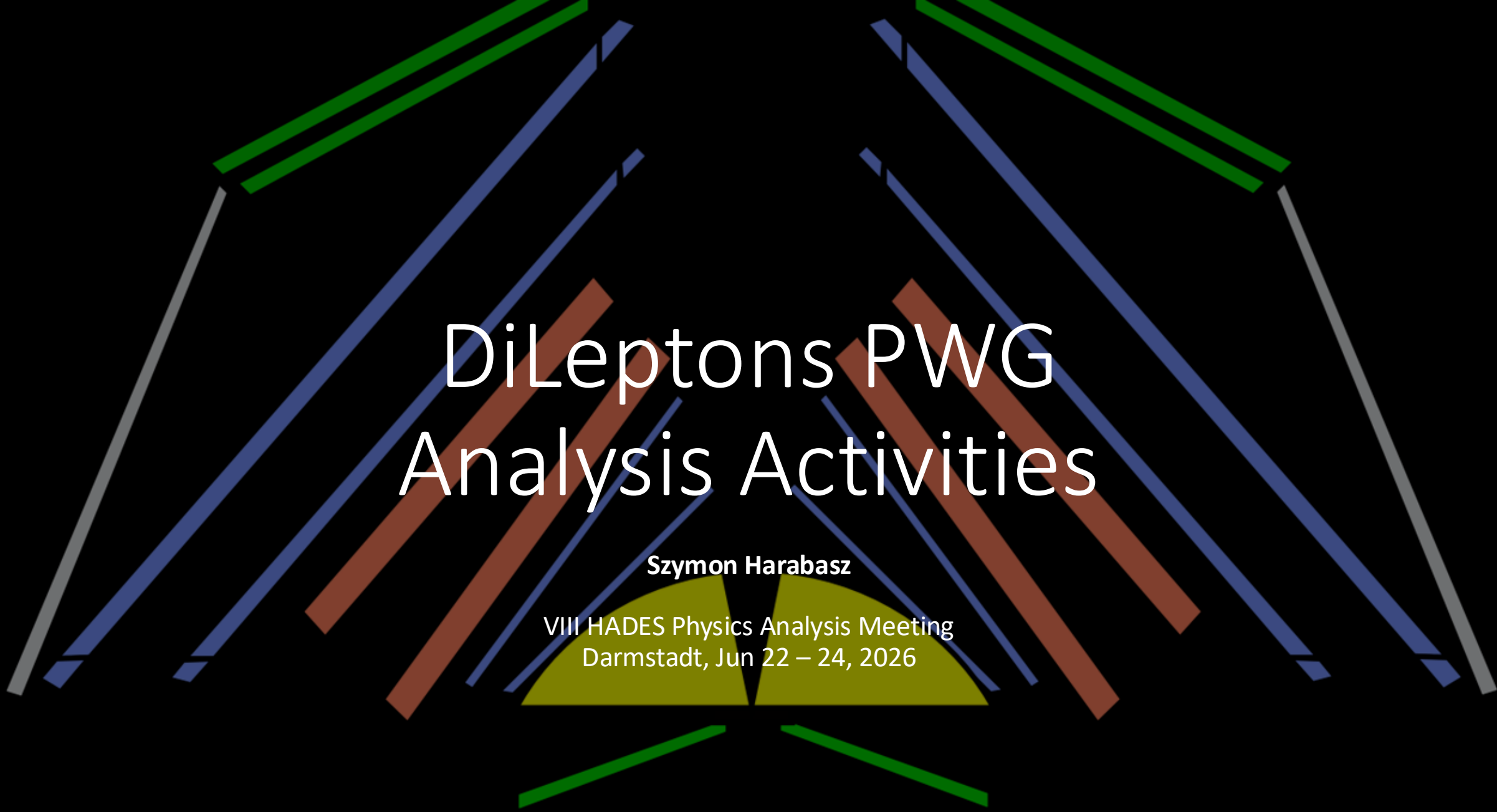


# DiLeptons PWG Analysis Activities

**Szymon Harabasz**

VIII HADES Physics Analysis Meeting
Darmstadt, Jun 22 – 24, 2026

# Overview

## Previous Collab. Meeting

Au+Au at 1.23*A* GeV

p+p at 1.58 (and 4.5) GeV

Ag+Ag at 1.23*A* GeV

Ag+Ag at 1.58*A* GeV

Layer efficiency?

np/pp ratio

Inclusive production

Acceptance matrices look different in gen8 and gen10?

