Current status and future prospects of measuring hadronic interactions in pp collisions at 13.6 TeV with ALICE

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Accessing hadronic interactions with femtoscopy

\[ C(k^*) = N \frac{N_{SE}(k^*)}{N_{ME}(k^*)} = \int S(r^*) |\Psi(k^*, r^*)|^2 \, d^3 r^* \]

**Workflow for fixing the source:**
- Measure correlation function \( C(k^*) \)
- Fix interaction \( \Psi(k^*) \)
- Study source \( S(r^*) \)

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**Workflow for accessing interaction:**
- Measure correlation function \( C(k^*) \)
- Fix source \( S(r^*) \)
- Study interaction \( \Psi(k^*) \)

⇒ Accessing exotic interactions, e.g.:
- \( p-\Omega \) and \( \Lambda-\Xi \) (multi-strange)
- \( p-D^+ \) (charmed)
How to constrain the source size:

• Measure correlation function $C(k^*)$
• Fix interactions $\Psi(k^*) \rightarrow p-p$ & $p-\Lambda$
• Take short-lived resonances into account
• Extract source as a function of $m_T$
Common baryonic source in pp collisions

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![Diagram showing sources and interactions](image)
Current status: Starting femtoscopy in Run 3

- First multiplicity and $m_T$ differential measurement of $p$–$p$ correlations
- First baseline measurement for constraining the source for all future femtoscopy studies in Run 3 with ALICE
  -> statistically limited channels and three body correlations accessible with Run 3 data
- Next steps: Extend source measurement to $p$–$\Lambda$ and core source

Observation:
Source radius increases with increasing multiplicity and decreases for increasing $m_T$

600 billion MB events collected in 2022 alone