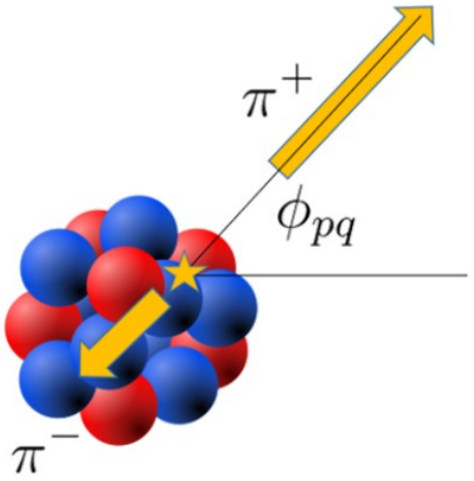
Update on dihadron analysis in e-A DIS with EG2 data



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Outline

- Reminder of observable / motivation
- News since last update
  - Acceptance correction
  - Systematic uncertainties

Observables

- Single-hadron multiplicity ratio

$$R_h(z, p_T^2, \nu, Q^2) = \frac{N_h^A(z, p_T^2, \nu, Q^2)/N_e^A(\nu, Q^2)}{N_h^D(z, p_T^2, \nu, Q^2)/N_e^D(\nu, Q^2)}.$$

- Double-hadron multiplicity ratio

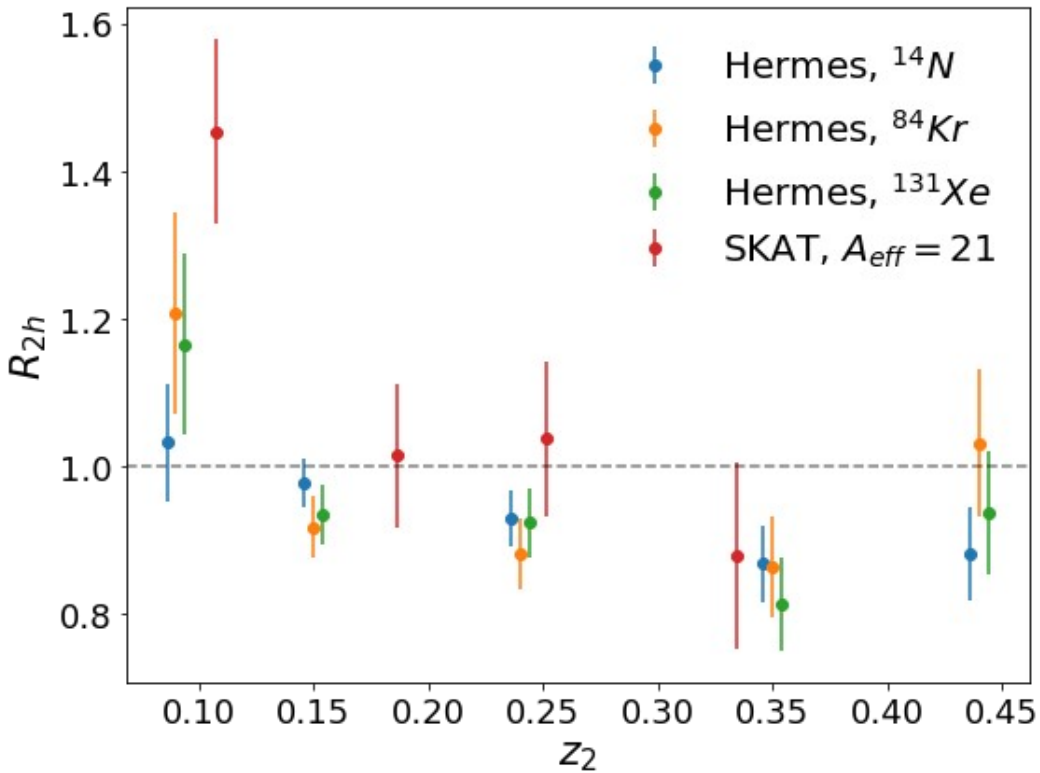
$$R_{2h}(z_2) = \frac{N_h^A(z_2|z_1 > 0.5)/N_h^A(z_1 > 0.5)}{N_h^D(z_2|z_1 > 0.5)/N_h^D(z_1 > 0.5)}.$$