Charged pion multiplicity - normalization

Charged pion flow

NN reference at 1.58*A* GeV

Final efficiency corrections

"Method", upgraded RICH

Multi-differential spectra

omega "disappearance"

Flow

Polarization

Thermal production/CG

Paper status

# Dileptons in p+p at 1.58 GeV

Talk by Karina Scharmann

Mon 16:00

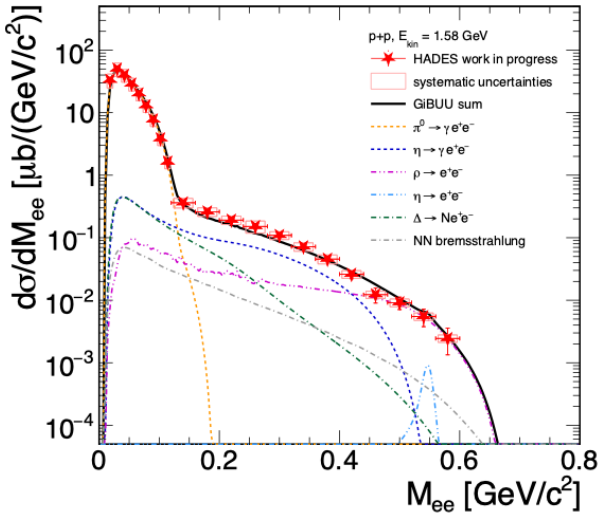
**Current status**

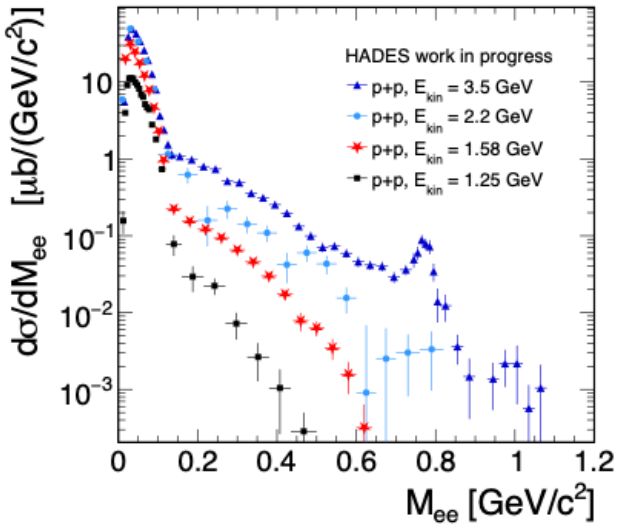
- All analysis steps redone with DST gen4
- Systematic uncertainties are being finalized
- Paper draft almost finished
- Analysis macros cleaned up, started writing documentation
- π0 normalization from gen3 – **need updating ECAL "π0 peak correction" in gen4**

  → Beamtime coordinators informed

**Steps to be done**

- Still some open questions regarding the "event bias" correction
- Better understanding of the presentation of d$\sigma$/d$M$ for different energies in one plot (different acceptances, what are the appropriate corrections? Any?)



