



# Broken Lines vs Refitter

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DESY/HH alignment meeting 15.12.09

# Overview

## ★ Track (re)fits

- CMSSW Track Refitter (325)
  - ✦ Strip hits are 2D
- Broken Lines (MP II refit, Runga-Kutta prop.)
  - ✦ Strips hits are 1D (default) or 2D

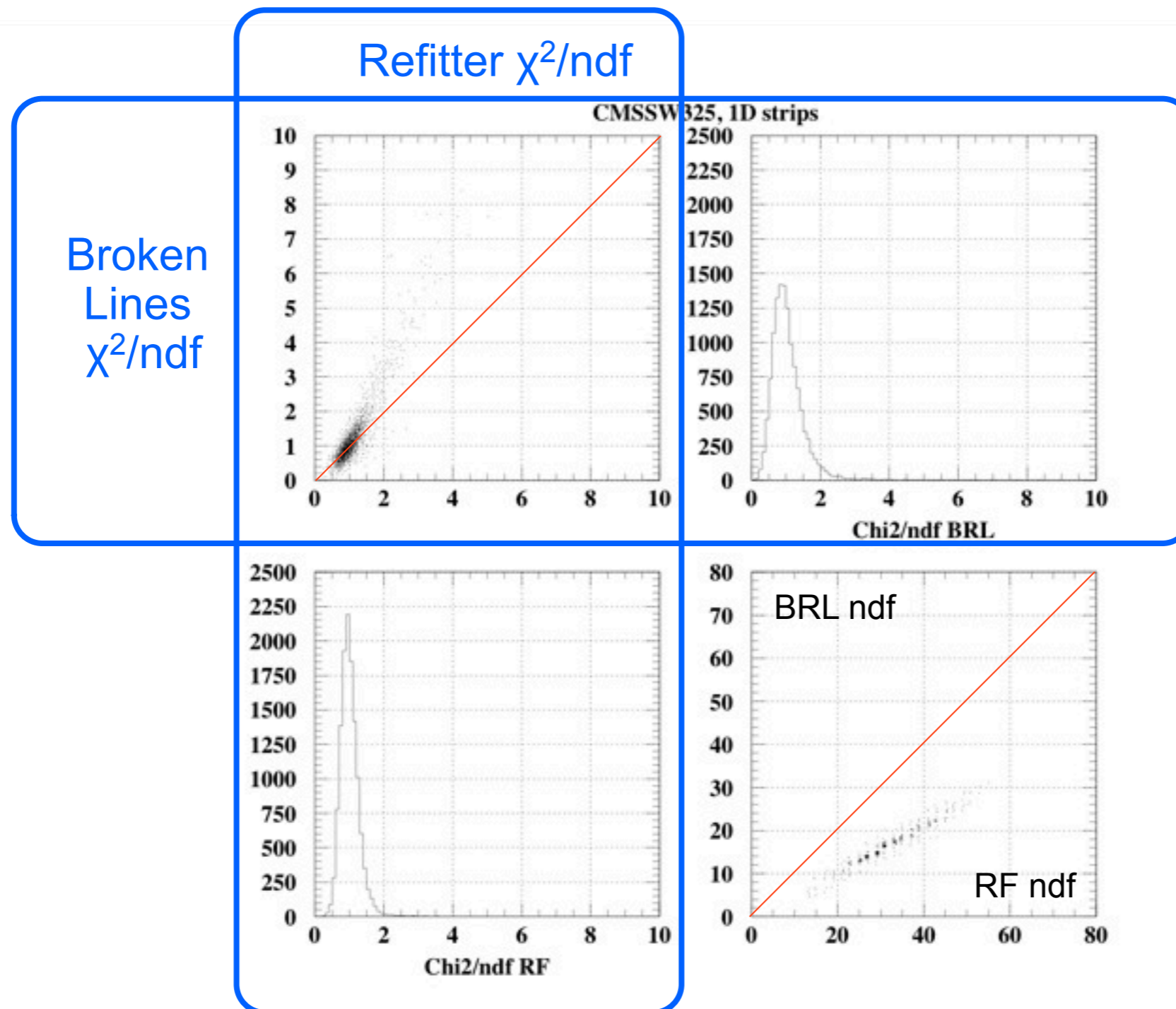
## ★ Compare

- $\chi^2$ , ndf, Prob( $\chi^2$ , ndf)

## ★ Dataset

- Ideal MC, isolated muons (TkAllIsolatedMuon\_Pt5/ALCARECO/MC\_31X)