Comparing the two allows to constrain correlations induced by nuclear effects

$$P(A \mid B) = \frac{P(A \cap B)}{P(B)},$$

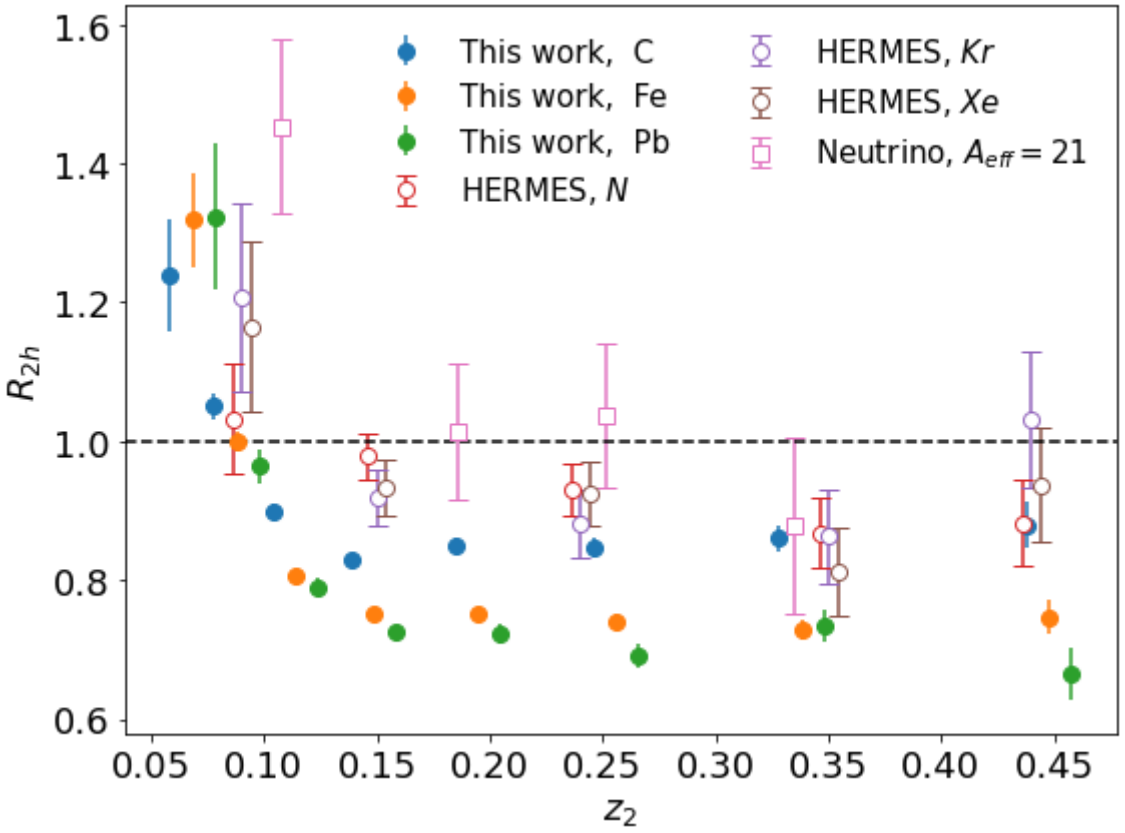
World's data on double-hadron production in DIS off nuclei

$$R_{2h}(z_2) = \frac{N_h^A(z_2|z_1 > 0.5)/N_h^A(z_1 > 0.5)}{N_h^D(z_2|z_1 > 0.5)/N_h^D(z_1 > 0.5)}.$$



