

# When less than an hour of work changed everything (or kind of)

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18 June 2019

Instead of sleeping during night...



... let's do some work instead

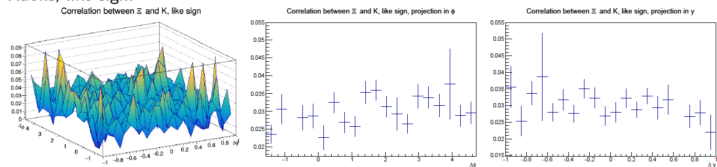
# Sending a summary of several weeks of work to my analysis group coordinators

## Slide 17:

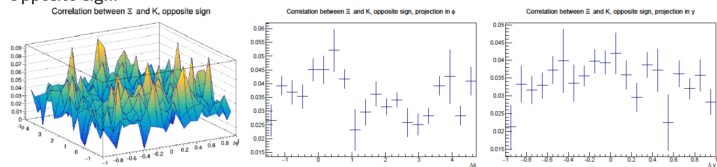
### Correlation results

- So far, no differentiation in  $p_T$  or multiplicity
- NUA of associated particles is turned off (other efficiency corrections are still applied) to get rid of spikes in the data – did not seem to help completely  $\implies$  further measures necessary

### Kaons, like-sign:



### Opposite sign:



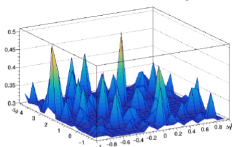
# Sending a summary of several weeks of work to my analysis group coordinators

Slide 18:

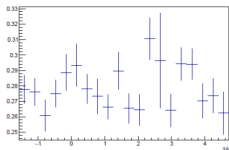
Correlation results, cont'd

Pions, like-sign:

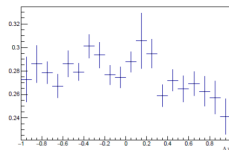
Correlation between  $\Xi$  and  $\pi$ , like sign



Correlation between  $\Xi$  and  $\pi$ , like sign, projection in  $\phi$

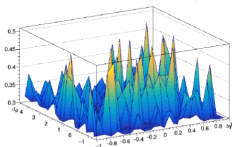


Correlation between  $\Xi$  and  $\pi$ , like sign, projection in  $\eta$

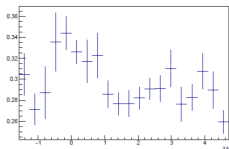


Opposite sign<sup>1</sup>:

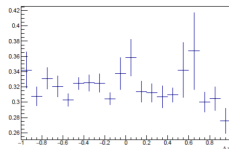
Correlation between  $\Xi$  and  $\pi$ , opposite sign



Correlation between  $\Xi$  and  $\pi$ , opposite sign, projection in  $\phi$



Correlation between  $\Xi$  and  $\pi$ , opposite sign, projection in  $\eta$



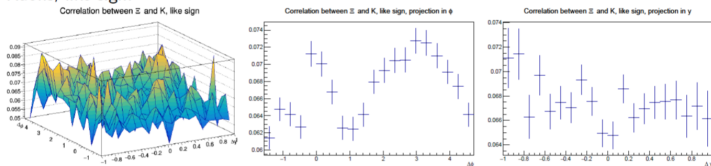
# Resubmitting three hours later (after changing four lines of code and waiting for it to finish)

Slide 17:

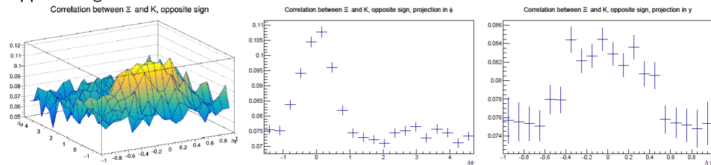
## Correlation results

- So far, no differentiation in  $p_T$  or multiplicity
- NUA of associated particles is turned off, as well as efficiencies on trigger particles, to get rid of spikes in the data ( $p$ -dependent efficiencies on associated particles still applied)