# BRL: 1D Strips



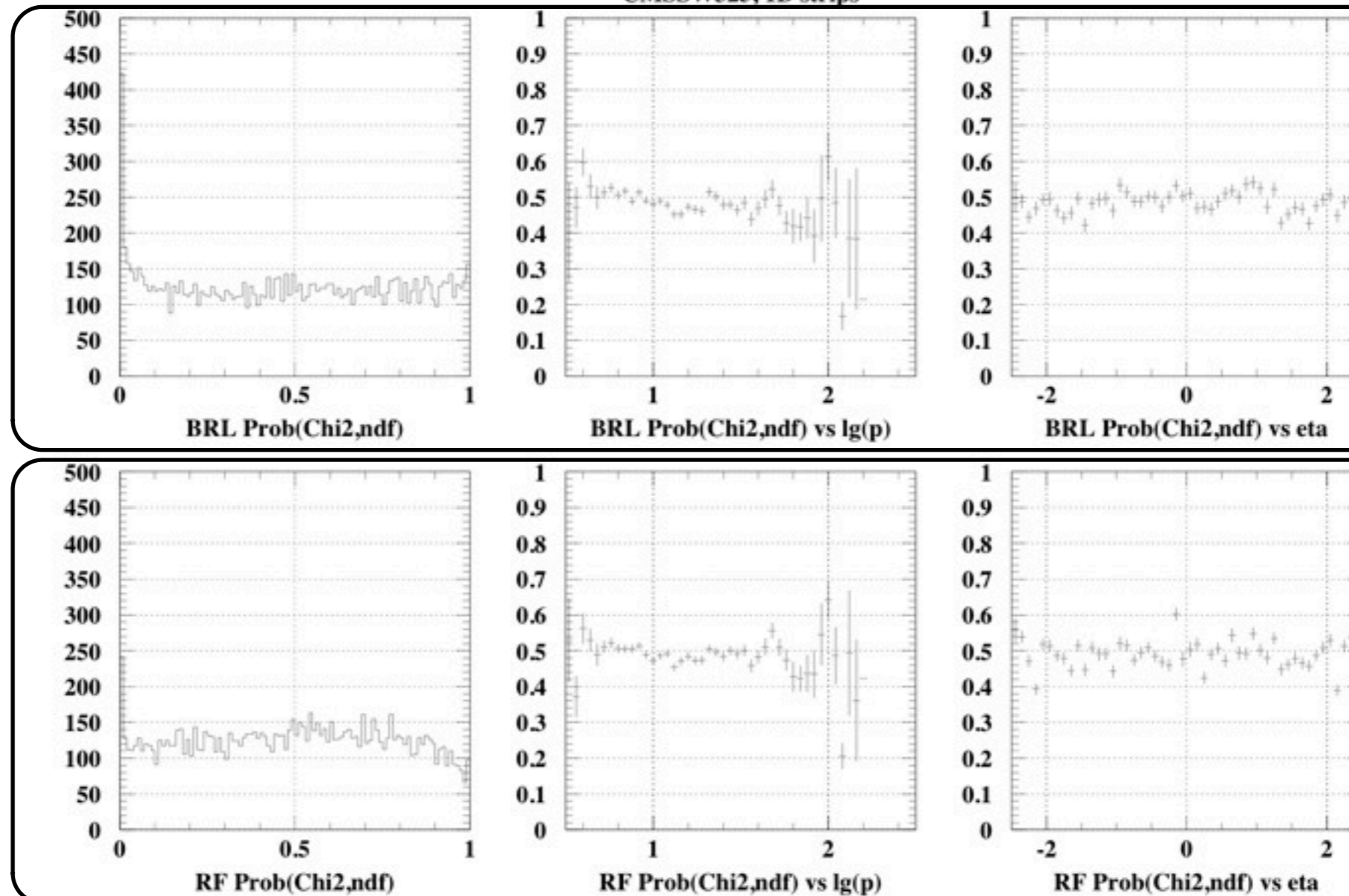
# BRL: 1D Strips

Prob( $\chi^2$ ,ndf)

