# Femtoscopic pΛ Correlations in Pb-Pb Collisions at $\sqrt{s_{NN}}$=2.76 TeV


Hans Beck[a] for the ALICE collaboration

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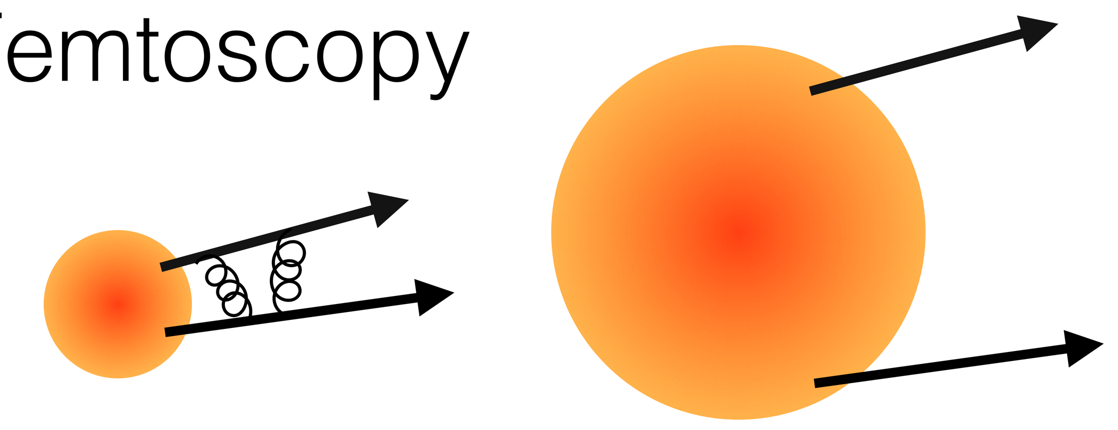
Goethe Universität Frankfurt am Main

[a]email: Hans.Beck@cern.ch


## Introduction and motivation

### Femtoscopy

- Measure the size of the particle emitting source
- Via two-particle correlations
  - pΛ: known strong FSI

