Event selection strategy for charged-particle R_{AA} measurement in light ion collisions

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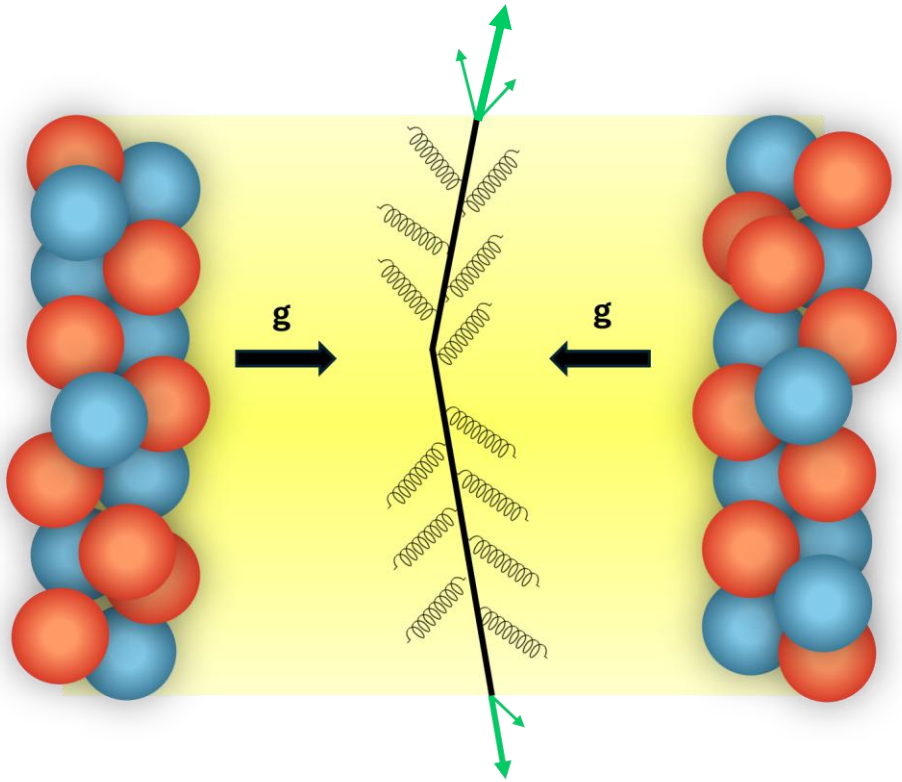
Nuclear modification factor

- **Quark-gluon plasma (QGP)** is formed in ultrarelativistic heavy ion collisions
- **Quenching**: Traversing partons lose energy → suppression in the particle yield
  - **Suppression has not been seen in small systems, such as p+Pb**

- **Nuclear modification factor R_{AA}**
  - Quantifies the suppression
  - **New measurements in light ion collisions** (O+O, Ne+Ne)

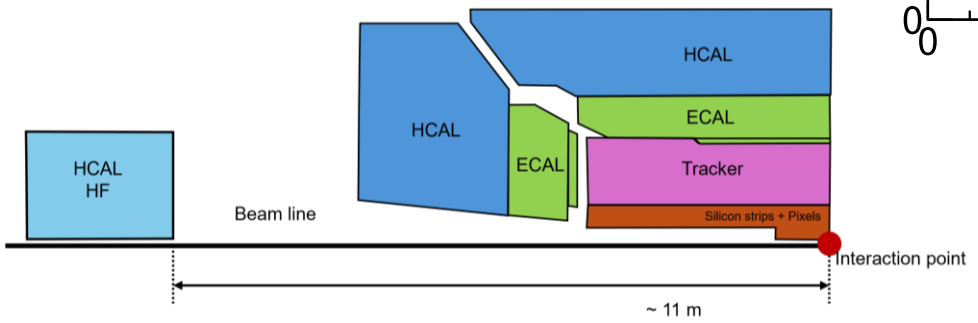
$$R_{AA} = \frac{1}{A^2}\left[\left(\frac{d\sigma^{AA}}{dp_T}\right)\Big/\left(\frac{d\sigma^{pp}}{dp_T}\right)\right]$$