Prob vs  $\log_{10}(p)$

Prob vs  $\eta$

CMSSW325, 1D strips



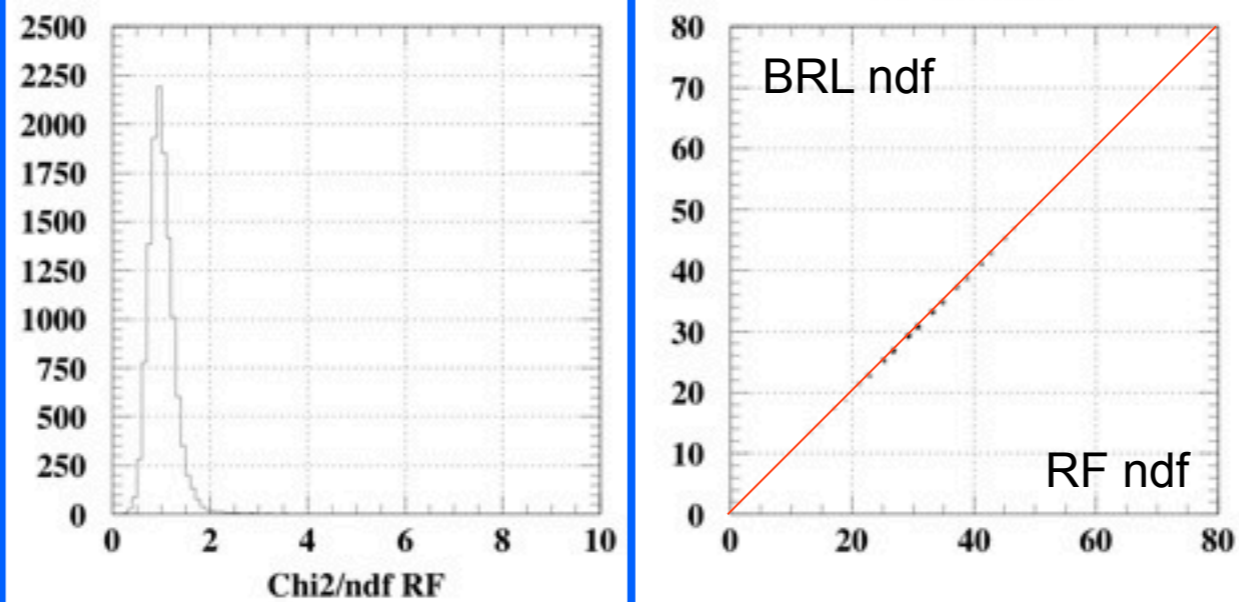
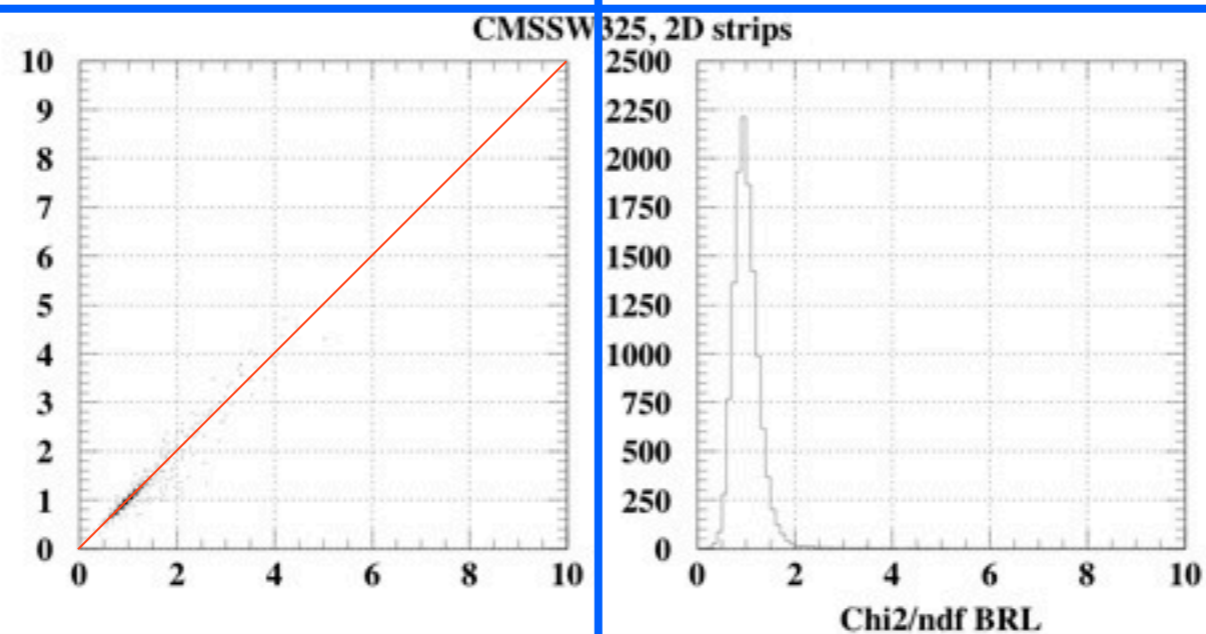
Broken  
Lines

