



NA61/SHINE

Collaboration

Physics

Summer Project

Conclusion

CERN from
the Jura

Data Analysis for a Low Momentum Particle Detector Prototype

Michael D. Glidden II
University of South Florida
Supervisor: Andras Laszlo, Ph.D.



The Collaboration

Collaboration

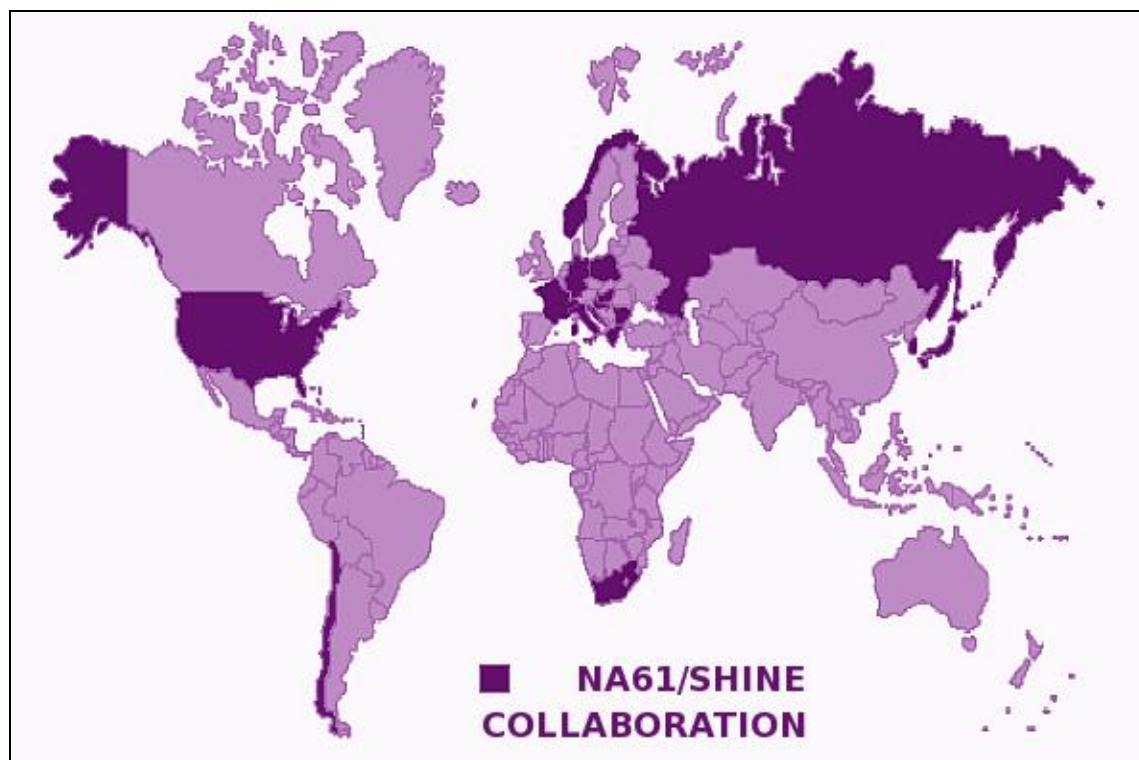
Physics

Summer Project

Conclusion

Road to
Previsin

- 105 physicists, 25 institutes, 15 countries
- Predecessor (NA49) was 2nd largest experiment at CERN before LHC





NA61 DAQ
Hardware



The Collaboration

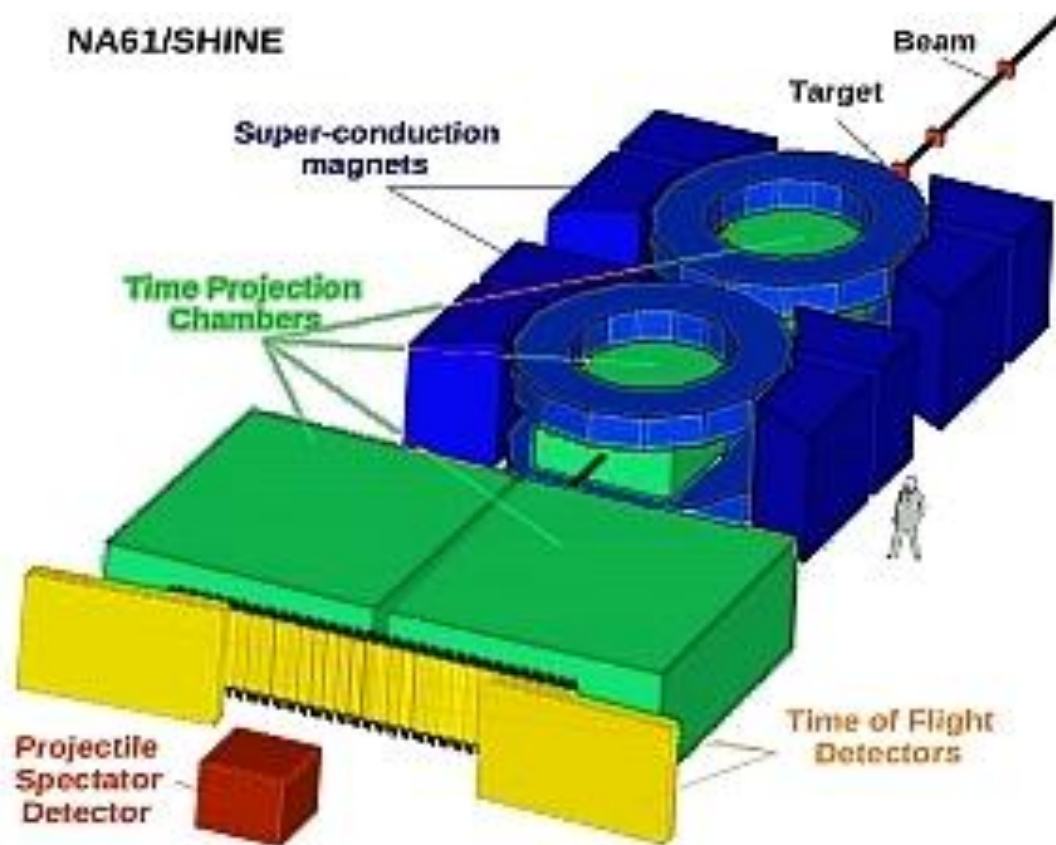
Collaboration

Physics

Data Analysis

Conclusion

- Fixed-target hadronic spectrometer at CERN SPS





The Physics:

Pb+Pb
Collisions

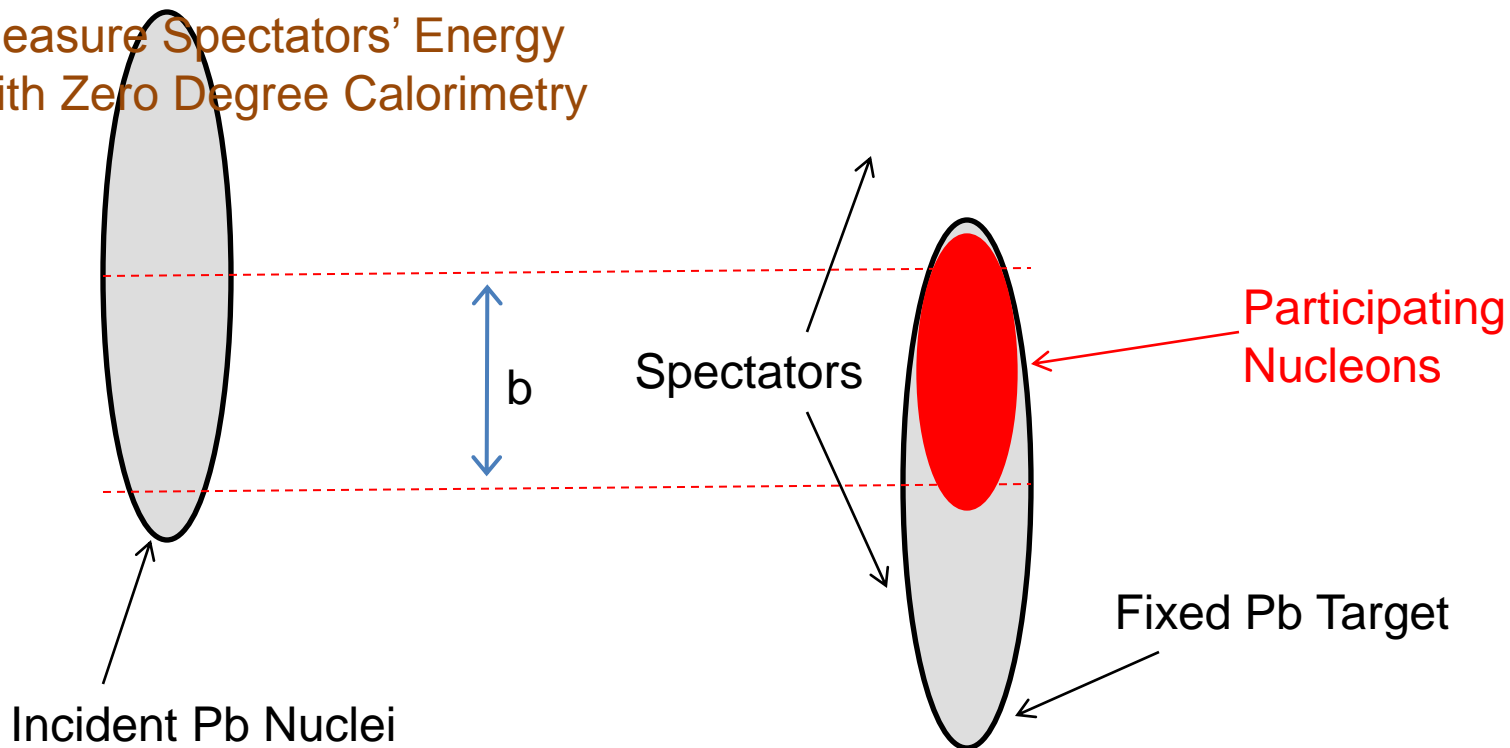
Introduction

Updated Progress

Conclusion

Anode
Currents

Measure Spectators' Energy
with Zero Degree Calorimetry



- For $b > 0$; collision is peripheral
- For $b \approx 0$; collision is central



The Physics:

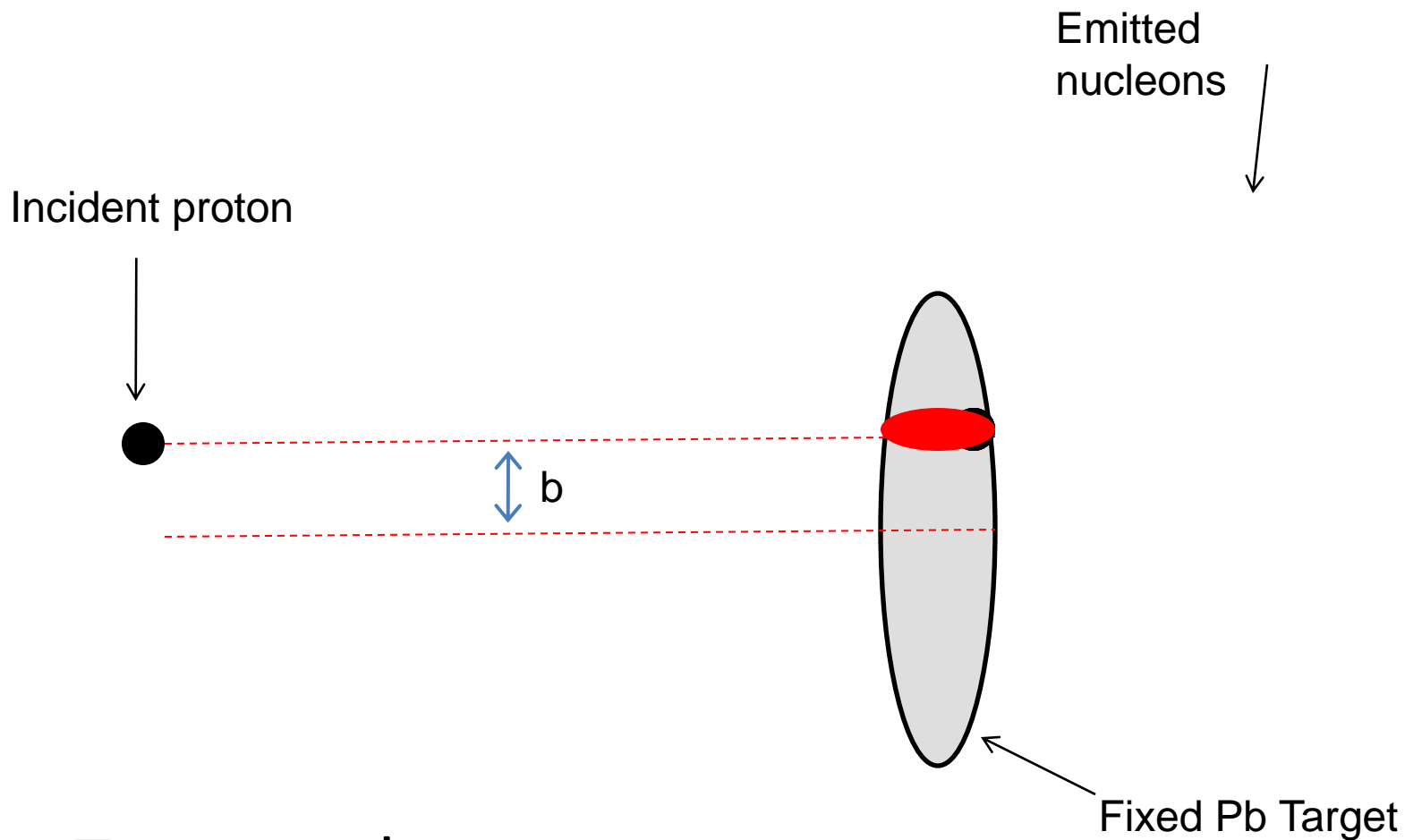
p+Pb
Collisions

Introduction

Updated Progress

Conclusion

NA61
Beamline



- Text goes here



The Physics:

Low Momentum
Particle Detector

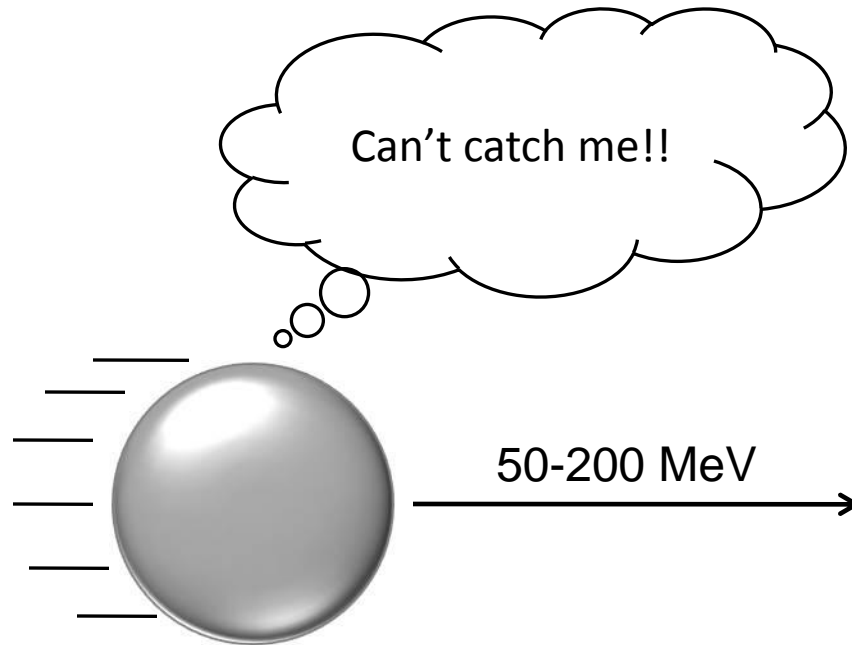
Introduction

Updated Progress

Conclusion

I'm Rich!

- Can characterize centrality in p+Pb collisions with gray protons
- But how to detect them?



- This looks like a job for a low momentum particle detector (LMPD)!



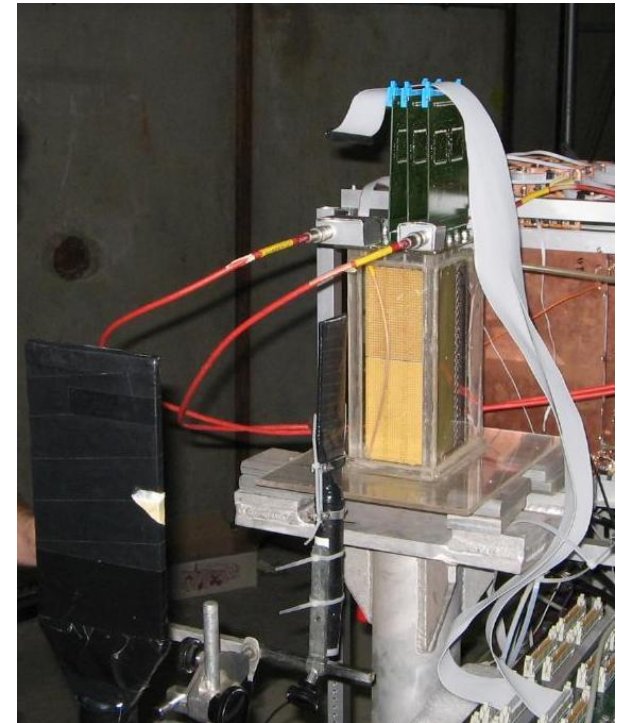
The Physics: Low Momentum Particle Detector

Introduction

Updated Progress

Conclusion

- Measures the tracks of particles in 3D
- Has 3 Absorber layers
 - Different ionization thresholds
 - Particles with velocity below the threshold will not penetrate



Swiss
National
Day Bonfire



The Physics:

Low Momentum Particle Detector



The United Nations

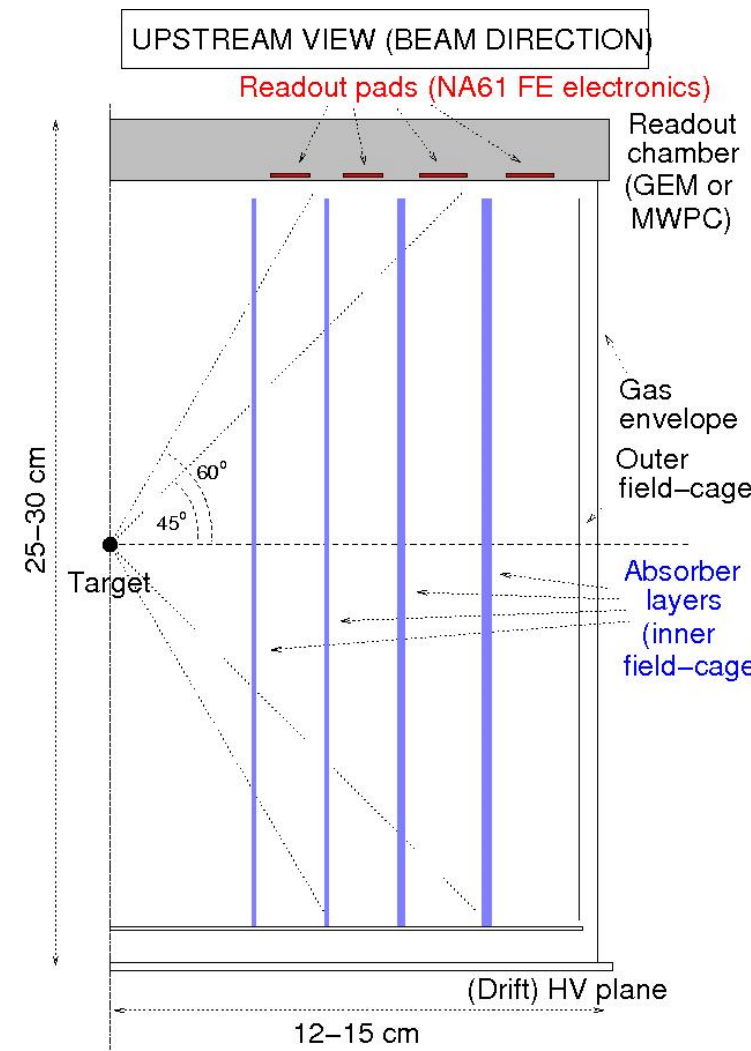


Introduction

Updated Progress

Conclusion

- Absorbers allow detector to discriminate energy ranges
- Gray protons selected





Night Shift
at NA61



The Summer Project:

The
Task

Introduction

Updated Progress

Conclusion

- Data Analysis of the pre-prototype LMPD
- Will culminate in Proof-of-Principle



The Summer Project:

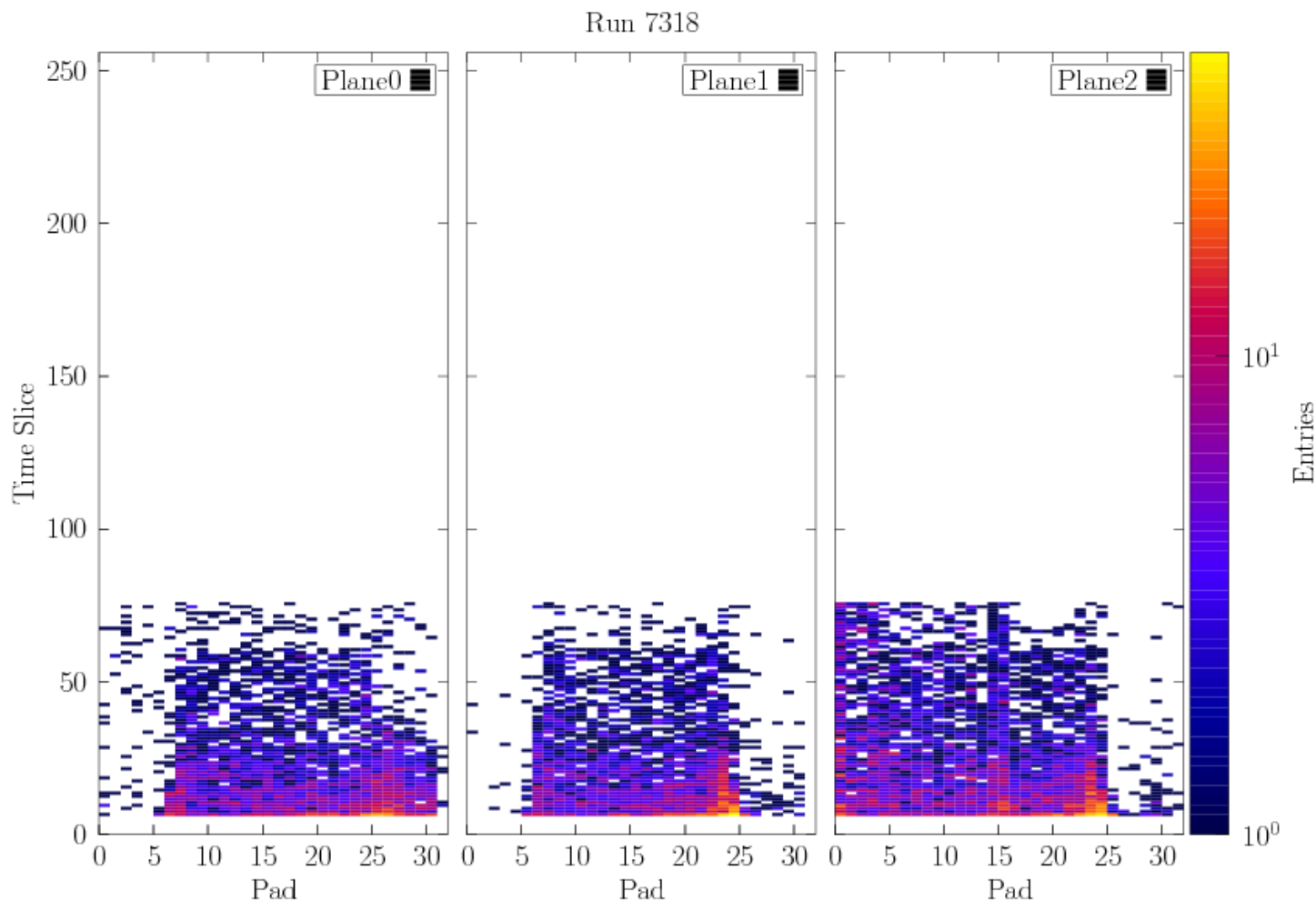
Quality
Cuts

Introduction

Updated Progress

Conclusion

- Full illumination run



Cathedral in
Laussane





The Summer Project:

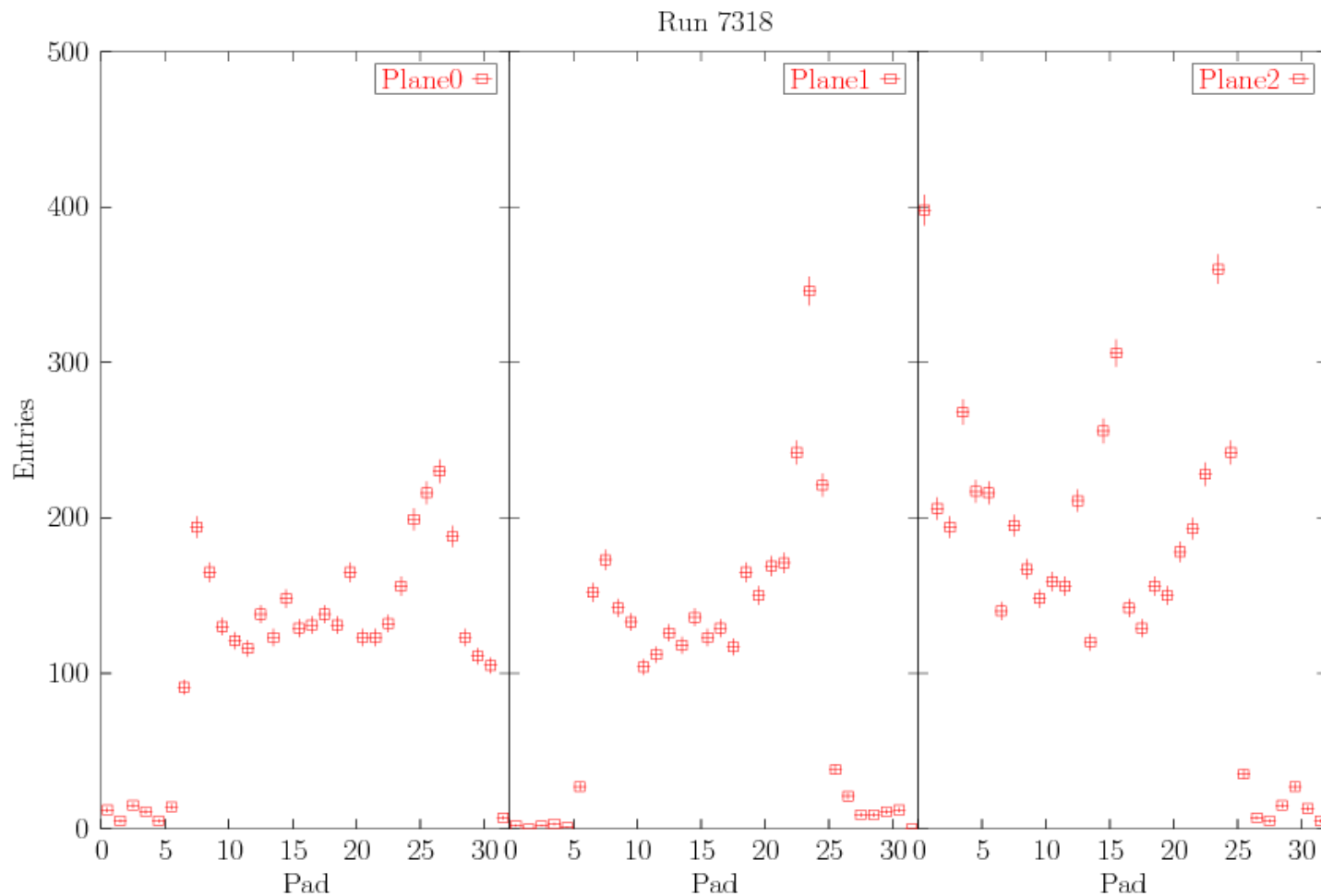
Quality
Cuts

Introduction

Updated Progress

Conclusion

- Broken down to 1D histograms



Inside the
Cathedral





~~The Summer Project:~~

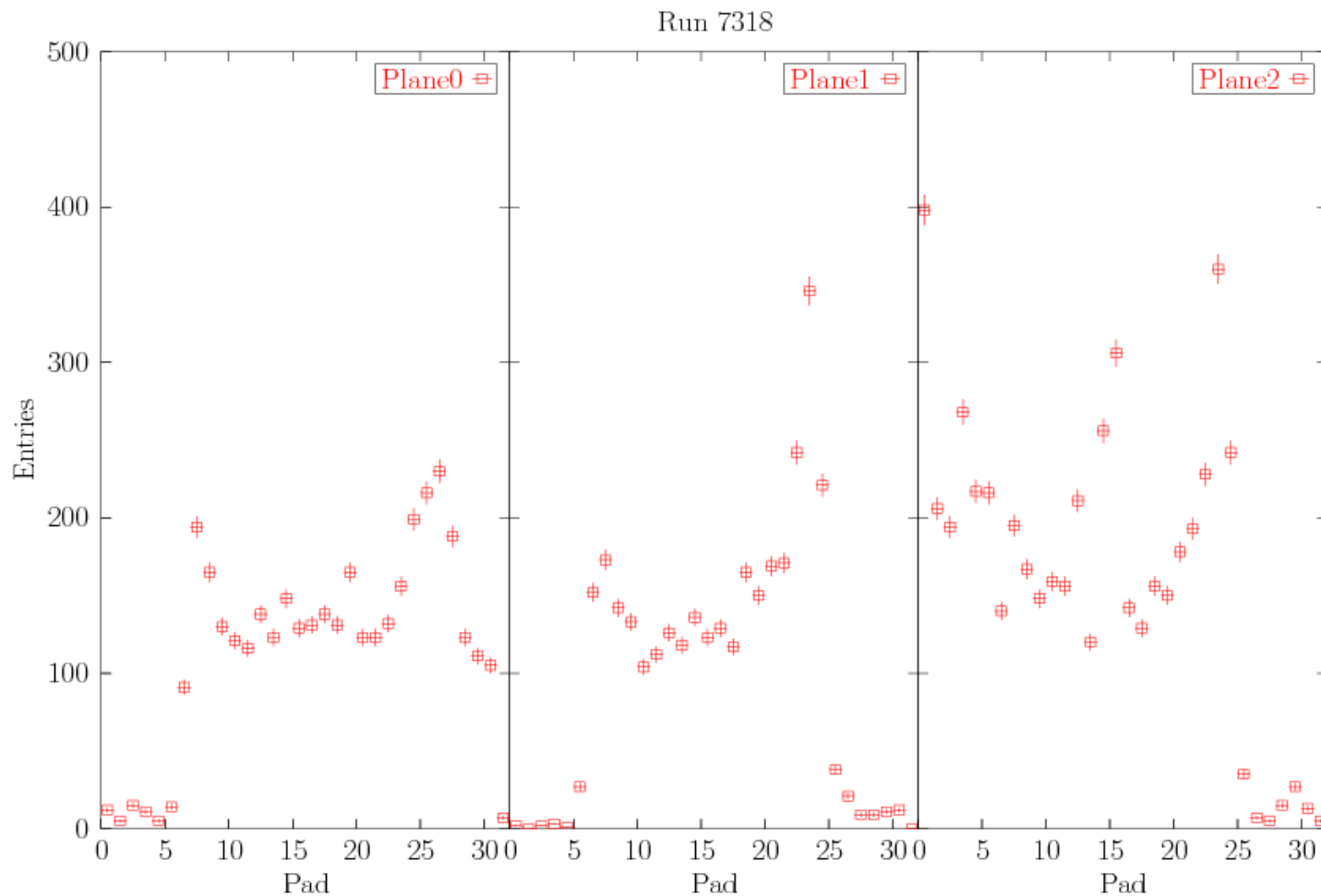
Quality
Cuts

Introduction

Updated Progress

Conclusion

