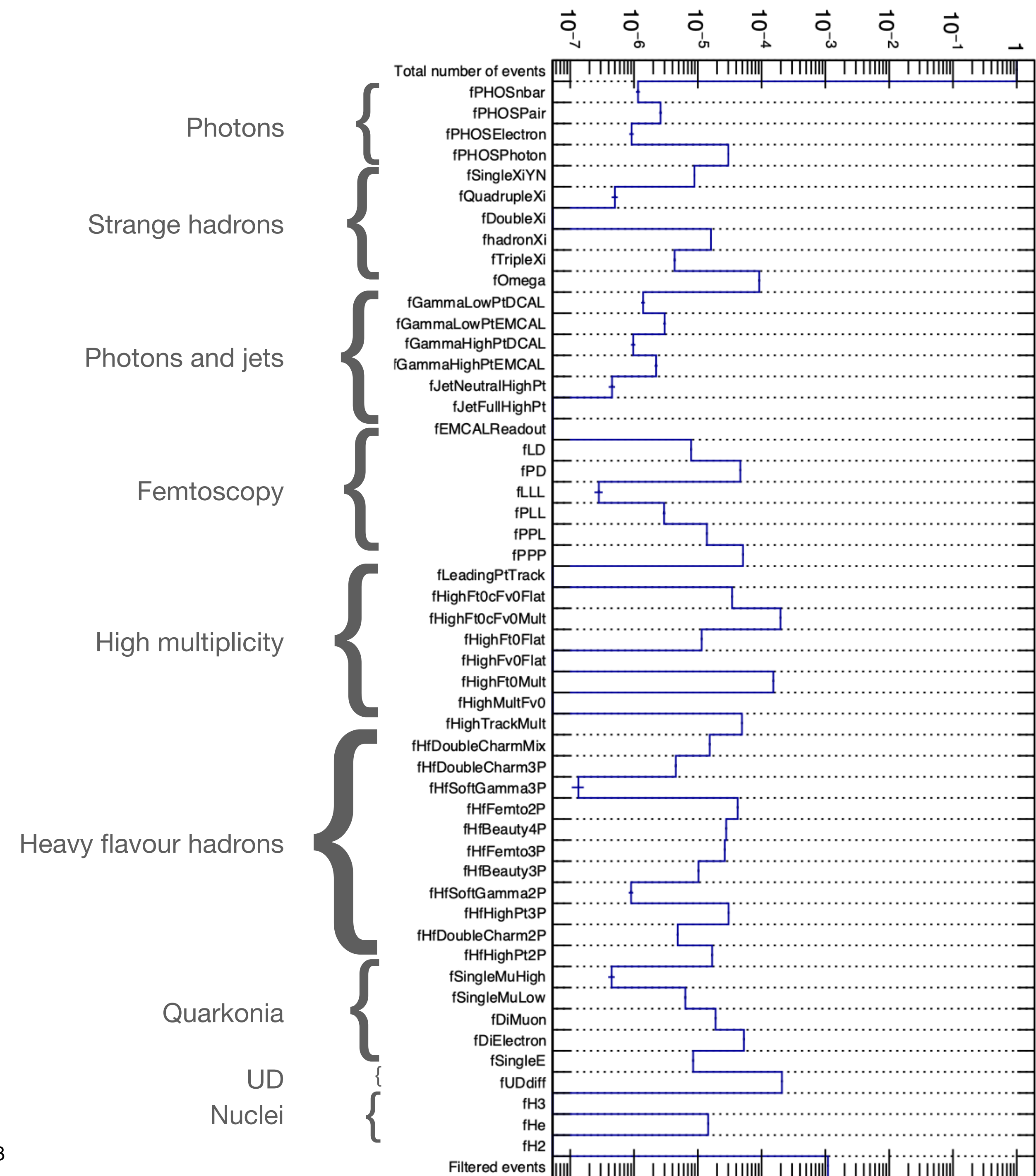
Software triggers

- Select data in a smart way to keep the interesting physics
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