Refitter

# BRL: 2D Strips

Broken  
Lines  
 $\chi^2/\text{ndf}$

Refitter  $\chi^2/\text{ndf}$



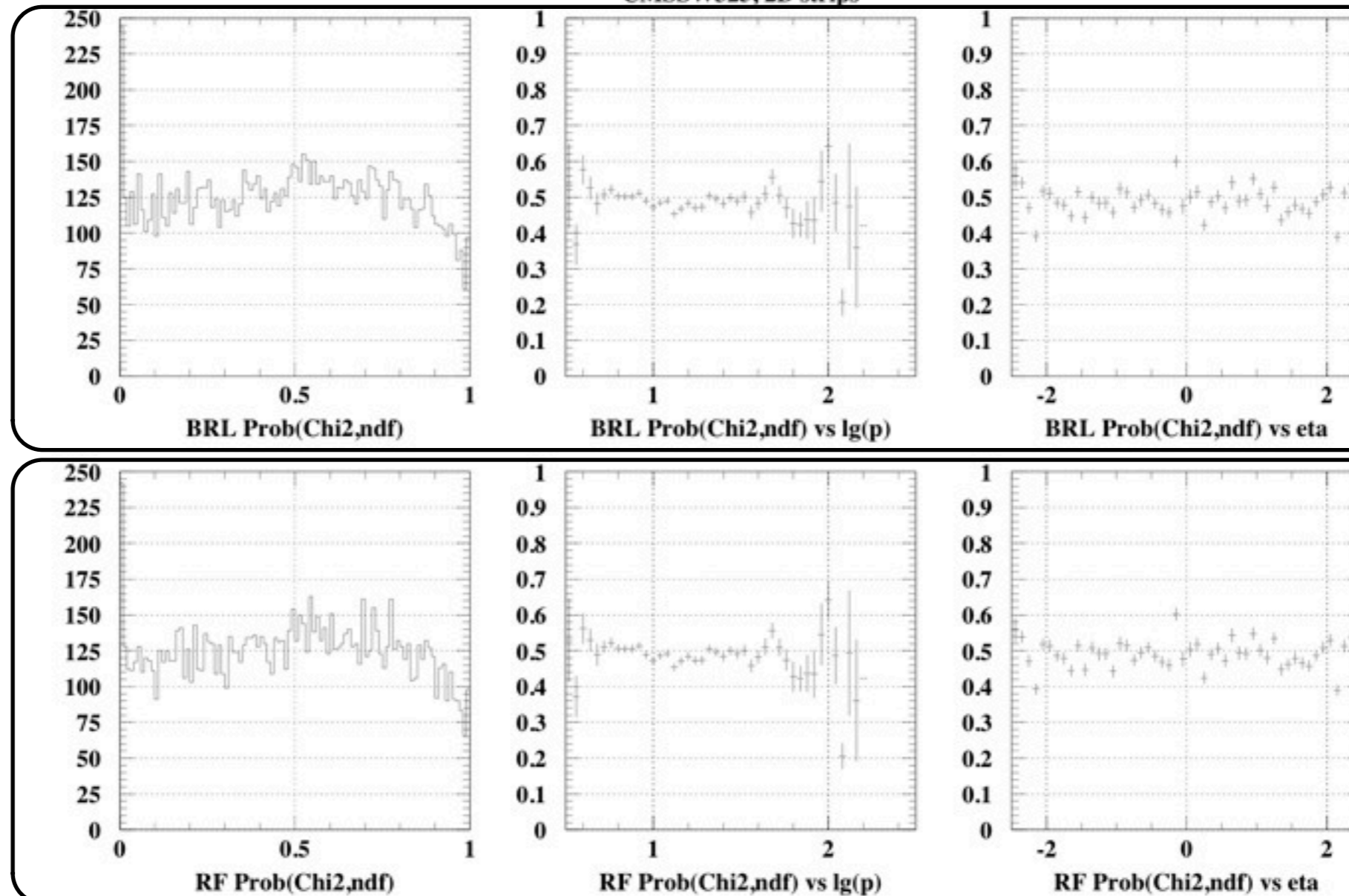
# BRL: 2D Strips

Prob( $\chi^2$ ,ndf)

