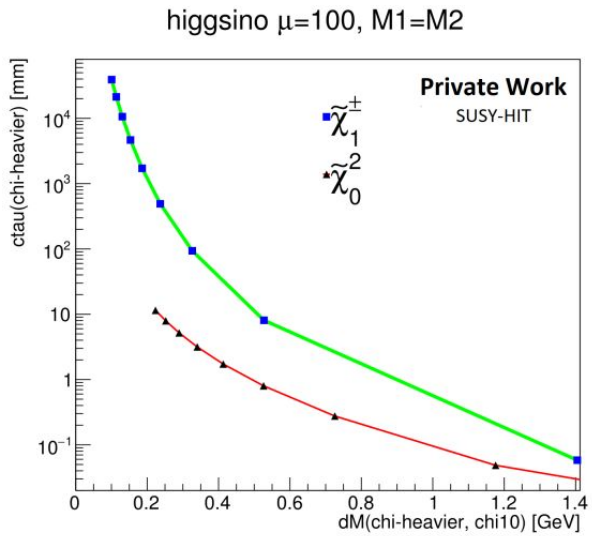
Soft leptons in compressed Higgsino searches

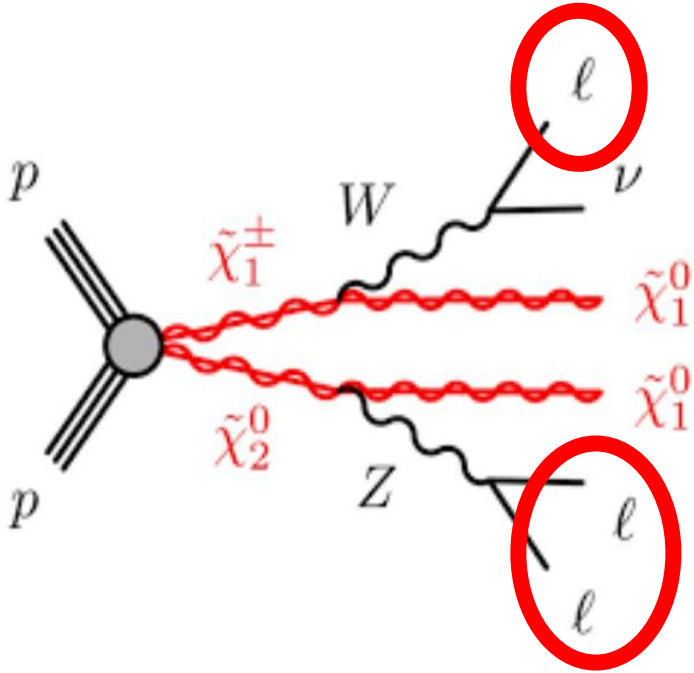
28.10.19 - Moritz

Introduction

leptons for $\Delta m(chi^{\pm}1/chi^{0}2, chi^{0}1) \approx 0.3 - 2$ GeV:

- displaced: $ctau(chi^{\pm}1/chi^{0}2) \approx 0.01 - 100$ mm
- very soft: pT < 2 GeV





arXiv:1712.08119 [hep-ex]