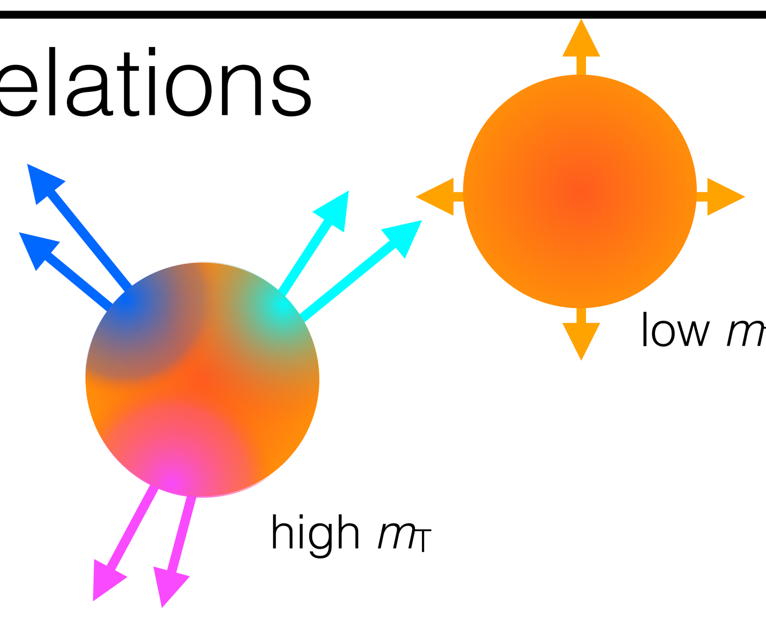


small size
particles correlated

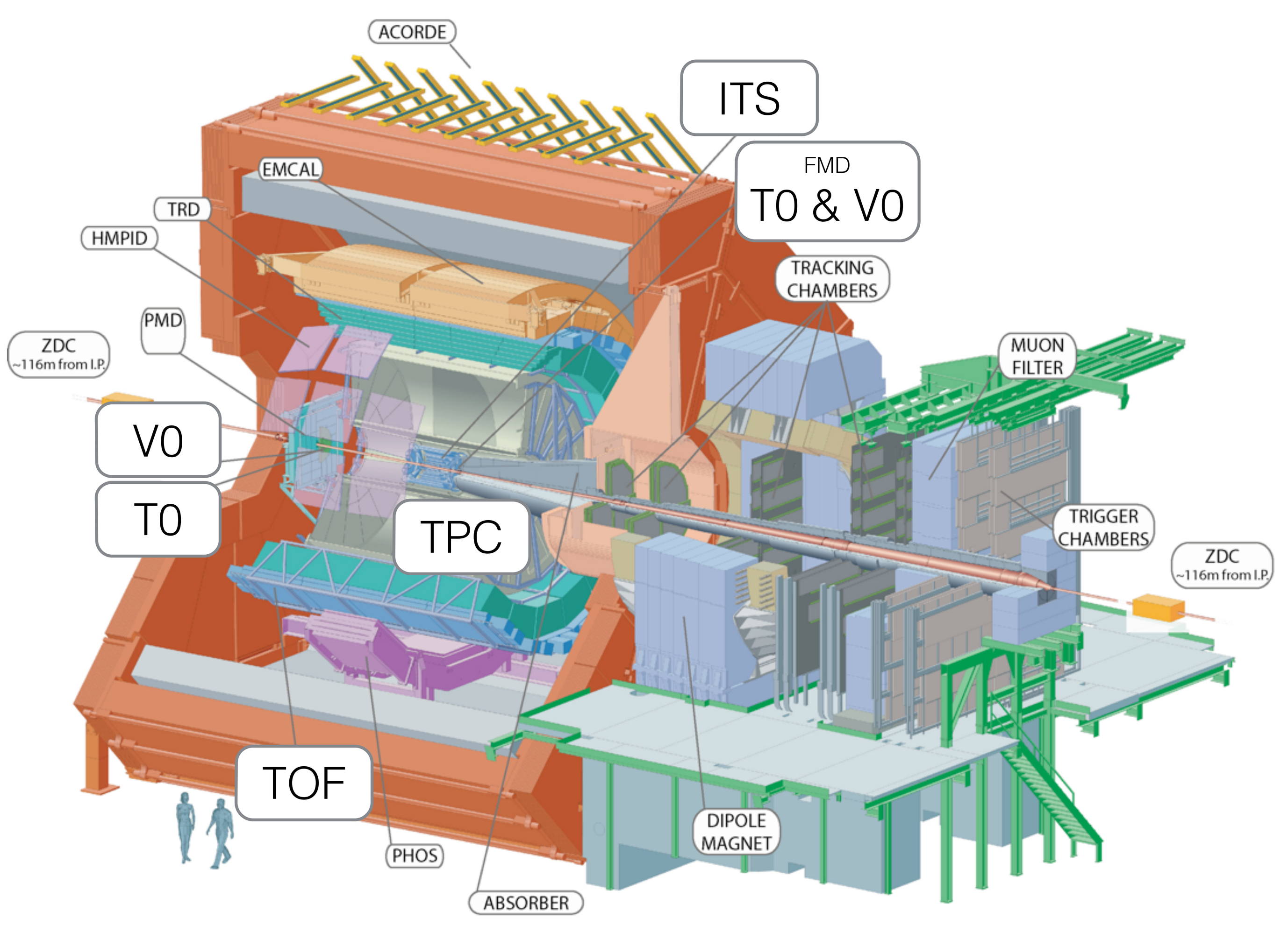
large size
particles uncorrelated

### pΛ correlations

- Thermal velocity $\sqrt{T/m_{\mathrm{T}}}$ competing with collective velocity
- $m_{\mathrm{T}}$ dependence of radii probes dynamics of the source
- Experimental $m_{\mathrm{T}}$ reach can be extended with heavy particles