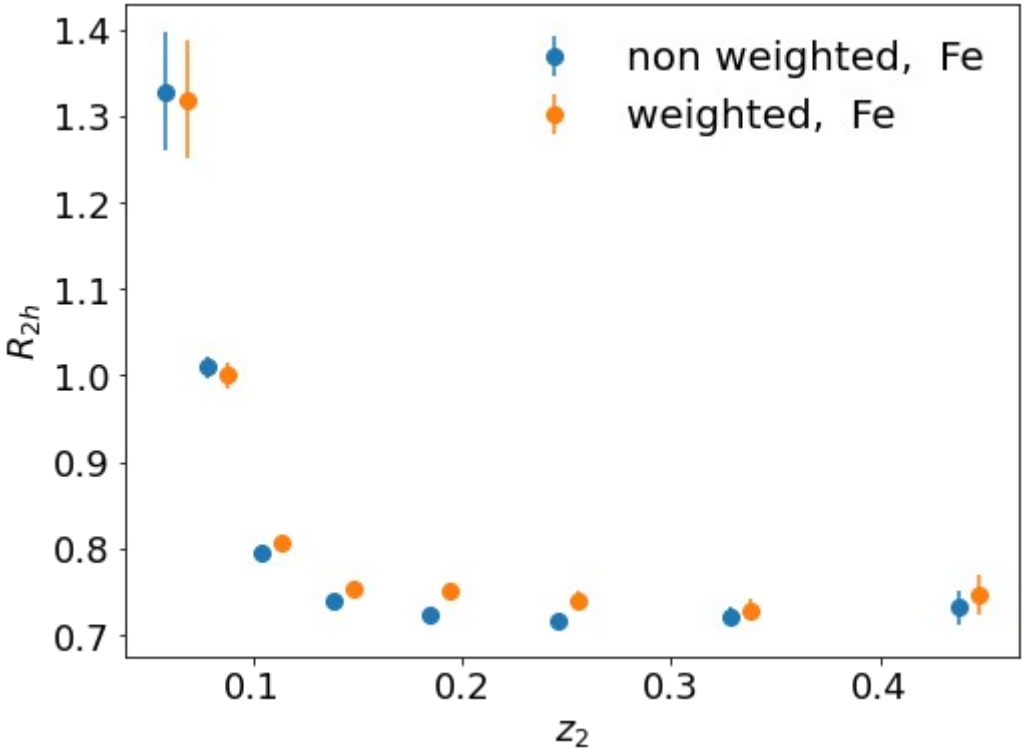
HERMES result:
Phys. Rev. Lett. 96, 162301

EG2 data (stat error only)



Acceptance correction

- It cancels to first order in the nuclear-to-deuterium ratio (1-4% correction dependent on z2)



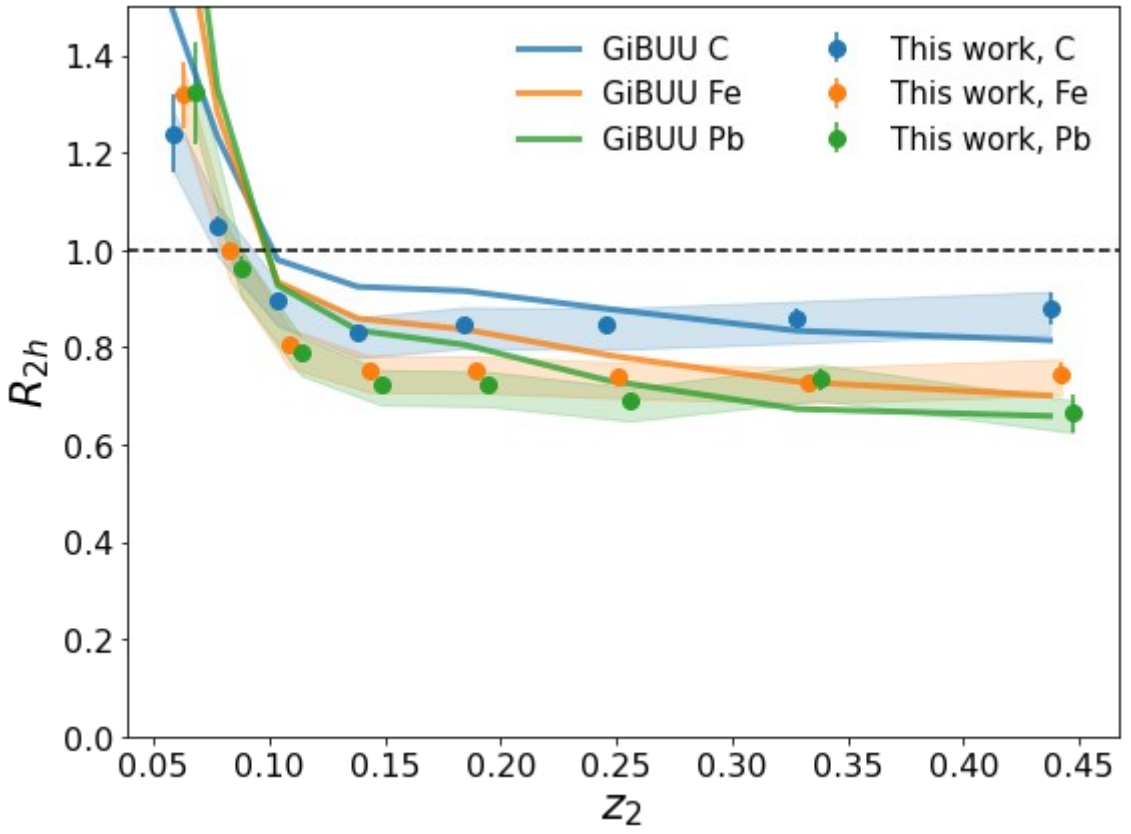
Systematic uncertainties

- Following the work from Sebastian's charged-pion analysis.