- Plane1 has the narrowest sensitive volume



Chateau
d'Chillon





~~The Summer Project:~~

Quality
Cuts

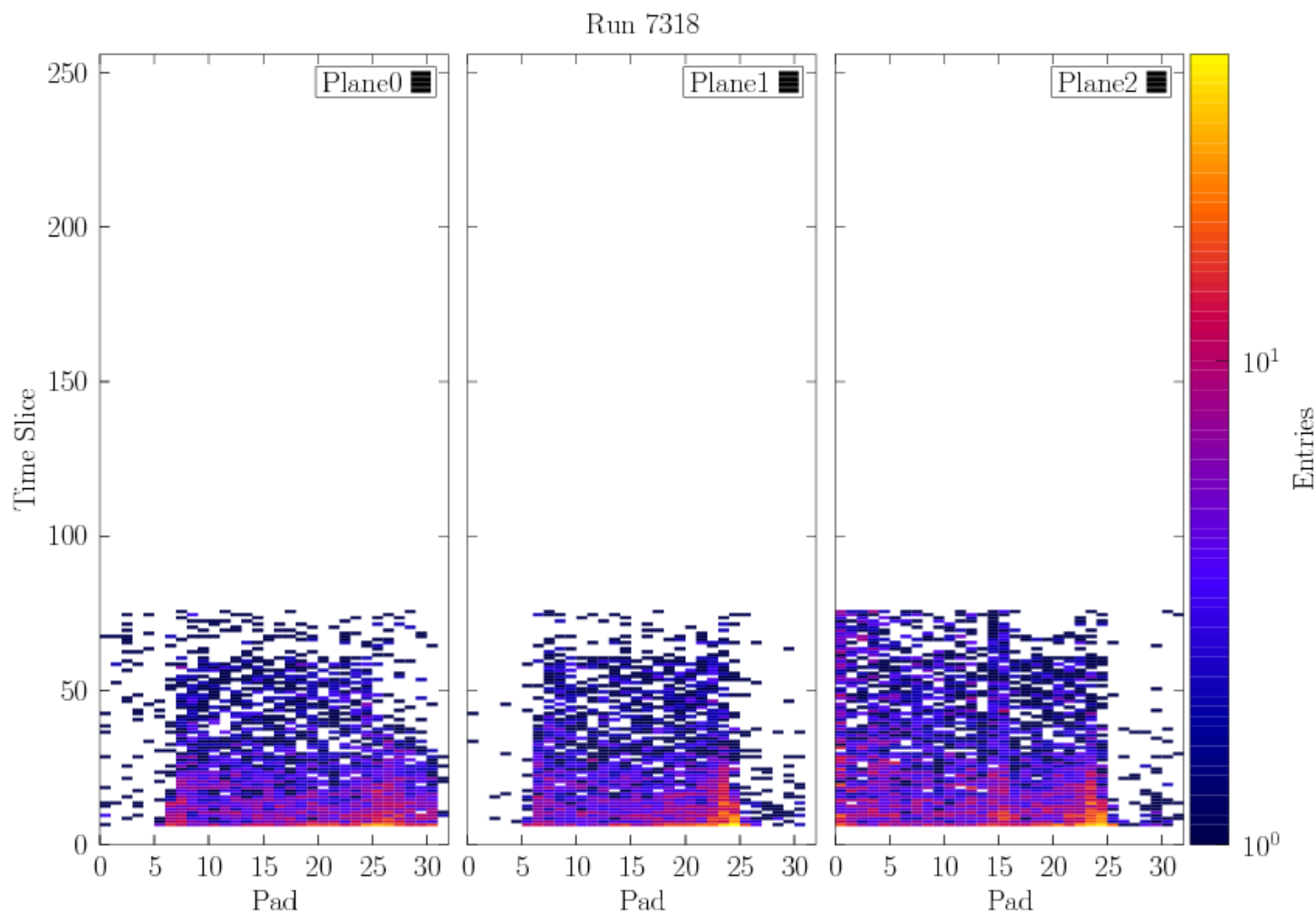
Introduction

Updated Progress

Conclusion

- Result of cut in x-dimension (Pad number)

Chair at the
UN





The Summer Project:

Quality
Cuts

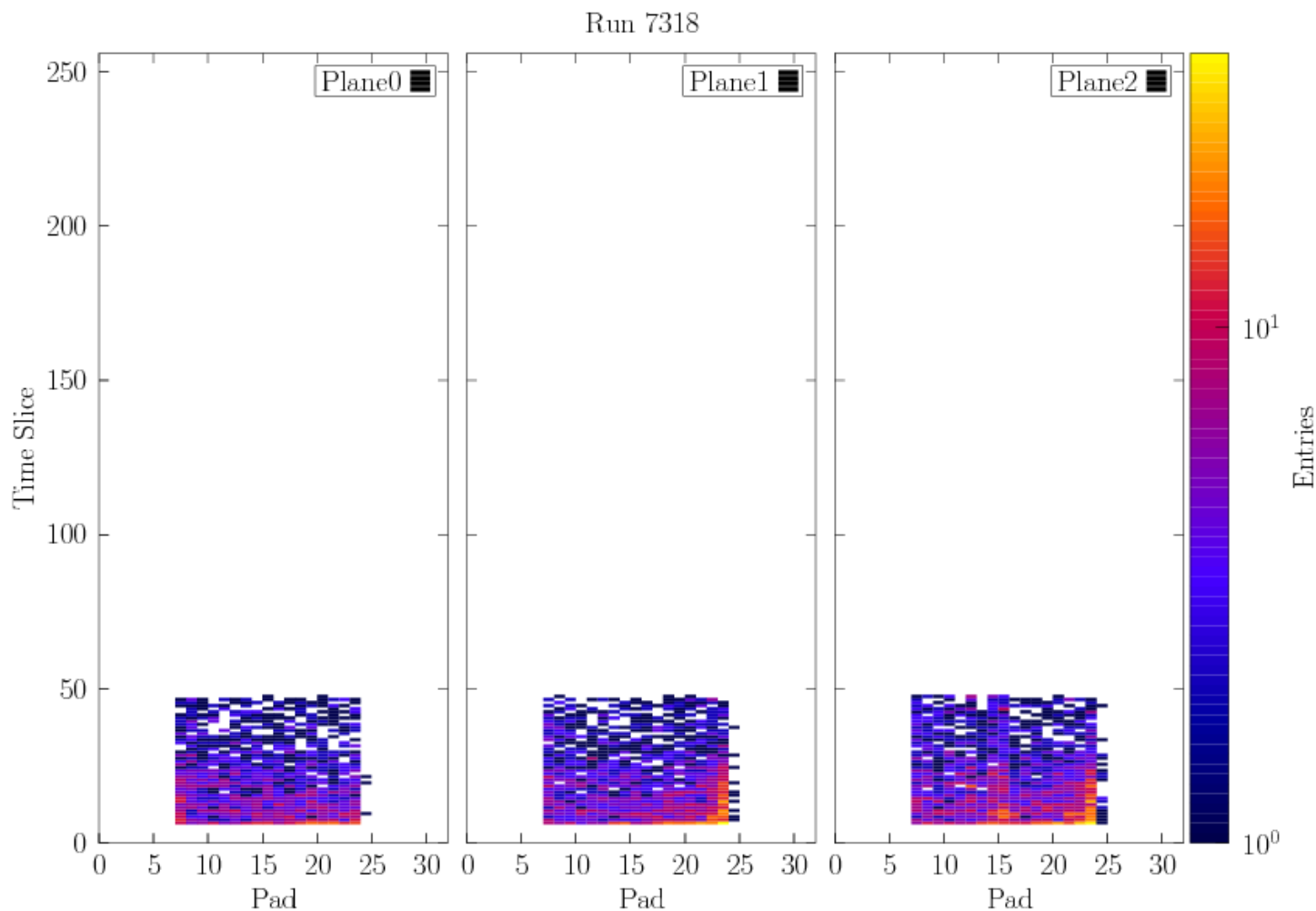
Introduction

Updated Progress

Conclusion

- Result of cut in x-dimension (Pad number)