### Kaons, like-sign:



### Opposite sign:

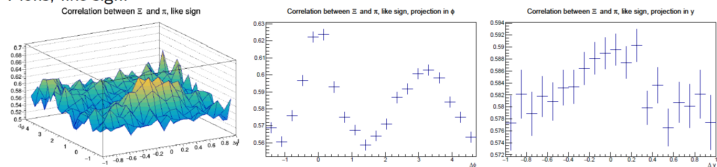


# Resubmitting three hours later (after changing four lines of code and waiting for it to finish)

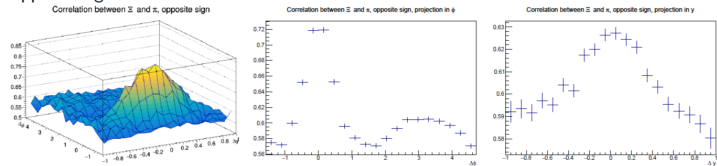
Slide 18:

Correlation results, cont'd

Pions, like-sign:



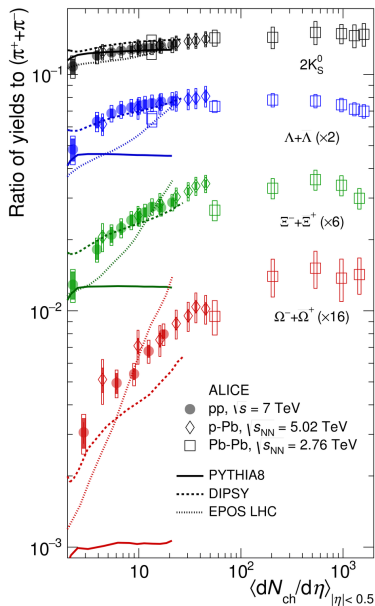
Opposite sign:



Wait, what is this?

Let's move to the whiteboard

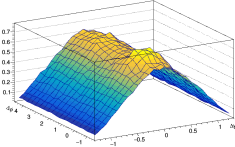
# Strangeness enhancement





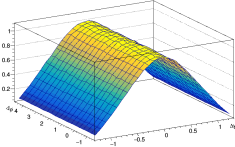
# Measuring correlations

Same-event correlation between  $\Xi$  and  $\pi$ , like sign



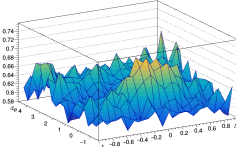
/

Mixed-event correlation between  $\Xi$  and  $\pi$ , like sign

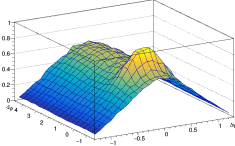


=

Correlation between  $\Xi$  and  $\pi$ , like sign

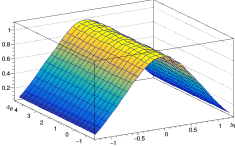


Same-event correlation between  $\Xi$  and  $\pi$ , opposite sign



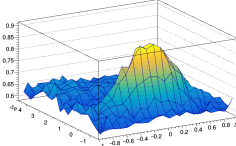
/

Mixed-event correlation between  $\Xi$  and  $\pi$ , opposite sign



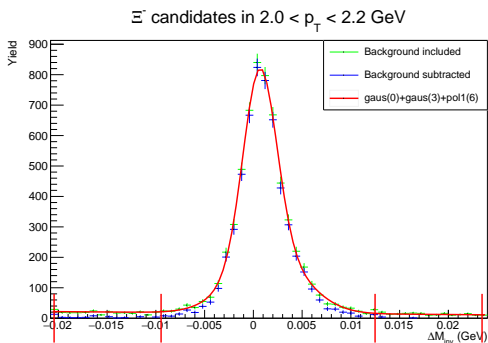
=

Correlation between  $\Xi$  and  $\pi$ , opposite sign



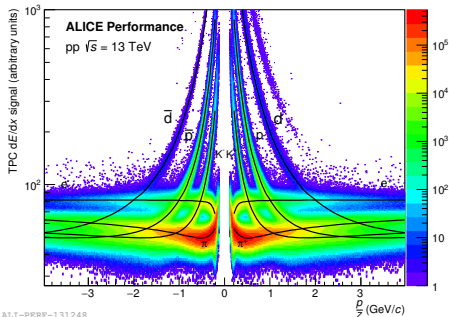
# How do we find the $\Xi^-$ s?