Paper status

# Dilepton production in Ag+Ag

**Current status**

- Updated analysis note being checked by the Writing Committee members
- Analysis macros collected in a dedicated directory, usage instructions to be written

**Steps to be done**

- Rerun with new DSTs after delta electron/layer efficiency update
- GiBUU simulation for p+p and p+n in the event mode (NN reference) – we will make a request for official/central production

Paper status

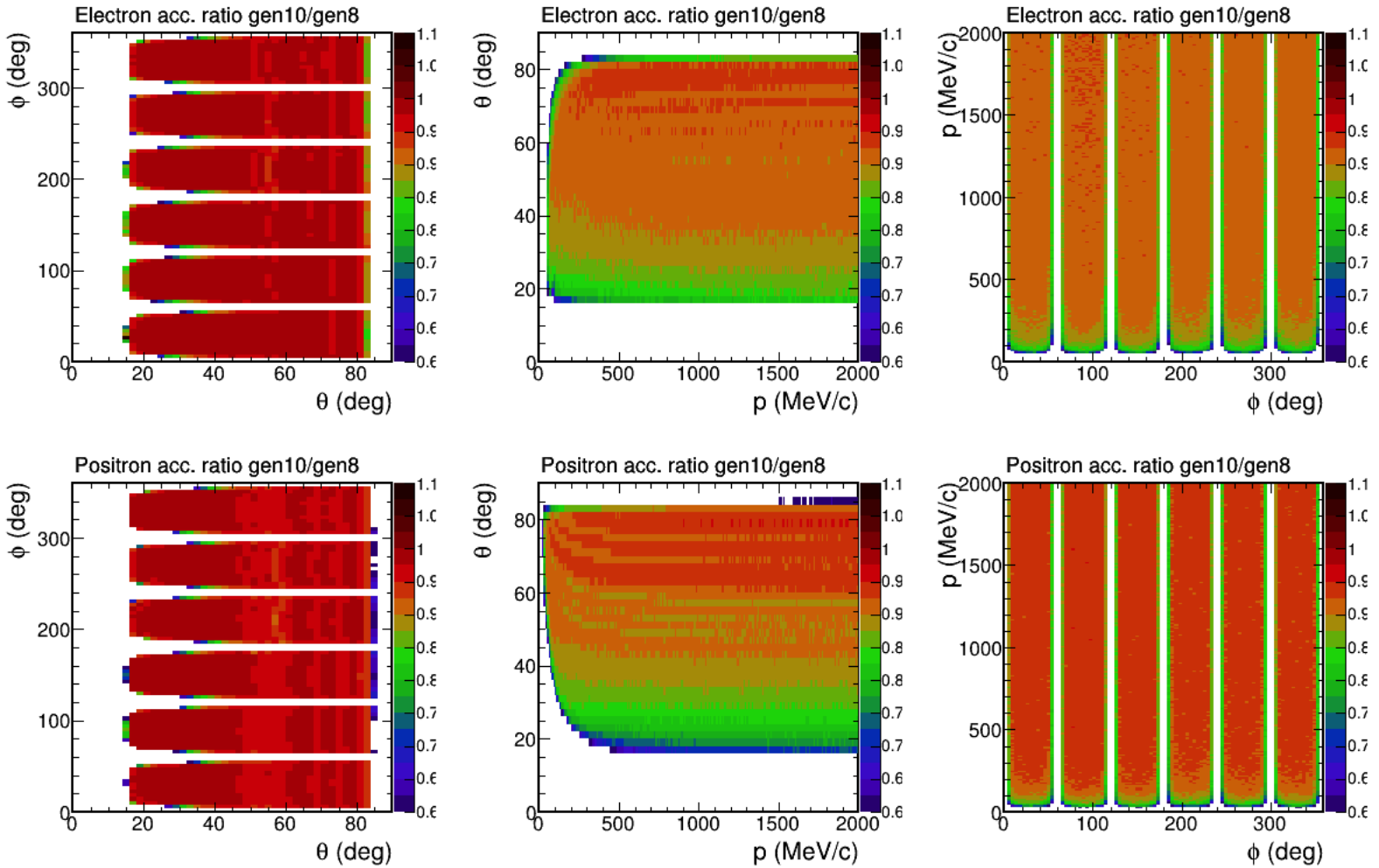
# Dilepton flow in Ag+Ag and Au+Au (apr12)