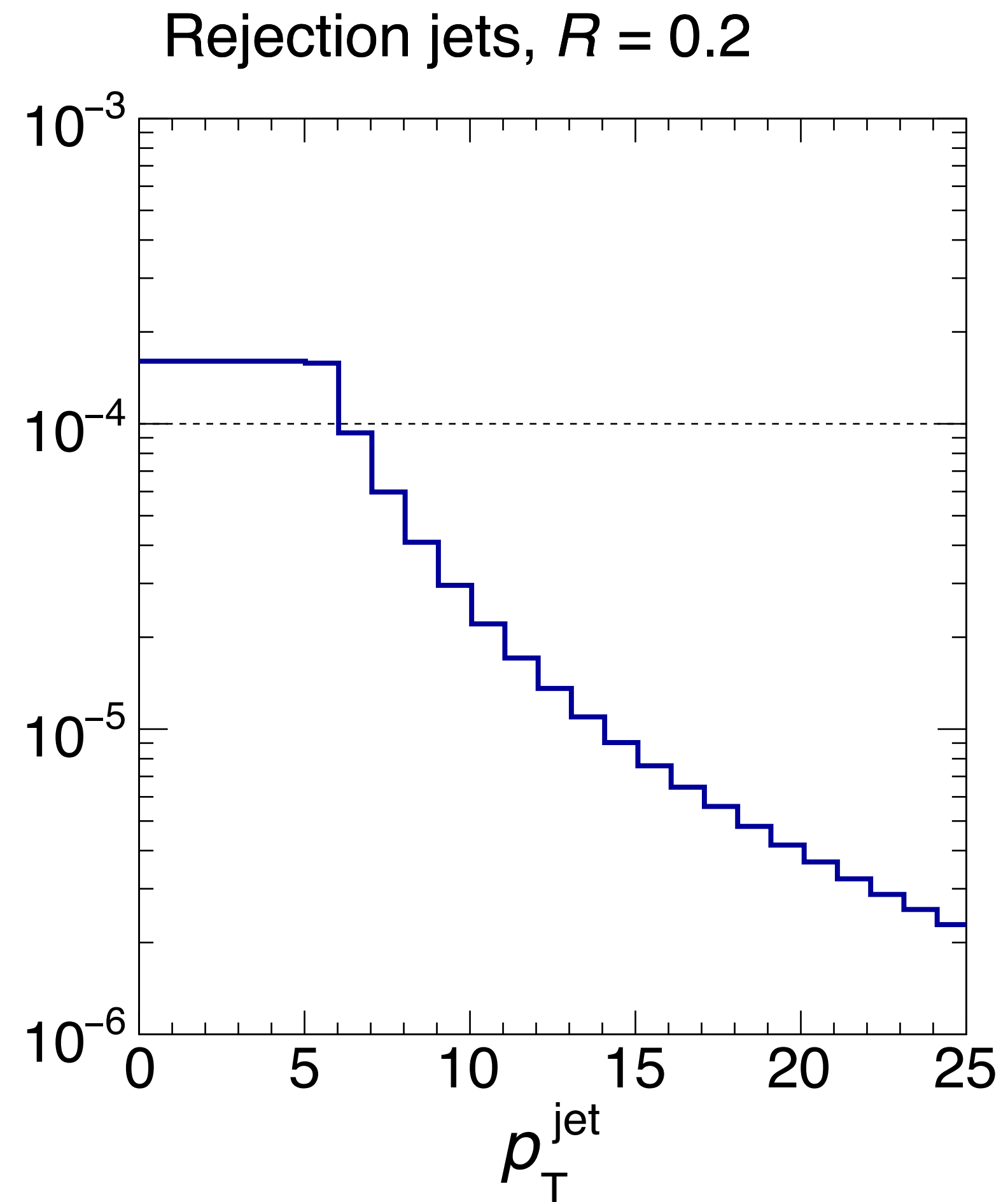


Software triggers

- Select data in a smart way to keep the interesting physics
 - Hardware: fast
 - Software: smart
- Full jets

