ZIMÁNYI SCHOOL 2024

L. Kassák: Image architecture

24th ZIMÁNYI SCHOOL

WINTER WORKSHOP

ON HEAVY ION PHYSICS

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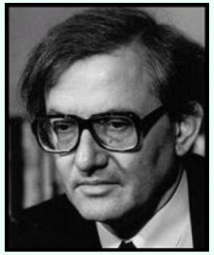
Budapest, Hungary



József Zimányi (1931 - 2006)

Drell-Yan measurements at low invariant masses with the upgraded ALICE detector

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ALICE

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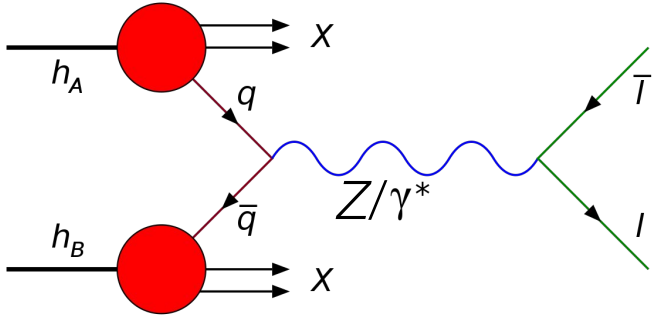
Drell-Yan process

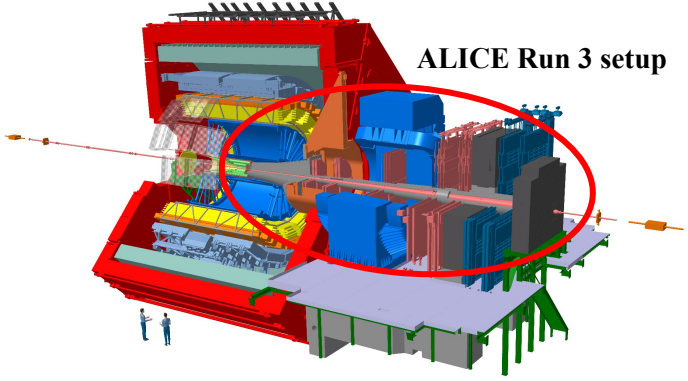
→ The Drell-Yan (DY) process is the production of a **lepton pair** from an **electroweak interaction** of a **quark-antiquark pair** :

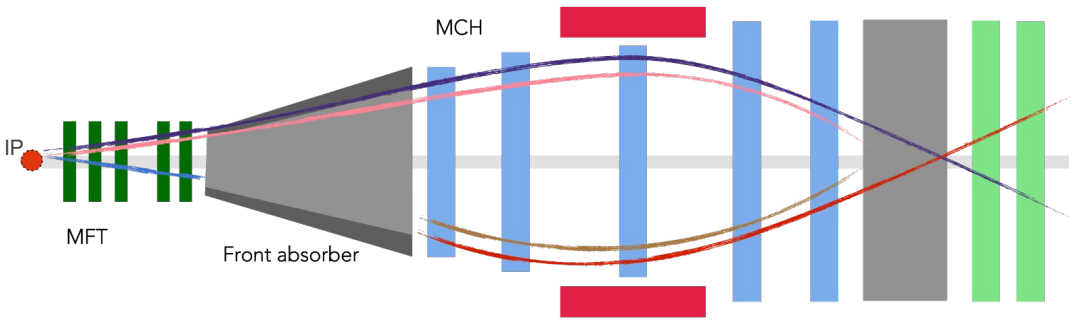


→ Measuring the DY process at LHC energies is particularly important to characterize thermodynamic and transport properties of the hot and dense medium created in ultra-relativistic heavy-ion collisions

→ Measurements provide stringent **tests for the theory of perturbative Quantum Chromodynamics** (pQCD) as well as **significant constraints on** the evaluation of **parton distribution functions** (PDFs)

Drell-Yan measurements with upgraded ALICE





→ Drell-Yan with **ALICE Run 3 setup** → ***μ*+*μ*–** detection and tracking in **forward direction** ($-3.6 < \eta < -2.5$) using the **ALICE muon spectrometer**