**Current status**

- Updated for Ag+Ag analysis (binning, systematics estimation etc.) was rerun
- Updates are being introduced to the draft
- Similarly, analysis macros collected in a dedicated directory, usage instructions to be written
- With Au+Au: no progress in understanding the white lepton acceptance question reported at last Collaboration Meeting

# Acceptance matrices in gen8 and gen10

- White leptons
- **These plots: ratios of acceptance matrices from two generations!!!**
- In this version: `isInAcceptanceBit(4,4,4,4,1,1)`
- **As a consequence, efficiency matrices also change**
- Note: NN reference and freeze-out cocktail are subtracted ”in HADES acceptance”
- Experts informed



# Dilepton flow in Au+Au at 800*A* MeV

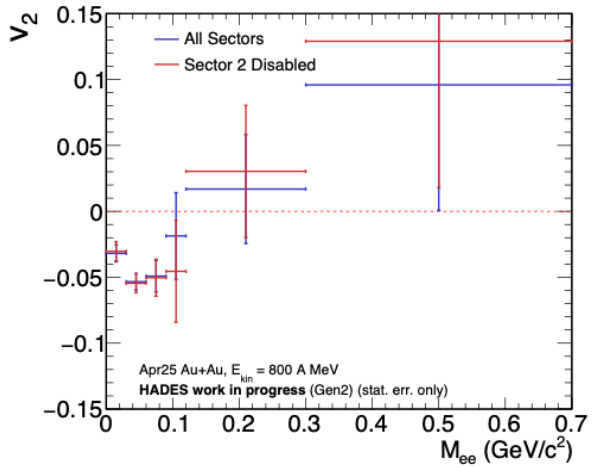
Sukyung Kim

## Current progress

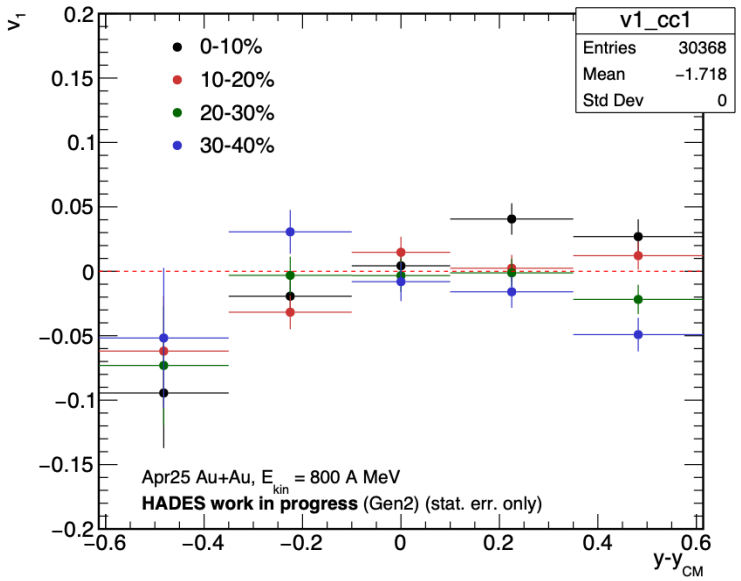
- Systematic study:
  - PID variation
  - `TProfile` vs. fitting
  - Event plane flattening
  - **Upper limit on the effect of efficiency (removing one sector)**
  - **Occupancy correction**
  - Other minor checks