Table I. Summary of systematic uncertainties (relative).

Acceptance correction	4.0%
Radiative corrections	3.0%
Electron identification	0.4%
Pair-acceptance	XX%
Pion identification	$< 0.1\%$
Target selection	$< 0.1\%$
Luminosity	negligible.
Trigger efficiency	negligible.
Time-dependent effects	negligible.

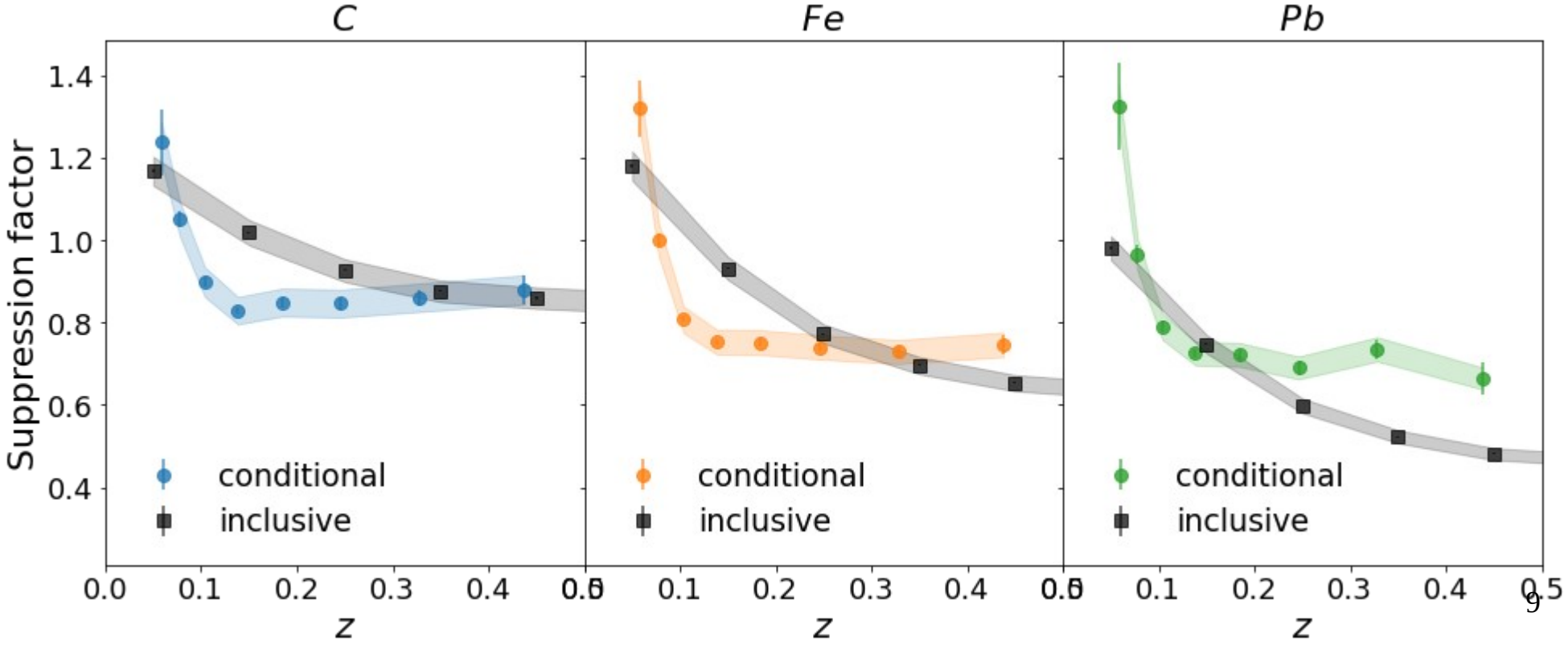
Comparison with GiBUU Model



Single vs double suppression factor

(in absence of correlations induced by nuclear effects, they should be the same)

- Comparison with Sebastian's results (single-hadron suppresion)