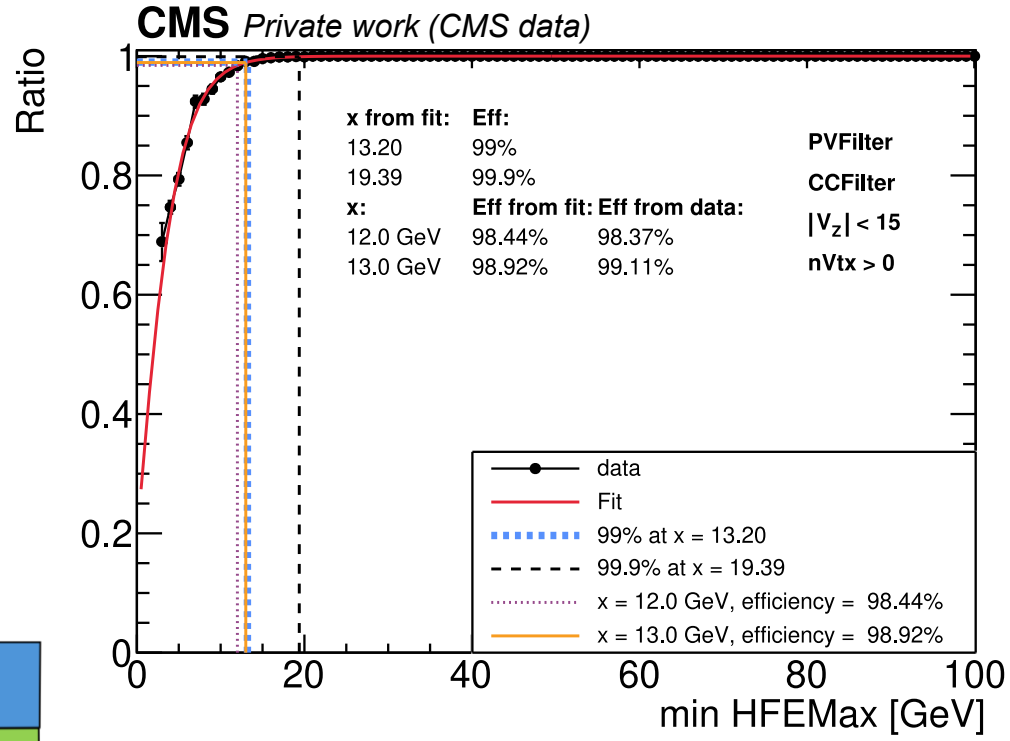


Challenges of event selection

- Ultraperipheral collisions with hadronic final states contaminate the data
- **Minimum bias** trigger to select **hadronic events** based on CMS's **hadron forward calorimeter (HF)**
- Event selection to remove **non-collisional background**

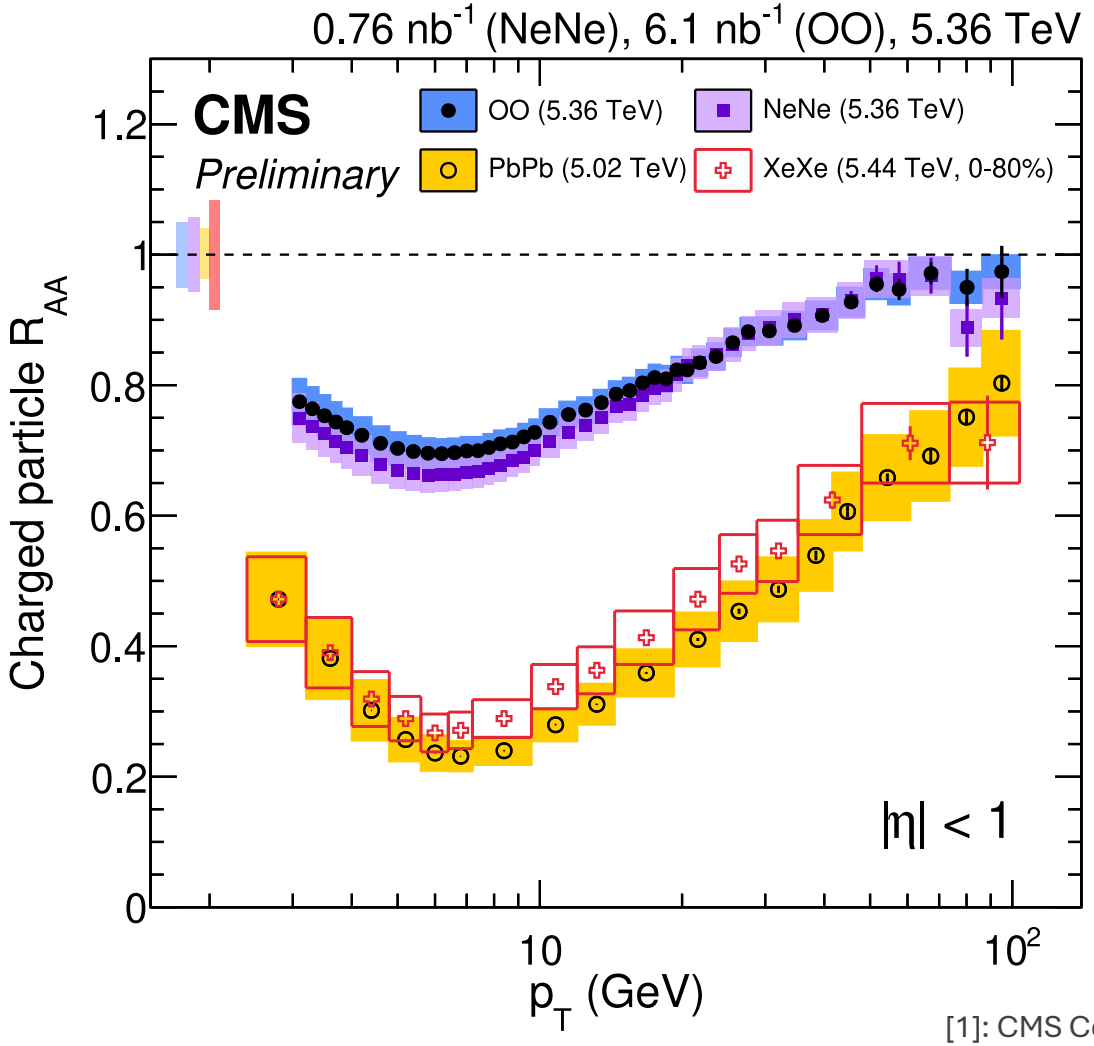
- **Trigger efficiency**
  - Offline selection on HF
  - Threshold is chosen to maximize trigger efficiency





Results

CMS-PAS-HIN-25-008 and CMS-PAS-HIN-25-014



Charged-particle R_{AA} in systems measured by CMS [1, 2] **including O+O and Ne+Ne**

For details on results, see talk by Ferenc Siklér's „Suppressed charged-particle production in OO and NeNe collisions from CMS"

[1]: CMS Collaboration, *JHEP* 04 (2017) 039 [2]: CMS Collaboration, *JHEP* 10 (2018) 138