After selecting cascades and applying a lot of cuts, we get something like this:



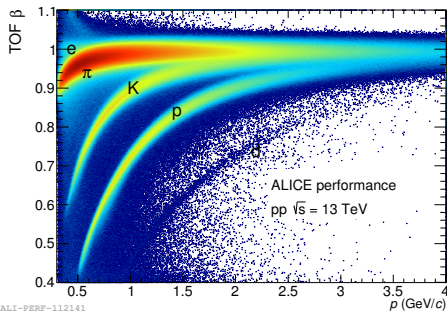
# And the associated particles?

TPC:



ALI-PERF-131248

TOF:



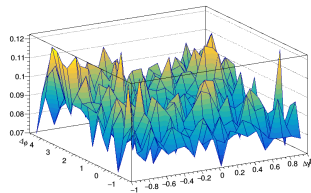
ALI-PERF-112141

- Clean at low  $p_T$ , at higher  $p_T$ , the tracks mix quite a lot
- I developed a method to account for this without applying strong rejection cuts  $\implies$  still being evaluated
- If anyone is interested, I can show it to you later

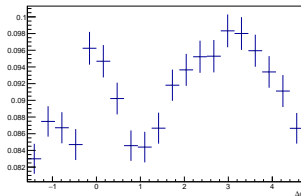
# Results and their implications

$$(\Xi^- - K^-) + (\Xi^+ - K^+)/2:$$

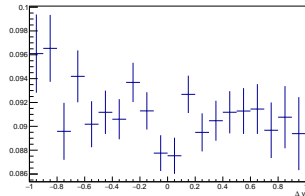
Correlation between  $\Xi$  and  $K$ , like sign



Correlation between  $\Xi$  and  $K$ , like sign, projection in  $\phi$

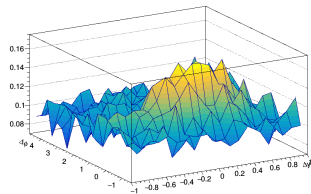


Correlation between  $\Xi$  and  $K$ , like sign, projection in  $y$

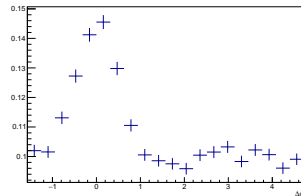


$$(\Xi^- - K^+) + (\Xi^+ - K^-)/2:$$

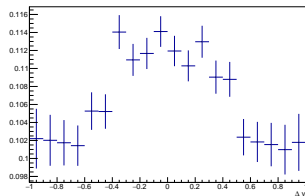
Correlation between  $\Xi$  and  $K$ , opposite sign



Correlation between  $\Xi$  and  $K$ , opposite sign, projection in  $\phi$



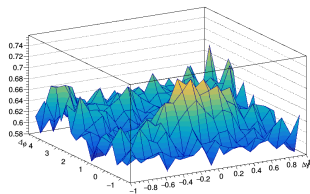
Correlation between  $\Xi$  and  $K$ , opposite sign, projection in  $y$



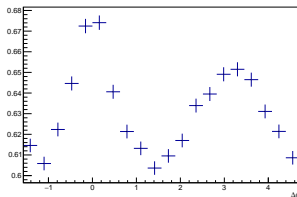
# Results and their implications

$$(\Xi^- - \pi^-) + (\Xi^+ - \pi^+)/2:$$

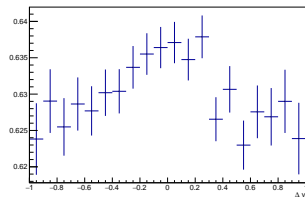
Correlation between  $\Xi$  and  $\pi$ , like sign