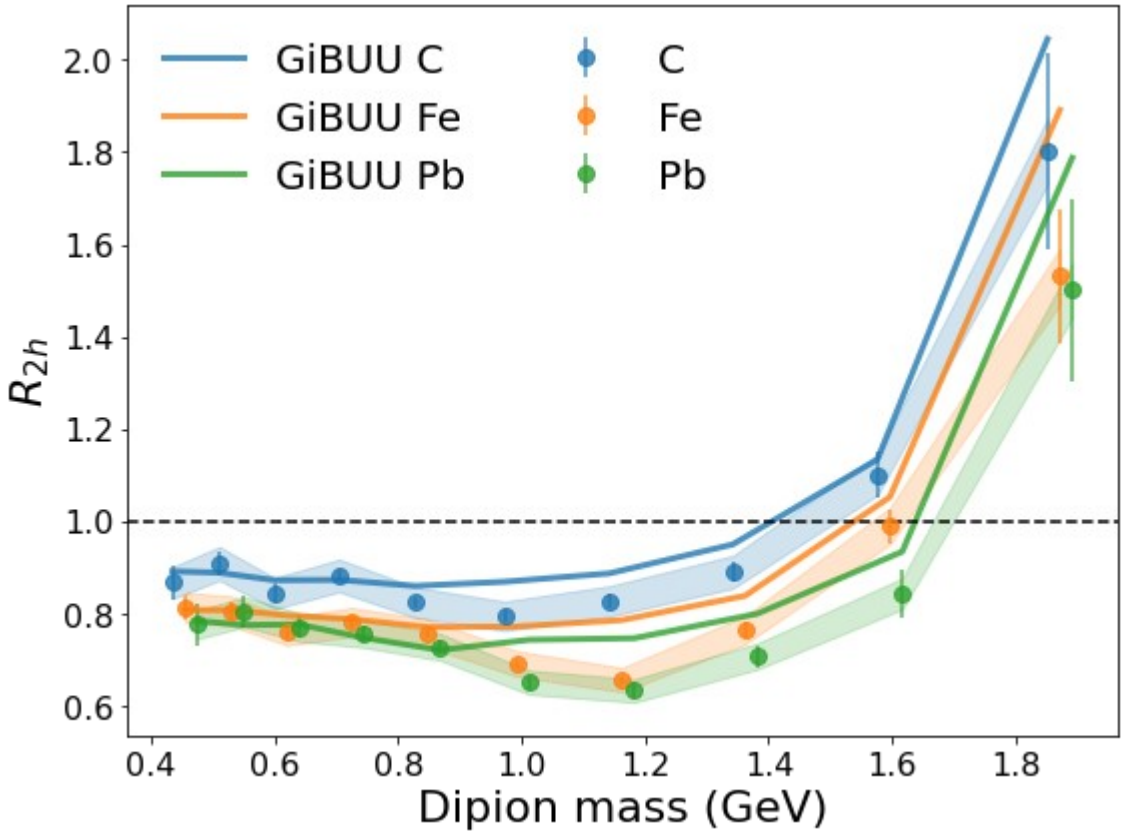


Beyond HERMES

With the high-statistics of the EG2 data, we can perform the following measurements.