## Next steps

- Combine systematics contributions
- Run Pluto simulation




After Occupancy Correction

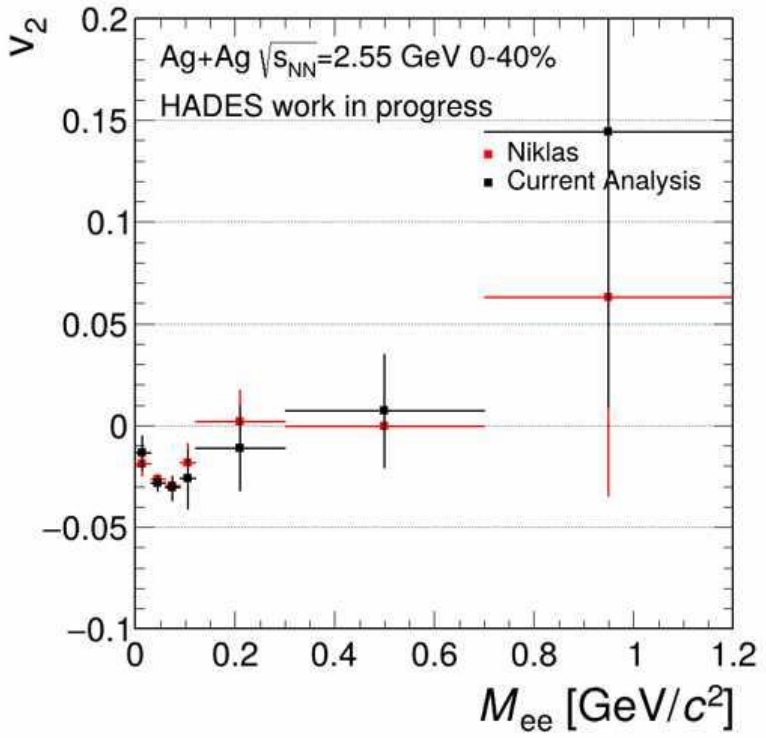


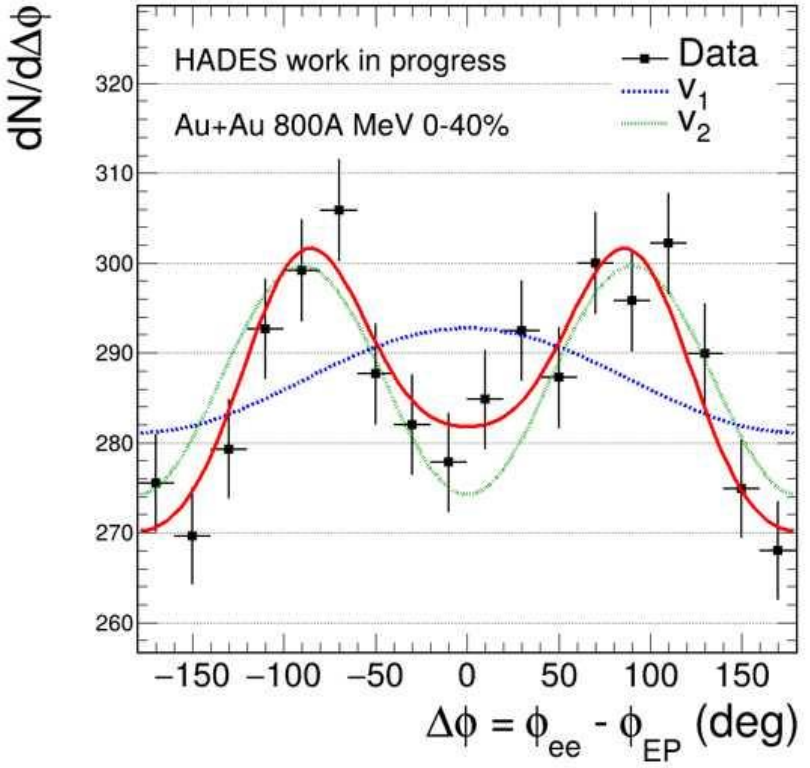
# Dilepton flow in Ag+Ag at 1.58*A* GeV

Talk by Henrik Flörsheimer

Mon 16:45

- Second analysis to reproduce the existing results
- Preparation for Au+Au at 800*A* MeV