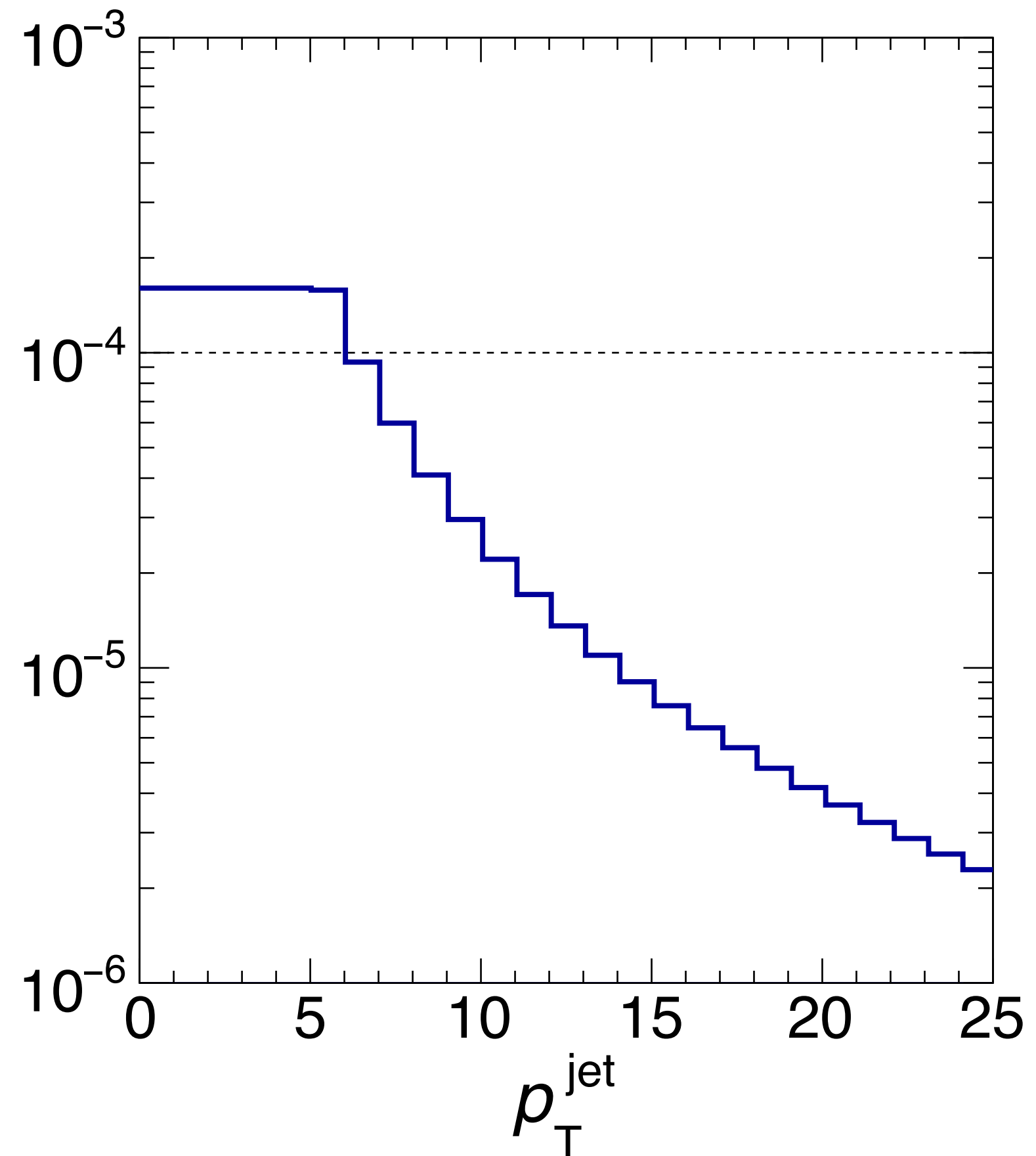


Jets trigger