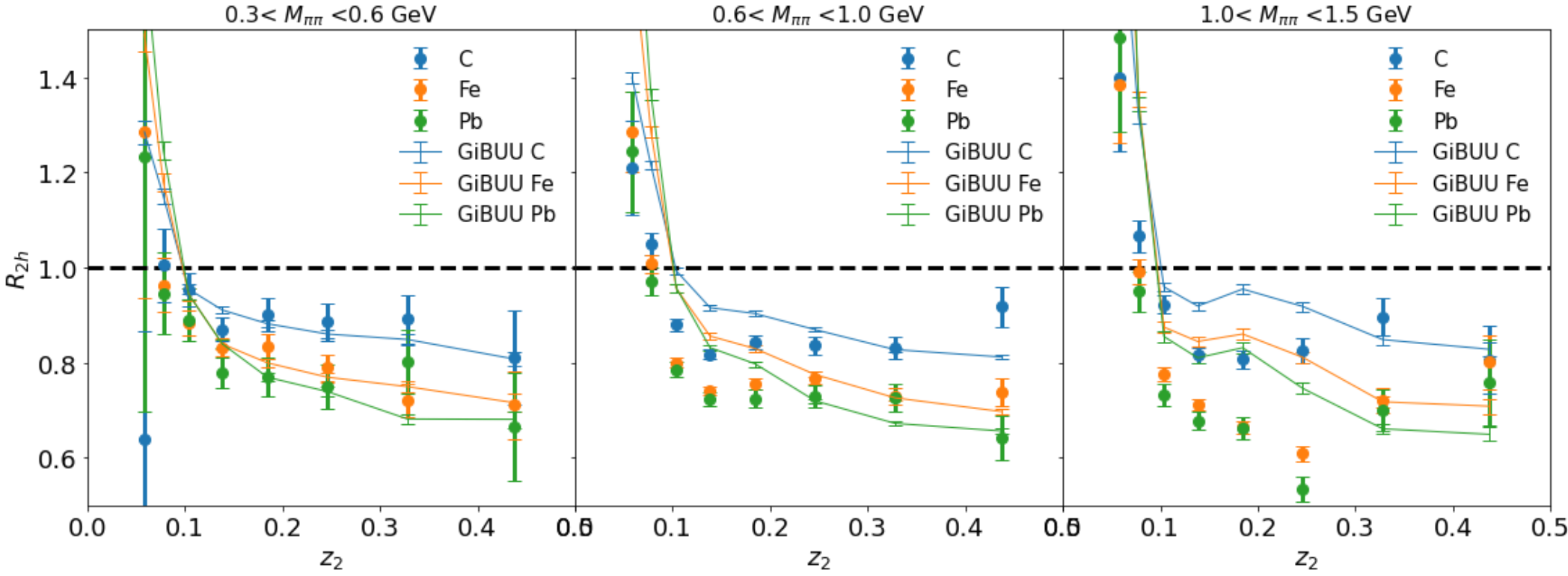
- Dipion-invariant mass dependence
- Azimuthal-angle distance dependence