# Soft dileptons

Talk by Carina Udrea

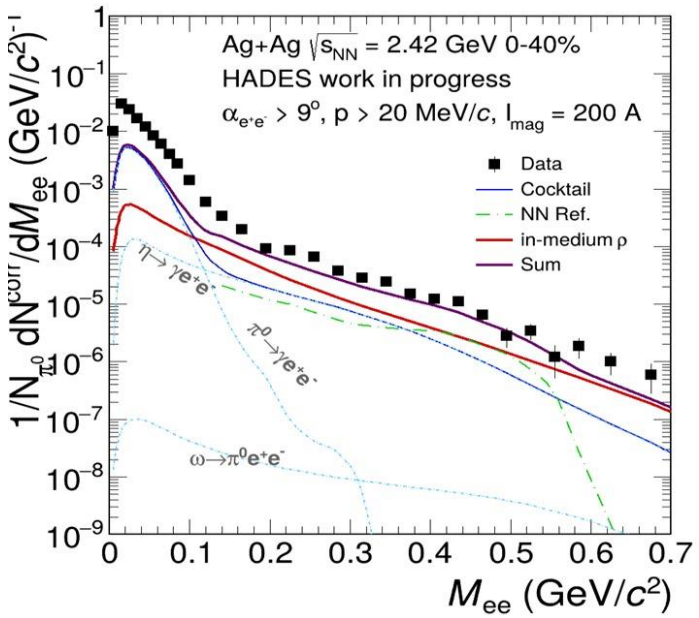
Mon 17:05

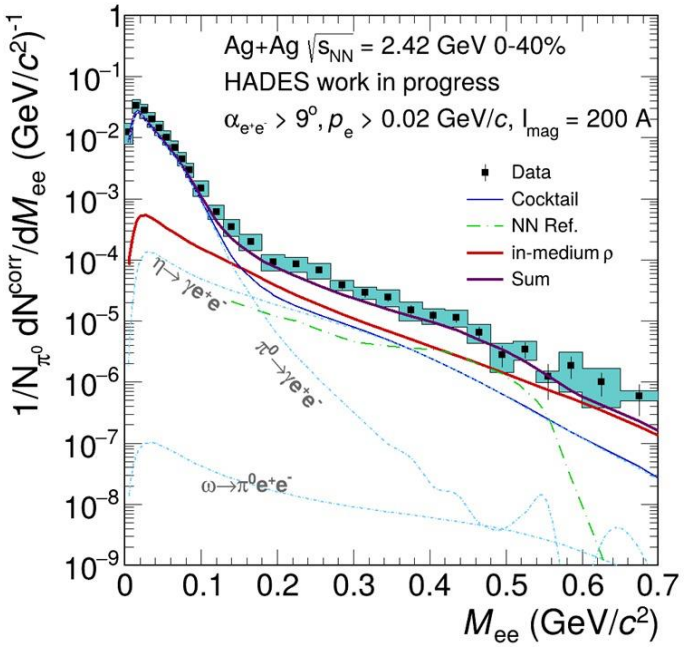
- Cross-check with high beam energy/high magnetic field:
  - Consistency between two independent analyses (Carina and Niklas)
- Systematic study:
  - Two different opening angle selections
  - Two different lepton momentum selecttions
  - Check if we can use the low-momentum cut and still control the efficiency, purity, S/BG
- Cocktail calculation for the low-field setting, for both the standard cuts (opening angle and momentum) and the lower-momentum cut
- Dilepton polarization incluced in the acceptance determination
- Extraction of excess radiation for both settings

# Problem with Pluto cocktail

- **Wrong acceptance for the $\pi^0$-Dalitz in:** /lustre/hades/dst/mar19/gen6/ag123ag/200A/embedding/vertexCluster/pi0/
- No evidence for similar problem with $\pi^0$-Dalitz for 1.58*A* GeV with 3200 A or any other cocktail component even with 200 A
- No obvious reason for the problem could be found so far