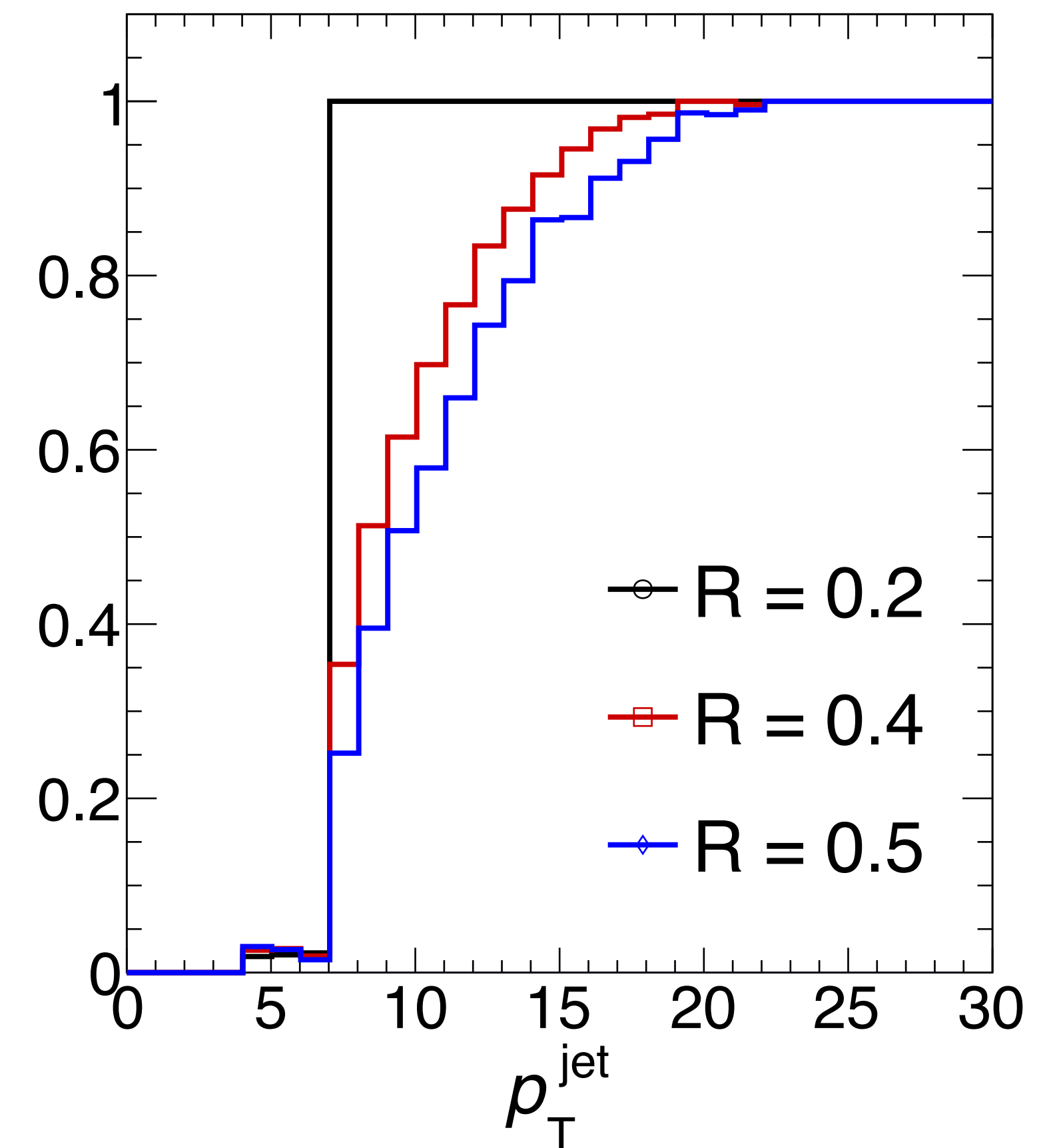


Jets trigger

Rejection jets, $R = 0.2$