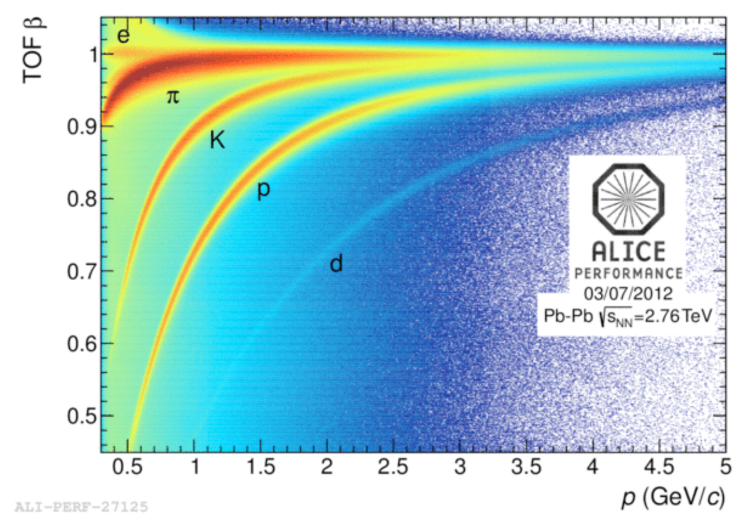



## Particle reconstruction and identification



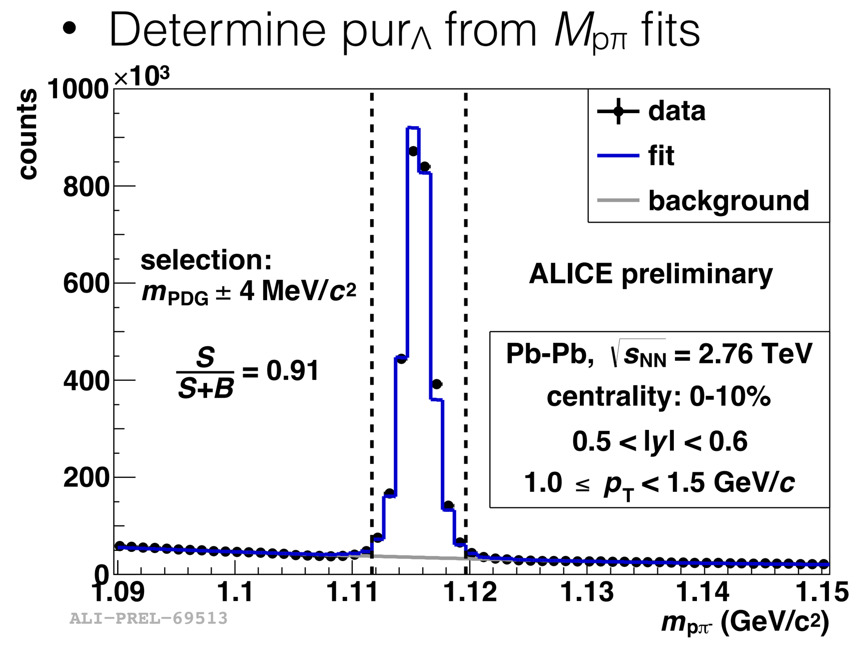

### p

- PID using TPC and TOF
- Up to $p$ = 5 GeV/$c$
- $\mathrm{pur_p} = \dfrac{S}{S+B} > 99\%$




### Λ

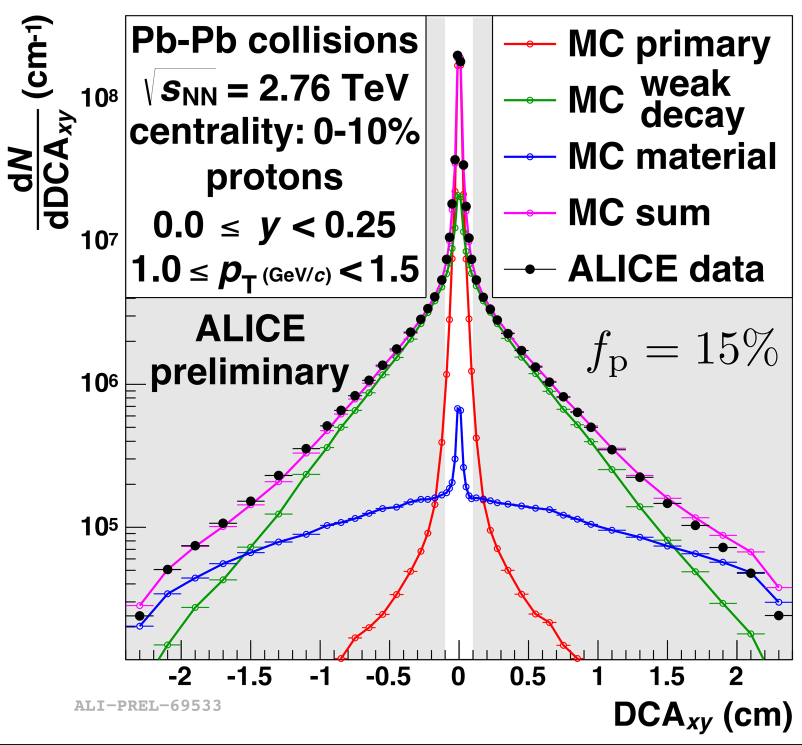
- Using V0 topology finder
- Reconstruct charged decay
- Determine $\mathrm{pur}_\Lambda$ from $M_{\mathrm{p}\pi}$ fits