Correlation between  $\Xi$  and  $\pi$ , like sign, projection in  $\phi$

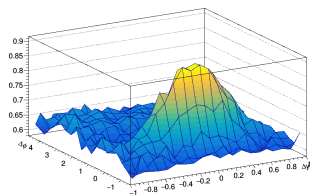


Correlation between  $\Xi$  and  $\pi$ , like sign, projection in  $\eta$

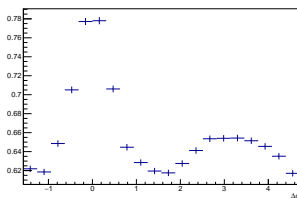


$$(\Xi^- - \pi^+) + (\Xi^+ - \pi^-)/2:$$

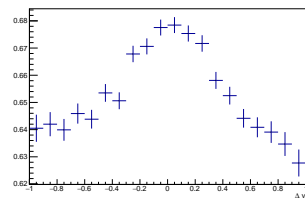
Correlation between  $\Xi$  and  $\pi$ , opposite sign



Correlation between  $\Xi$  and  $\pi$ , opposite sign, projection in  $\phi$



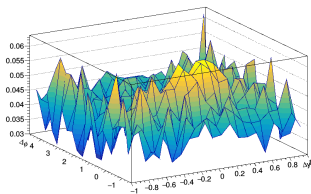
Correlation between  $\Xi$  and  $\pi$ , opposite sign, projection in  $\eta$



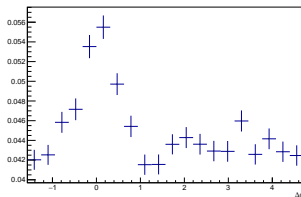
# Results and their implications

$$(\Xi^- - \bar{p}) + (\Xi^+ - p)/2:$$

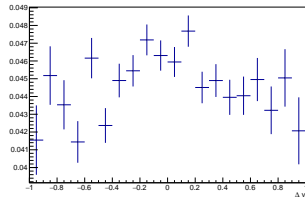
Correlation between  $\Xi$  and  $p$ , like sign



Correlation between  $\Xi$  and  $p$ , like sign, projection in  $\phi$

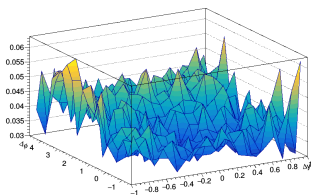


Correlation between  $\Xi$  and  $p$ , like sign, projection in  $y$

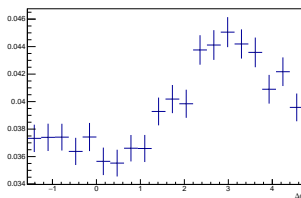


$$(\Xi^- - p) + (\Xi^+ - \bar{p})/2:$$

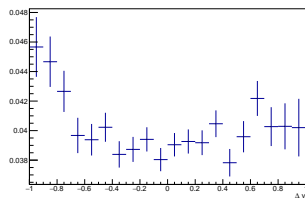
Correlation between  $\Xi$  and  $p$ , opposite sign



Correlation between  $\Xi$  and  $p$ , opposite sign, projection in  $\phi$



Correlation between  $\Xi$  and  $p$ , opposite sign, projection in  $y$



# What happens next?

First things first:

- Cross-checks (this is partly a new method, after all)
- Apply efficiency corrections
- Run on more data
- Deeper collaboration with the Munich group
- And of course: get some physics out of this!





## Take home messages

Even small things may have a huge impact on the results, and possibly give you new opportunities!

So when you are struggling with your code and feel like the world hates you, don't give up – there is light at the other end of the tunnel!

Thank you for your attention!