Prob vs  $\log_{10}(p)$

Prob vs  $\eta$

CMSSW325, 2D strips

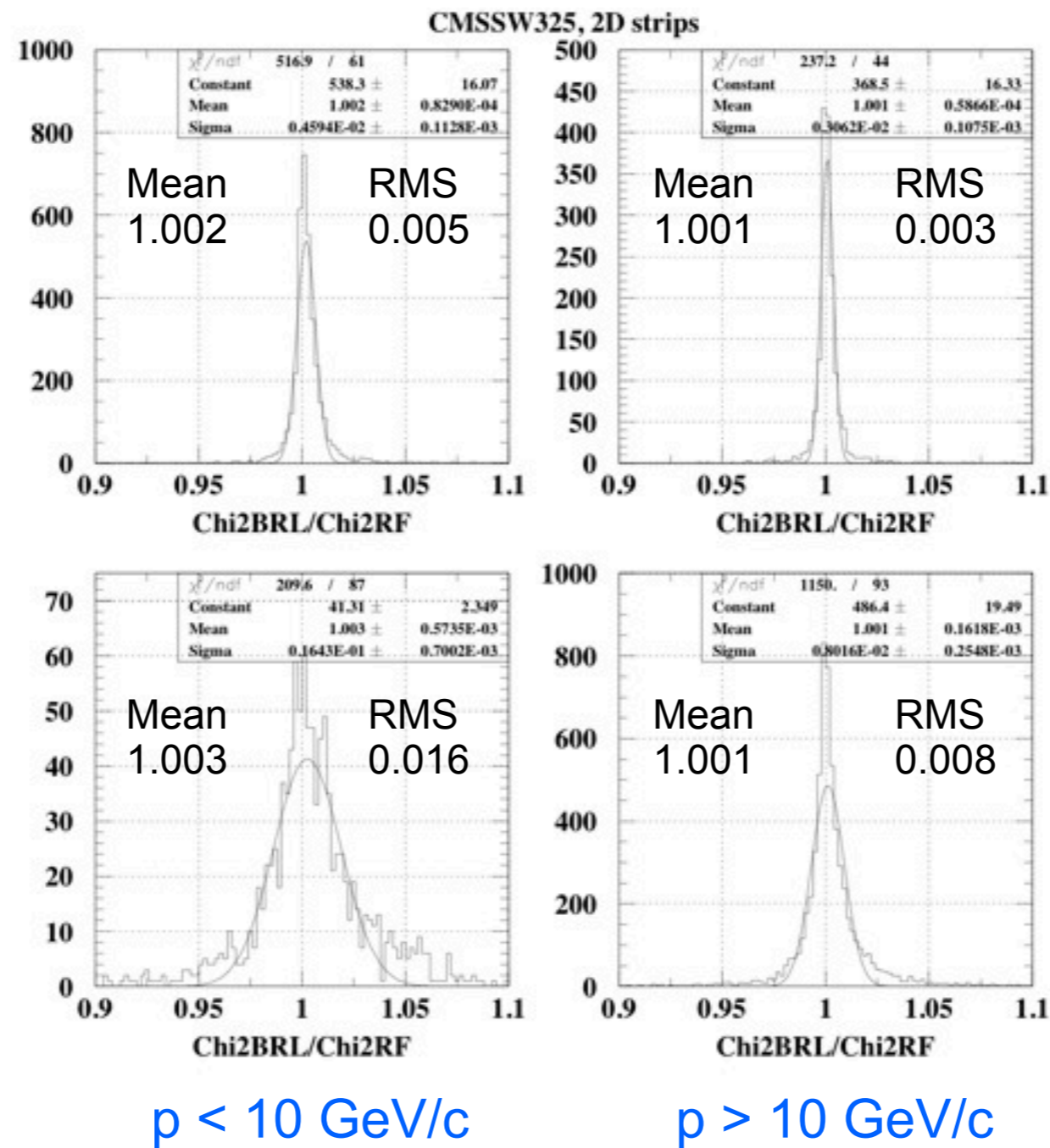


Broken  
Lines

Refitter

# 2D Strips, $\chi^2$ ratios

$$\chi^2_{\text{BRL}} / \chi^2_{\text{RF}}$$



# Summary

- ★ Refitter and Broken Lines are equivalent

- ▶ For 2D strips the ndf are identical
- ▶ For 2D strips the  $\chi^2$  are comparable
  - ✦ Mean of differences on permille scale
  - ✦ RMS of differences on (sub)percent scale, depending on size of material effects (p, n)

- ★ Conceptual differences

- ▶ Refitter samples magnetic field and material on (Kalman) filtered track,  
Broken Lines on 'helix' from reference hit