

Comprehensive Analysis of Ionization Cooling within the MICE Cooling Channel.

C. Hunt

Outline

1. Introduction

- This is the most precise measurement of beam emittance ever? Maybe?

2. Emittance Measurement

- Outline and compare the different reconstruction schemes used.
- Define amplitude

3. MICE

- Cut-Paste previous descriptions
- Specify all runs, settings and absorbers used
- Description of design optics

4. Theory

- MC Model of the cooling channel
- Optics Model of the cooling channel
- Absorber Model

5. Uncertainties

- Statistical Uncertainties Scattering and Straggling
- Module Alignment
- Track Fitting
- Field Modelling

6. Beam Selection

- Routines
- Initial and final distributions

7. Results

- What is *The Plot*? Comparison of $\Delta\epsilon$ vs ϵ for Theory, MC and Data?
- Comparison of all data sets
- Some amplitude plots to be self consistent

8. Discussion

9. Conclusion

- Observed cooling in agreement with Theory and MC
- Systematic uncertainties are smaller than the statistical uncertainties?! Maybe...

Key Considerations

- 40 • Beamline Model Tom L / Viktor P / Durga R
 - Improve agreement with data
 - Fix/Treat TOF issues
- Field maps Joe L
 - Required for all settings used
 - Required for the reconstruction systematics study
- 45 • Track Fitting Chris H
 - Needs improving!
 - Low-pt treatment for the downstream tracker?
 - Field integrated Kalman
 - Improved/change pattern recognition - Filtered selection?
- 50 • Absorber Systematics Ajit K / Craig B / Scott W / John N
 - Critical for MC/Theory systematic error
 - Absorber length as a function of position?
 - Use our own estimates of scattering and energy loss!
- Beam Selection Chris H
 - Can we achieve a matched beam?
 - 55 – Need to change the MC model to represent what's achievable.
- Magnetic Module Alignment Chris H / Paul J / Craig B
 - AFC Alignment is the missing piece.
- Optics Model Paul J
 - Hopefully provide the “Theory” aspect.
 - 60 – Possibly model the effects of heating
 - Can affect where the measurement is made (reference plane or absorber?)
- Design optics and their evolution Chris R / Jaroslaw P

Notes

- 65 • Non-Parametric emittance measurements - Different paper
- Deconvolve optical heating with empty absorber data - Different paper?
- Use results to design a new cooling channel - Different paper

This is the abstract

- 1 Introduction**
- 2 Emittance Measurements**
- 70 **3 The Muon Ionization Cooling Experiment**
- 4 Theory**
- 5 Uncertainties**
- 6 Beam Selection**
- 7 Results**
- 75 **8 Discussion**
- 9 Conclusion**