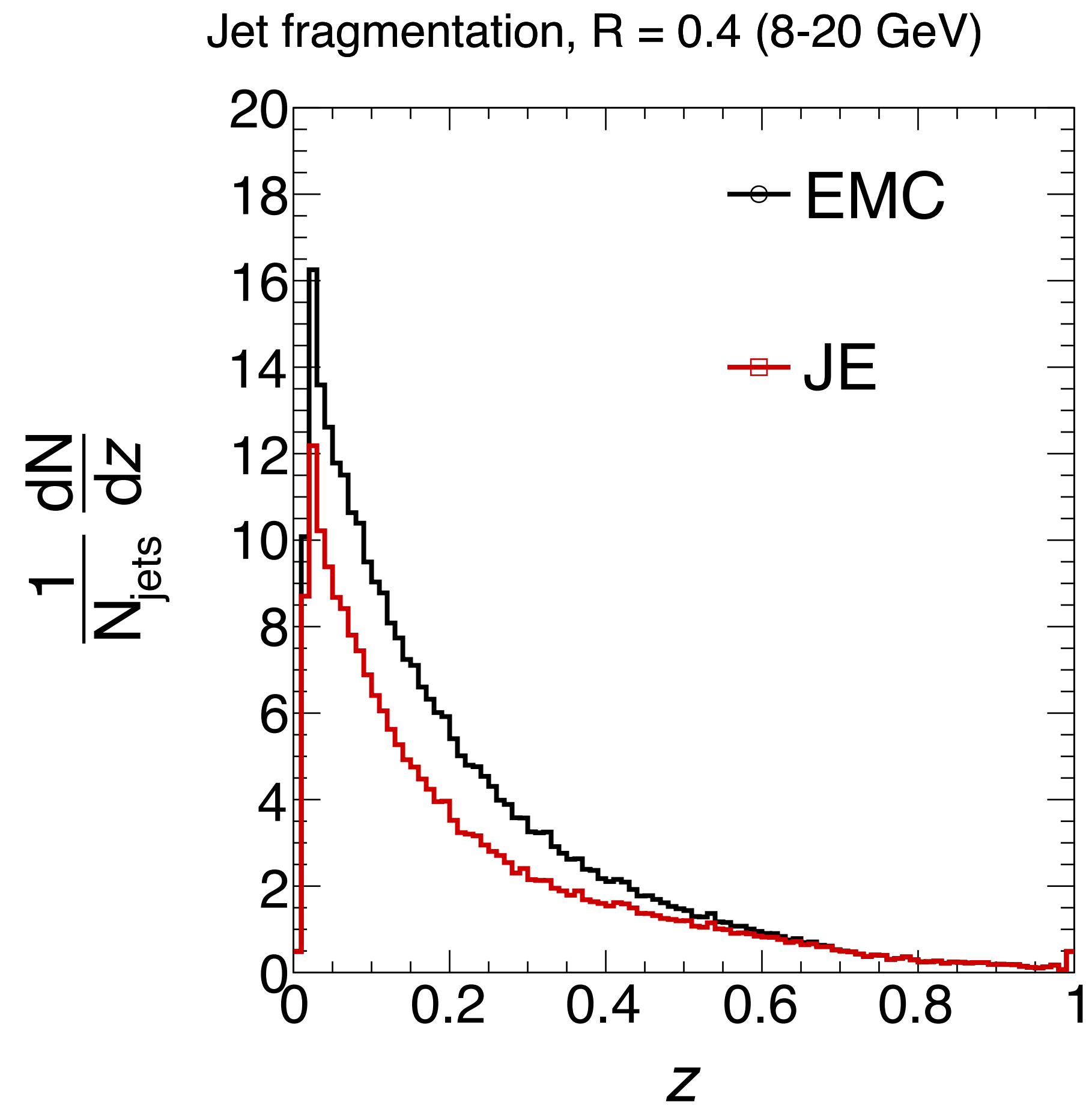


Turn-on jets (8 GeV cut, $R = 0.2$)