## Feed-down determination and correction procedure

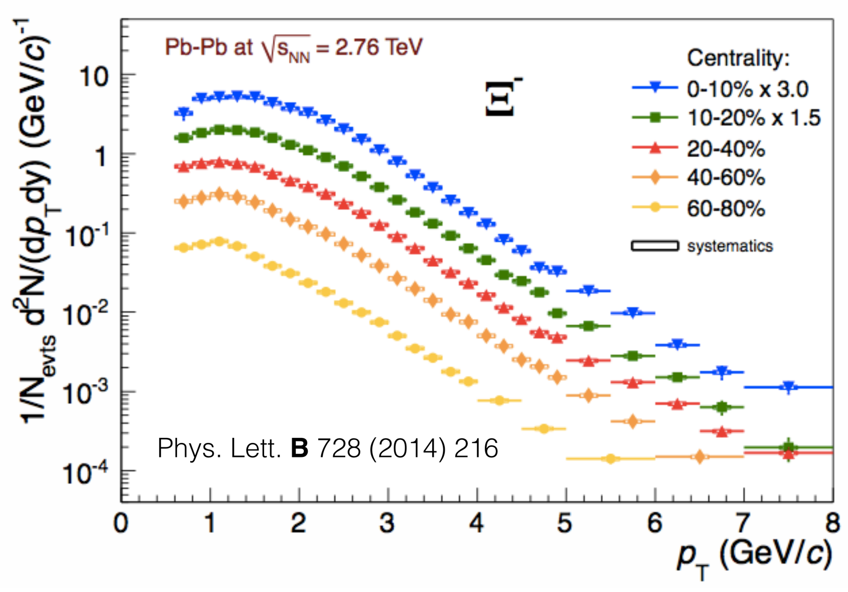
### p

- DCA fits in ($y$,$p_{\mathrm{T}}$)
- Using MC templates
- Quantify feed-down fraction $f_{\mathrm{p}}$




### Λ

- E.M. decays from thermal model
- Weak decays using ALICE measured spectra and reconstruction efficiencies from MC




### Correction

- Raw correlation function:

$$C_2^{\mathrm{raw}}(q, m_{\mathrm{T}}) = \frac{\text{real events}}{\text{mixed events}}$$

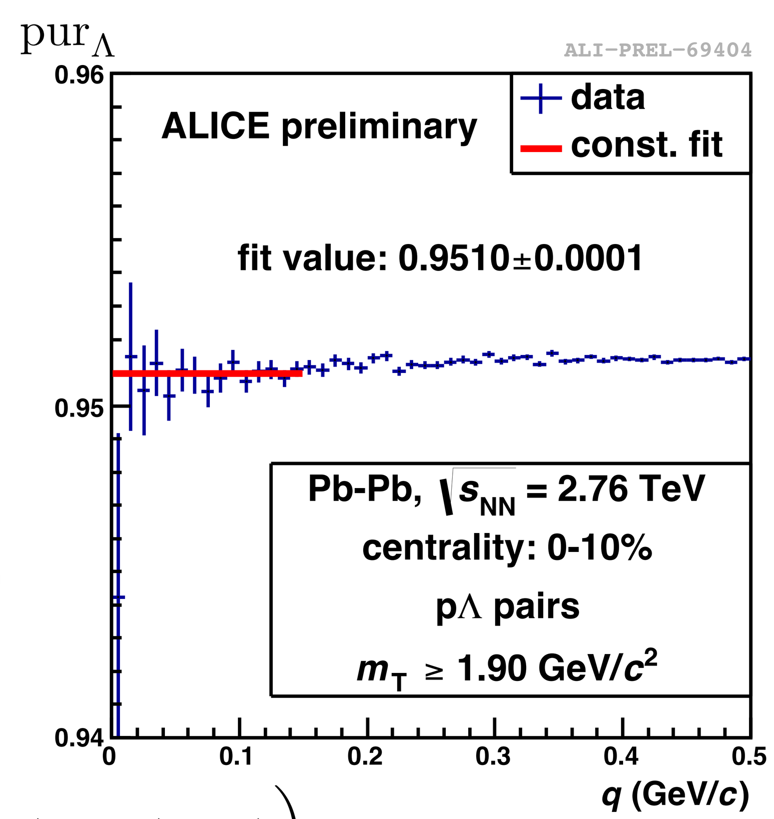
$$q = \text{momentum difference}$$

- Purity:

$$\mathrm{pur}(q, m_{\mathrm{T}}) = \mathrm{pur}_\Lambda(q, m_{\mathrm{T}}) \cdot (1 - f_{\mathrm{p}}(q, m_{\mathrm{T}})) \cdot (1 - f_\Lambda(q, m_{\mathrm{T}}))$$

