

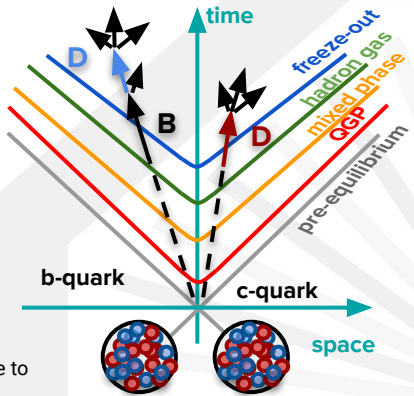
Physics Motivation

In Pb–Pb ultrarelativistic collisions, QCD predicts **colour-deconfined** phase, called quark-gluon plasma (QGP):

- Heavy-quark produced in **shorter time scales** than QGP formation
 - Experience **full system evolution**
 - Interact with QGP constituents, **energy loss** in the medium

Heavy-flavour hadronisation in presence of QGP medium

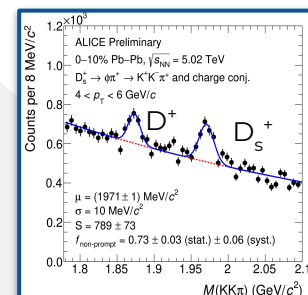
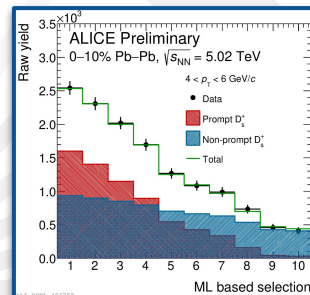
- Two competing mechanisms
 - Fragmentation
 - Coalescence
- Strange quarks abundant in the QGP
 - Enhancement of heavy-flavour mesons with strange quarks relative to non-strange heavy-flavour mesons



Analysis Strategy

Prompt D_s^+ mesons: sensitive to **charm** hadronisation via coalescence;
Non-prompt D_s^+ mesons: from B meson decays (5-10%) sensitive to **beauty** hadronisation via coalescence;

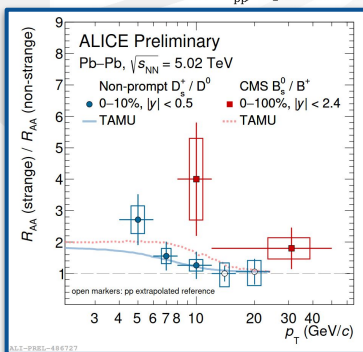
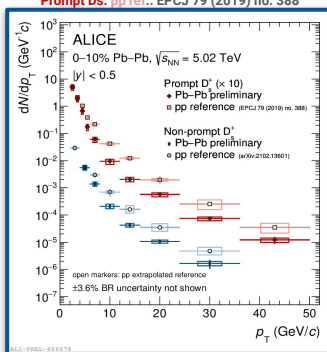
- Candidate selection based on Machine Learning (ML) **multi-class classification** (XGBoost)



D-meson nuclear modification factor

$R_{AA}(\text{strange})/R_{AA}(\text{non-strange})$: **enhancement** due to **enhanced production of B_s** from beauty hadronisation via coalescences

$$R_{AA} = \frac{1}{\langle N_{\text{coll}} \rangle} \frac{dN_{AA}/d\phi_T}{dN_{pp}/d\phi_T}$$



Outlook: ITS Upgrades

Major **upgrades** of the ALICE Inner Tracking System (ITS) ongoing:

- ITS crucial for heavy-flavour measurements**
 - ITS2:** completely new detector
 - ITS3:** truly cylindrical layer based on ultra-thin curved sensor

	ITS2	ITS3
# of layers	7	3
X/X_0	0.35%	0.05%
innermost layer radius (mm)	22	18
pixel size (μm^2)	30x30	0(15x15)