Jet fragmentation

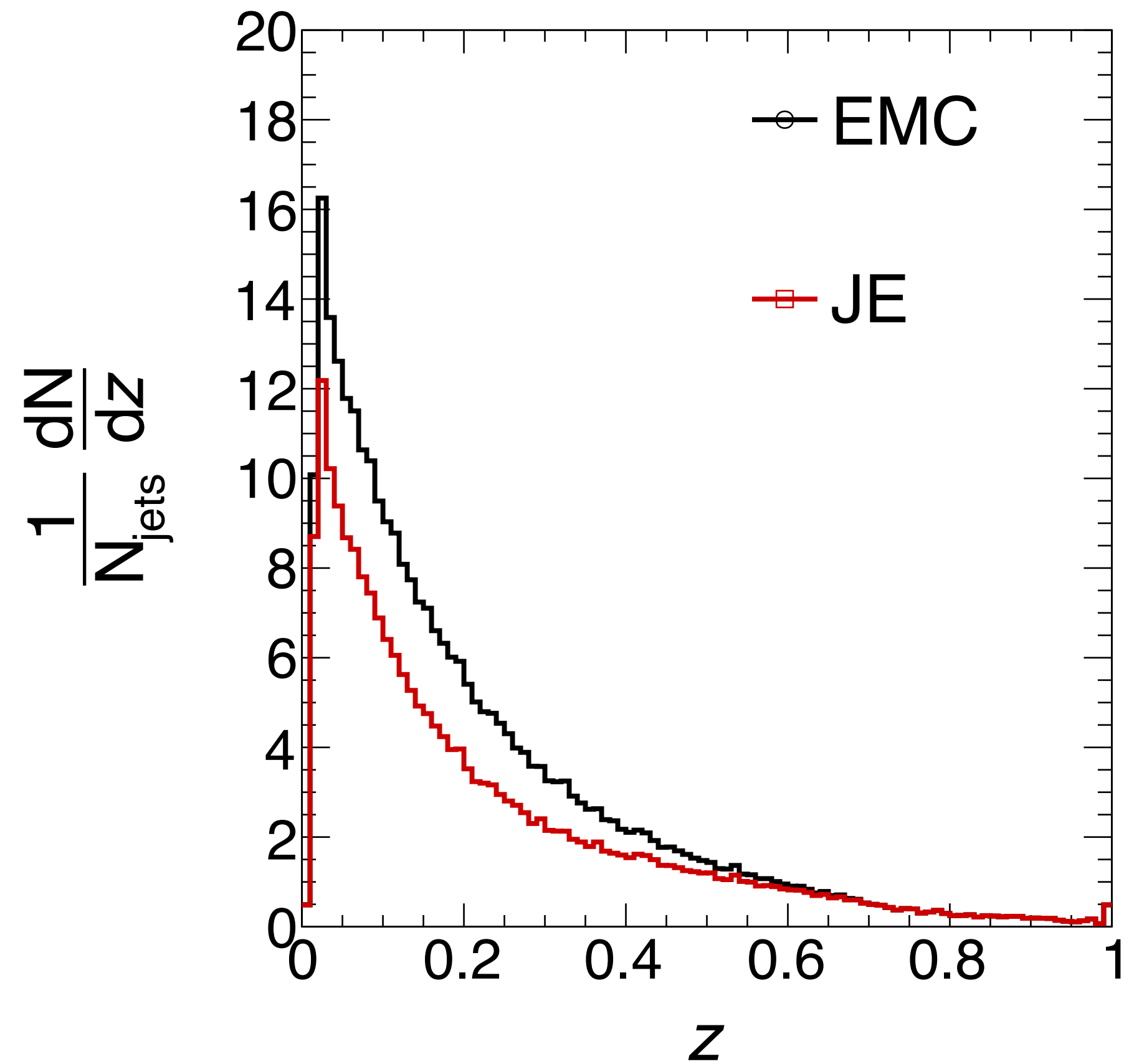
Trigger bias



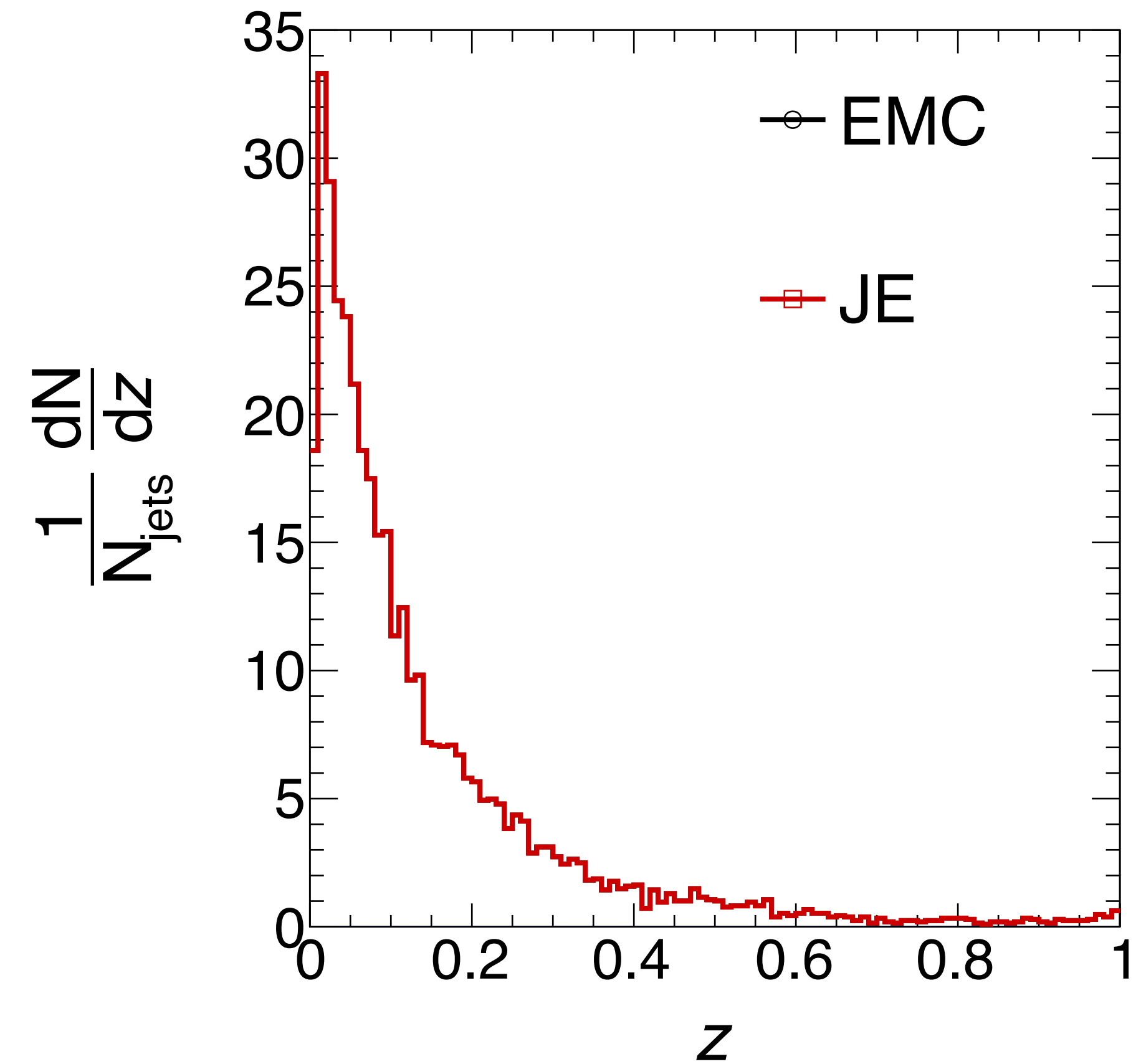
Jet fragmentation

Trigger bias

Jet fragmentation, $R = 0.4$ (8-20 GeV)



Jet fragmentation, $R = 0.4$ (20-30 GeV)



Summary

- Fragmentation of gluons is poorly constrained
- Using jets to understand fragmentation
- Measure fragmentation into K^0 , Λ^0 in Run 3 pp data
- Data selection for jets using full jet trigger

Backup

Tracks in jets

Trigger bias