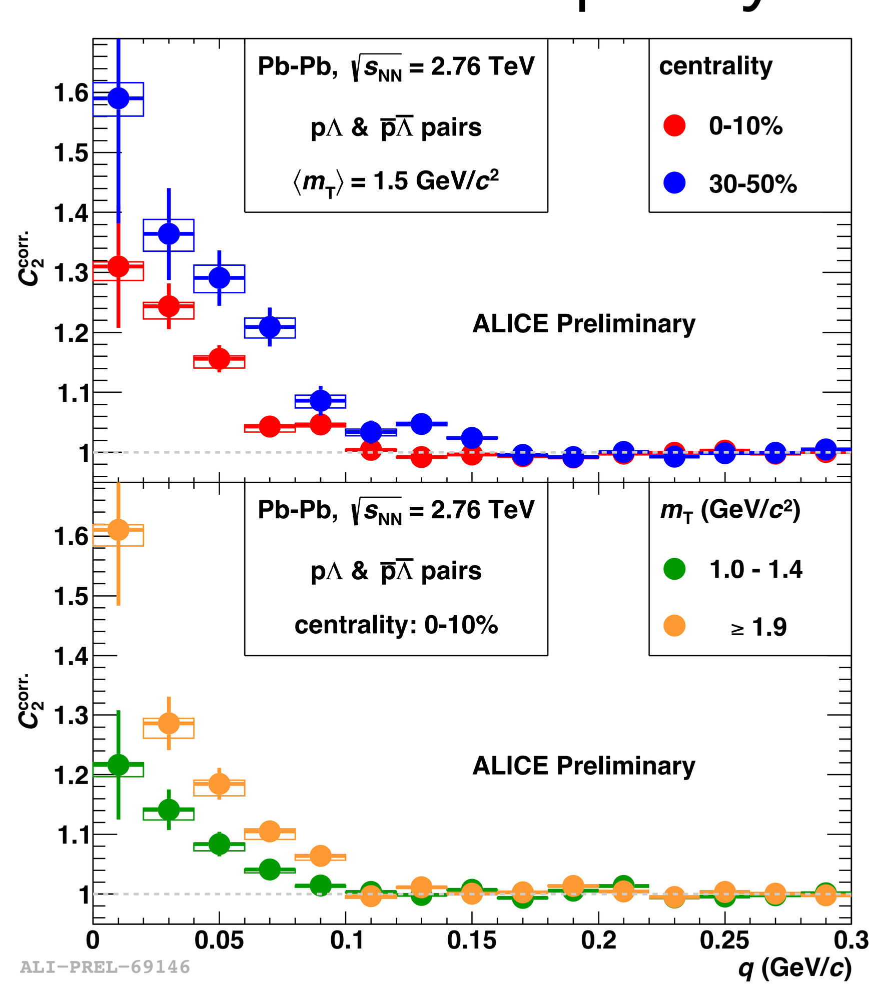
- Corrected correlation function:

$$C_2^{\mathrm{corr.}}(q, m_{\mathrm{T}}) = \left(\frac{1}{\mathrm{pur}(q, m_{\mathrm{T}})} \cdot (C_2^{\mathrm{raw}}(q, m_{\mathrm{T}}) - 1)\right) + 1$$




## Results

### Exemplary correlation functions




- Corrected for purity and feed down
- Not corrected for momentum resolution of ~10 MeV in $q_{\mathrm{gen}}$ - $q_{\mathrm{rec}}$
- pΛ & $\bar{\mathrm{p}}\bar{\Lambda}$ merged on the level of $C_2^{\mathrm{corr.}}$
  http://pdg.lbl.gov/2013/reviews/rpp2013-rev-rpp-intro.pdf
- Note high $m_{\mathrm{T}}$
- $m_{\mathrm{T}}$ and centrality dependence seen

### Conclusion

- ALICE allows to attain highly pure samples of (anti-)p and (anti-)Λ with rich statistics
- Obtained corrected pΛ & $\bar{\mathrm{p}}\bar{\Lambda}$ correlation functions multi-differential in centrality and $m_{\mathrm{T}}$
- Reached highest $m_{\mathrm{T}}$ so far
- Expected centrality and $m_{\mathrm{T}}$ dependence observed
- Looking forward to extract radii with high precision