→ **Goal:** To measure **low-mass DY lepton pairs** (M_{DY} down to 4 GeV/c^2) to constrain nuclear PDFs at small Q^2 and x (**down to 10^{-5}**) where there is lack of data

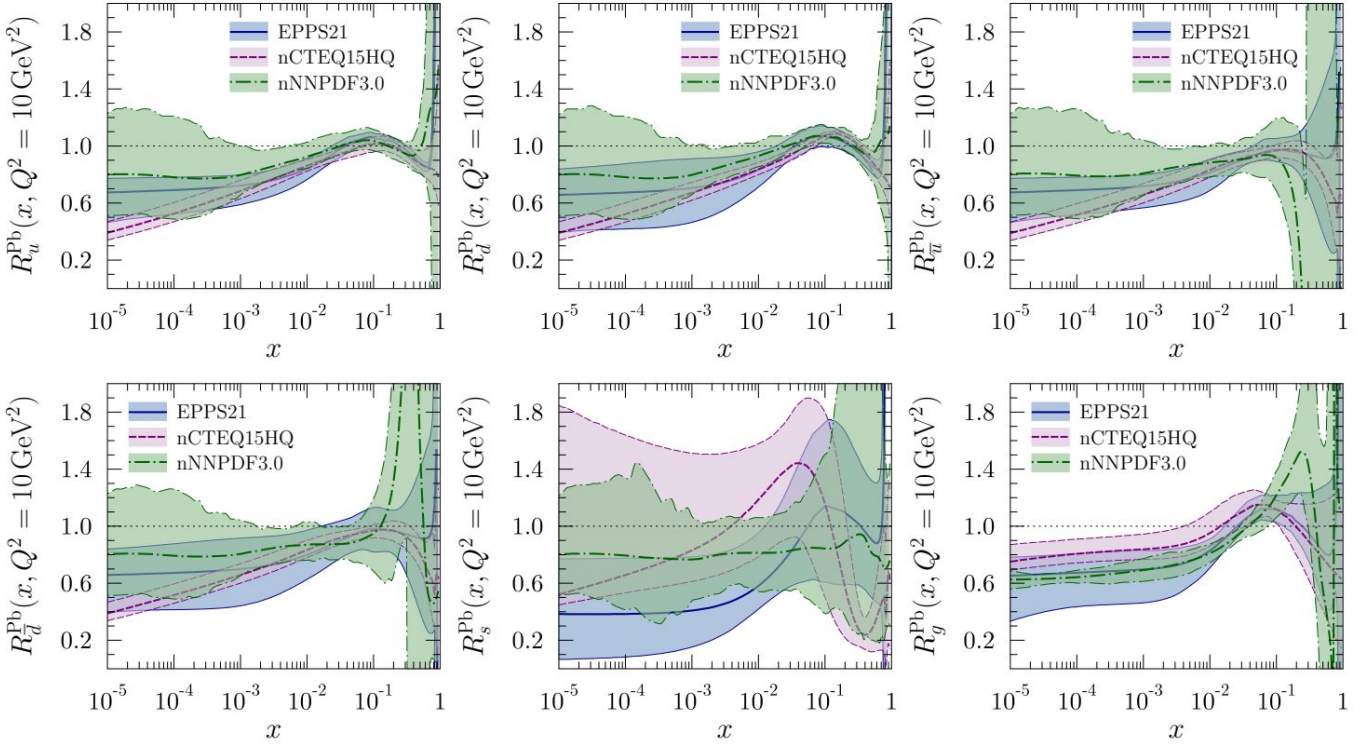
→ **~10^4 – expected Drell-Yan statistics** at forward rapidity in pp with the proposed luminosity (L) ~ 200/pb (Pythia and NLO calculations for lepton p_T ~ 3 GeV/c)

Prospect

→ At small-x, the ratio of the **nuclear modification factors** of DY and J/ψ in **p-Pb collisions** (R_{pPb}) can provide important **constraints on gluon densities**

→ Comparison of the ^{208}Pb nuclear modifications from the EPPS21, nCTEQ15HQ and nNNPDF3.0 global analyses of nuclear PDFs show **large uncertainties for $x<10^{-3}$**

→ **Certainly a need to improve the precision of the low-x calculations**



Thank You
Köszönöm

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References:

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