Pluto $\pi^0$-Dalitz ran centrally for embedding




Pluto $\pi^0$-Dalitz ran privately

# Dilepton polarization in Ag+Ag

Talk by Sacha Mehat

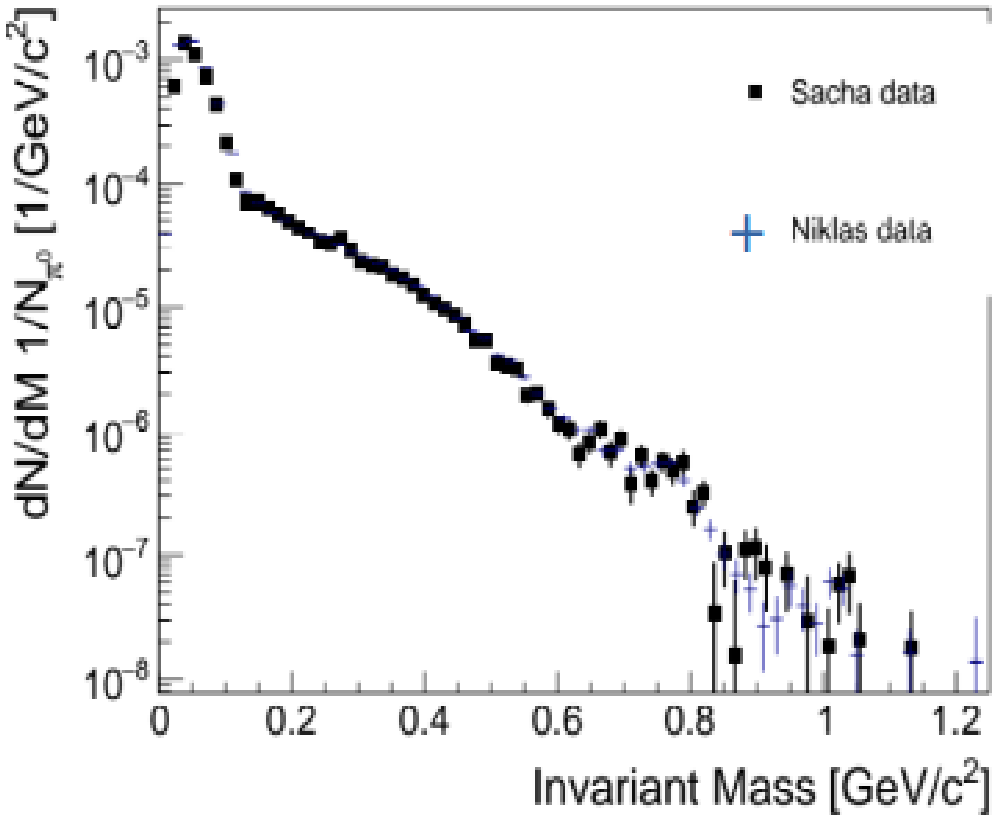
Mon 16:20

**Current status**

- For $M_{ee}$: consistency with independent analysis by Niklas
- Self-consistency of efficiency corrections under control
- Distributions for lepton selection (PID, CP reject.) are very similar between SIM and EXP
  - Differences mainly due to different population of close pairs

**Next steps**

- Introduce cuts based in *x* % intervals instead of *nσ*
- Move on to angular distributions



# Multidifferential analysis of dileptpons in Ag+Ag at 1.23A GeV

Talk by Philipp Zitzmann

Mon 17:30

- Master Thesis proposal at TU Darmstadt
- Preliminary analysis:
  - Extraction of the corrected signal
  - Comparison to model calculation incl. in-medium ρ
  - Spectra as a function of $M$, $p_t$, $y$.
- Next steps:
  - Multi-differential comparison
  - Estimation of systematic uncetainties