Fete de
Geneve





~~The Summer Project:~~

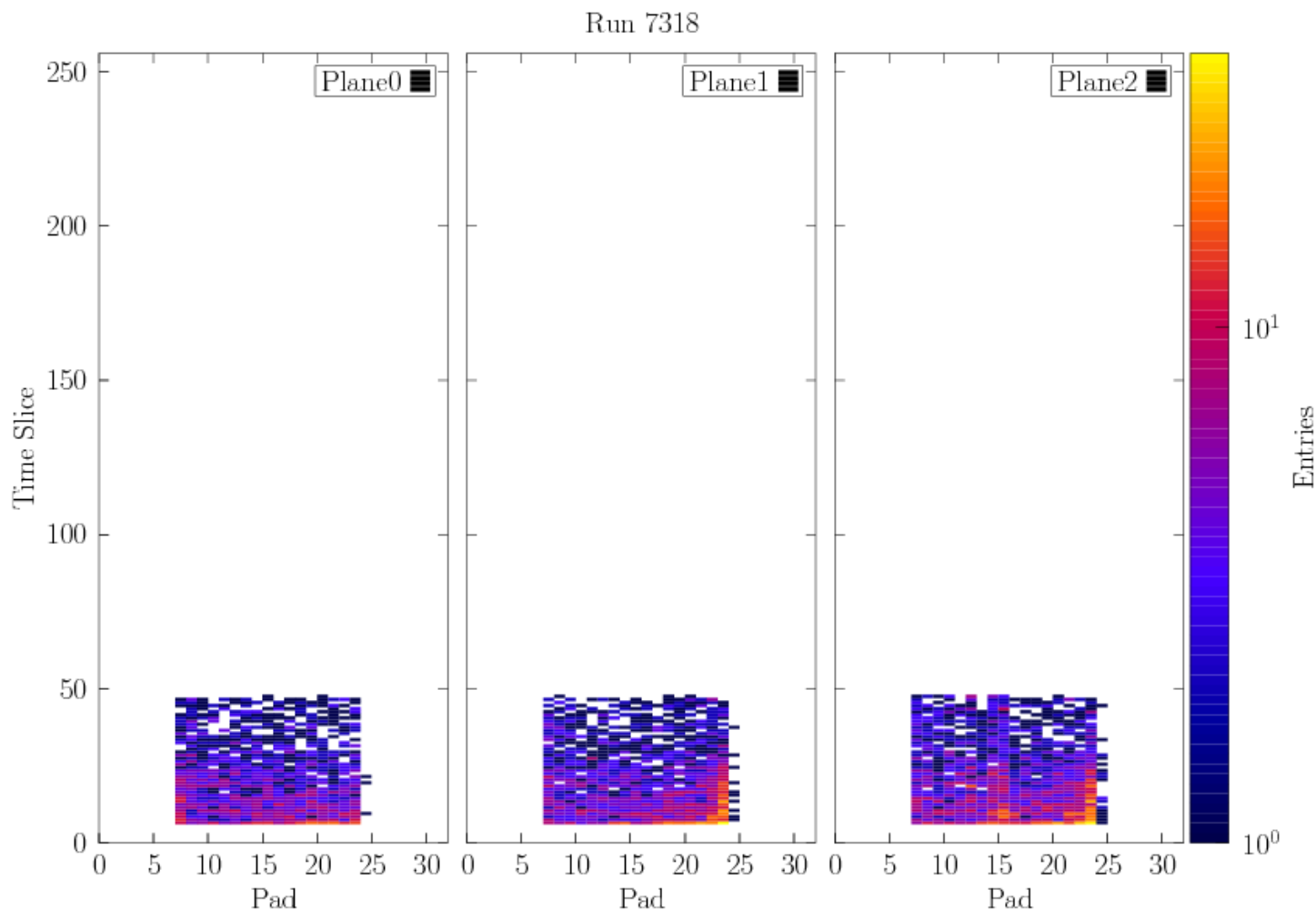
Quality
Cuts

Introduction

Updated Progress

Conclusion

- Make a cut in the time slice dimension



Mountains
in Montreux





The Summer Project:

Quality
Cuts

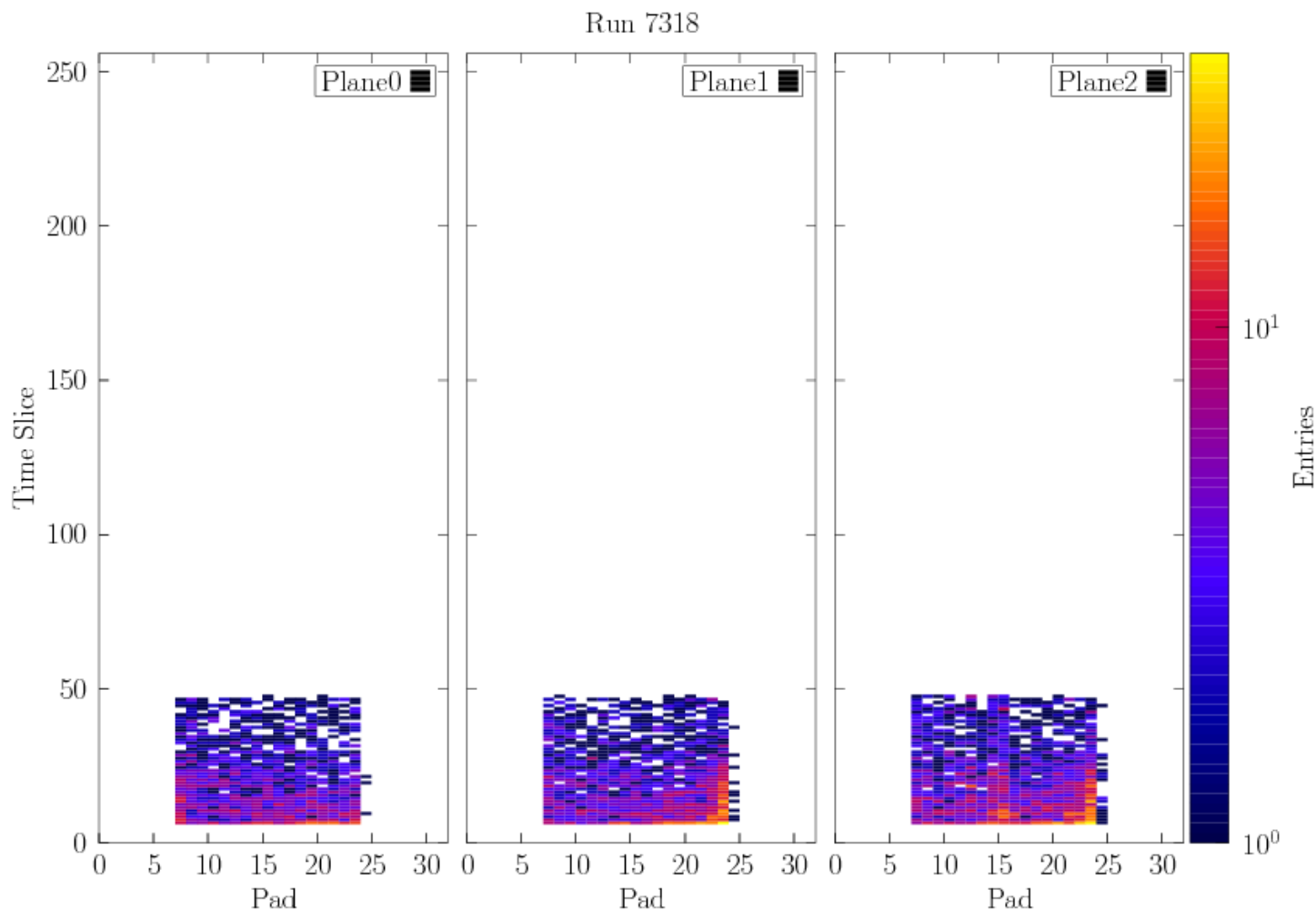
Introduction

Updated Progress

Conclusion

- Sensitive volume has been selected

Sunset
above Jura





The Summer Project:

Detector
Calibration

Introduction

Updated Progress

Conclusion

- Talk about charge distributions

Montreux
on the Lake





Conclusion

Introduction

Updated Progress

Conclusion

- First exposure to Linux and C++
- Learned a lot about of particle physics
- Had an awesome summer
- Would like to thank
 - Andras Laszlo and the NA61 collaboration
 - Drs Homer Neal, Jean Krisch, and Stephen Goldfarb and Mr. Jeremy Herr
 - Also NSF and CERN for funding

Sunset over
the Globe