Invariant mass dependence

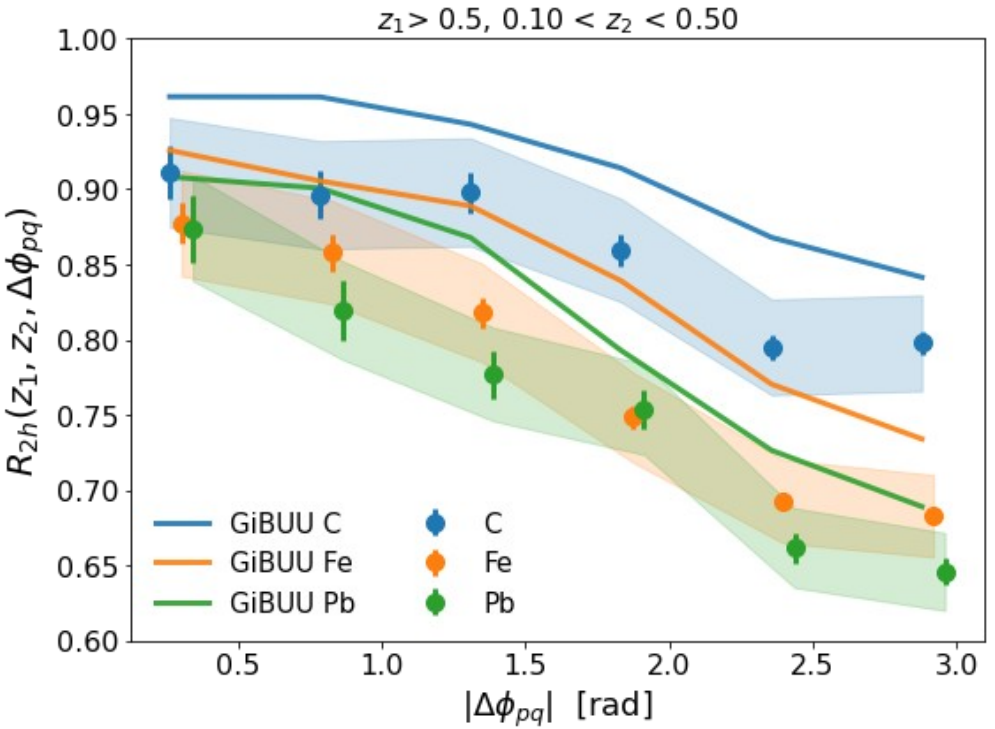


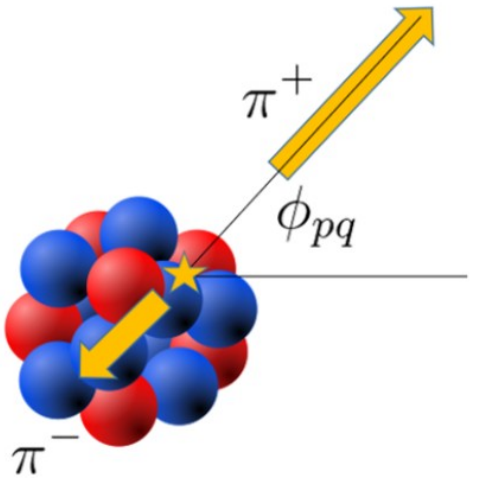
- Weak mass dependence until large values, where “Cronin-like” effect is observed (nuclear broadening)
- Nothing interesting at rho mass (as also seen by HERMES)
- Well reproduced by GiBUU

Differential in mass:



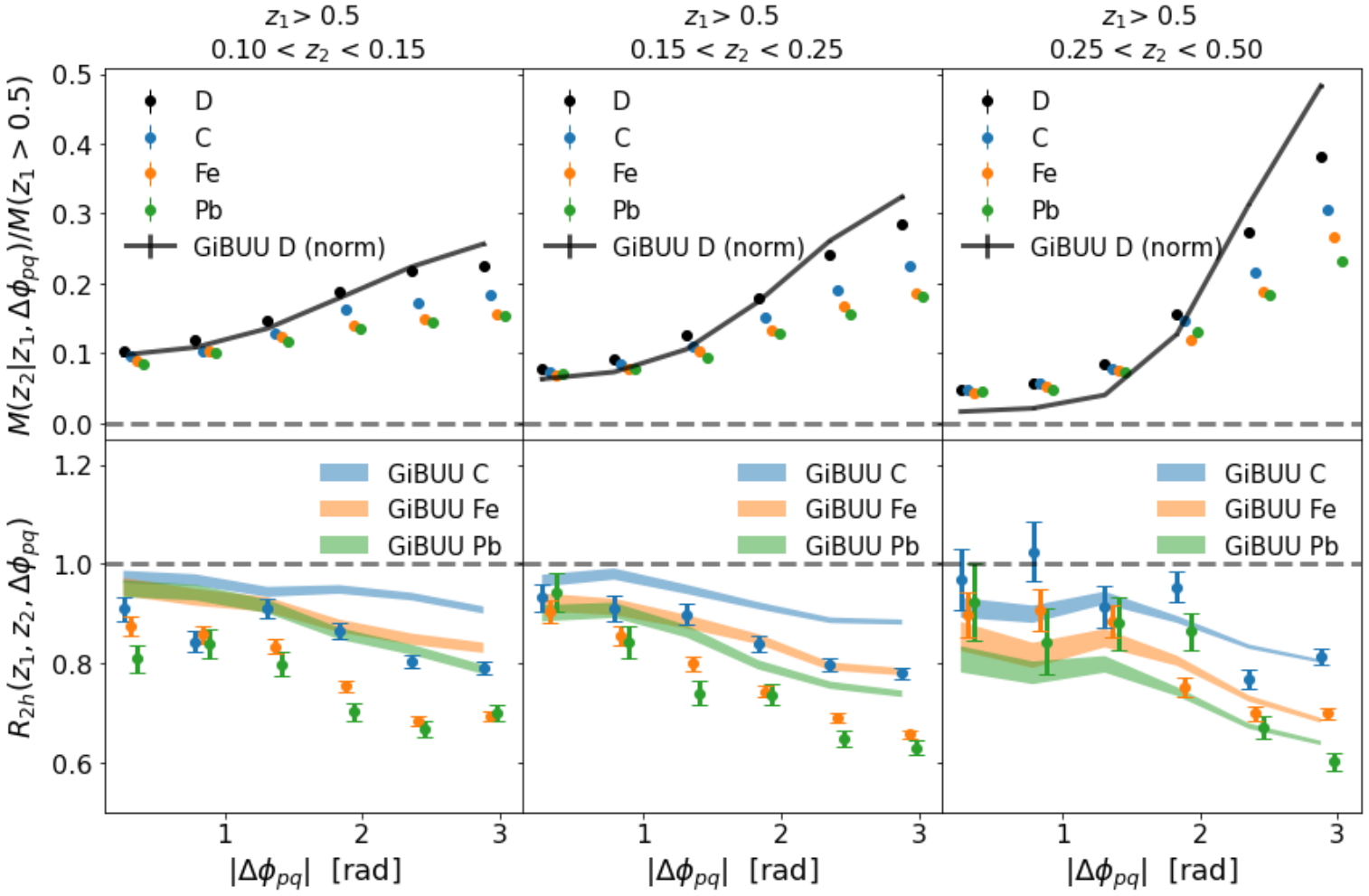
Azimuthal-angle dependence





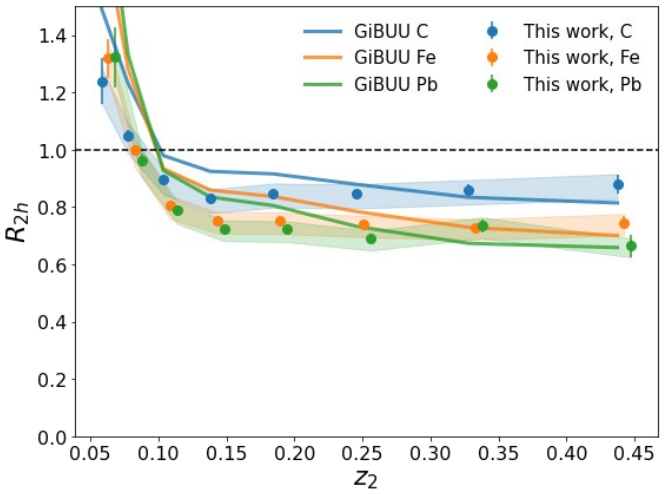
- Strong dependence, consistent with GiBUU

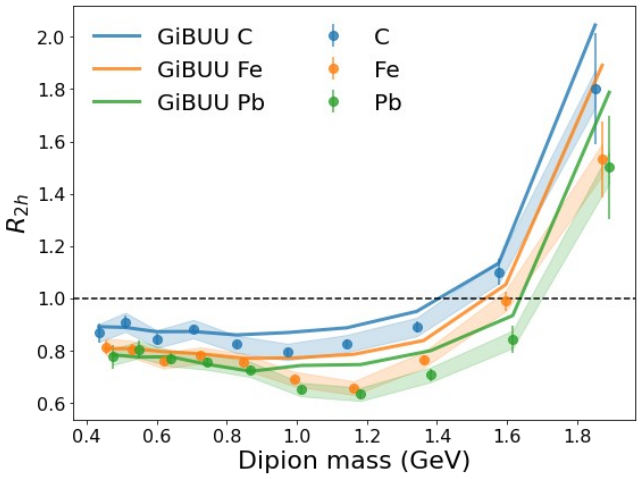
Multi-differential measurement

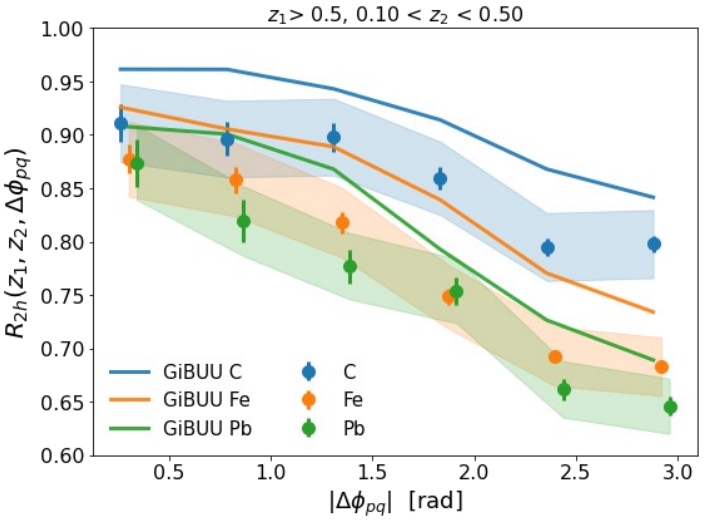


Paper plots

- We will prepare a letter with the following plots:







Summary

- Since last time, we've aligned the selection/corrections/systematics with Sebastian's single-hadron analysis.
- Missing systematics are related to pair-acceptance effects, which will address with event-mixing technique.
  Systematic expected to be subdominant.
- We'll soon prepare a analysis note and paper draft.
  (many things in common with single-hadron paper).
  We aim at starting review process for this analysis early next year.