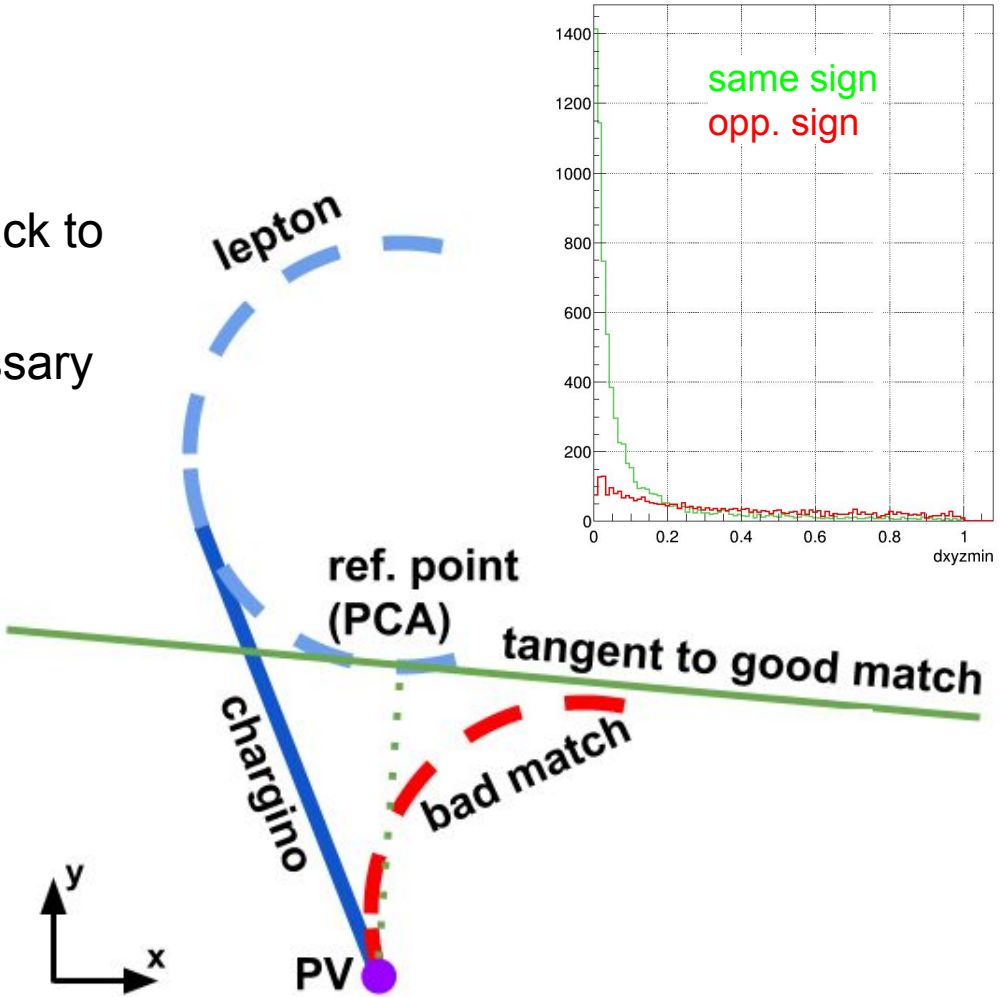
Gen. matching issue

- instead of dR: use distance of track to gen. lepton vertex
- track helix parametrization necessary

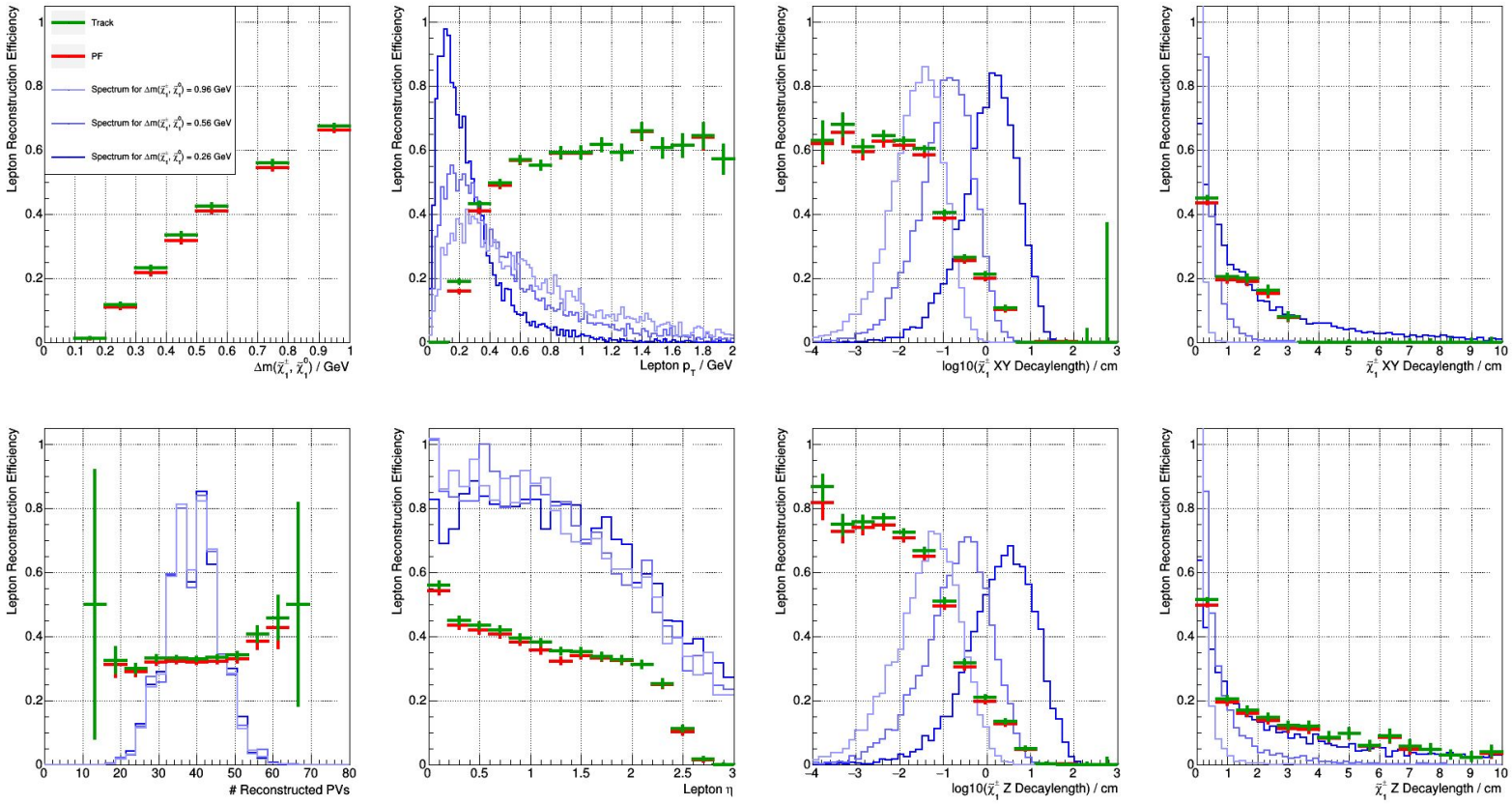
new matching:

- same sign
- relative dPt < 0.2
- dEta < 0.1
- smallest dXYZ

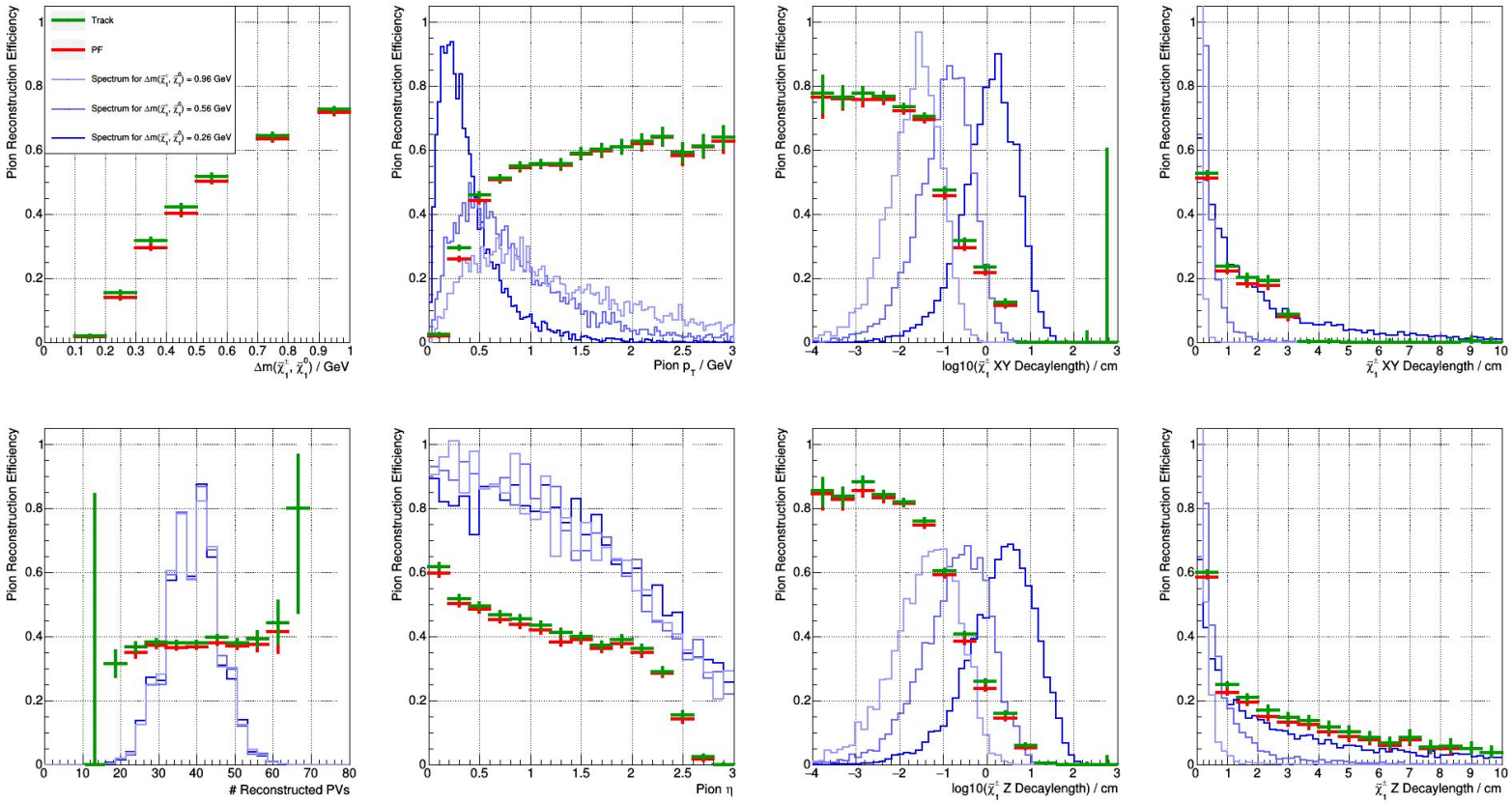
check against opposite sign tracks



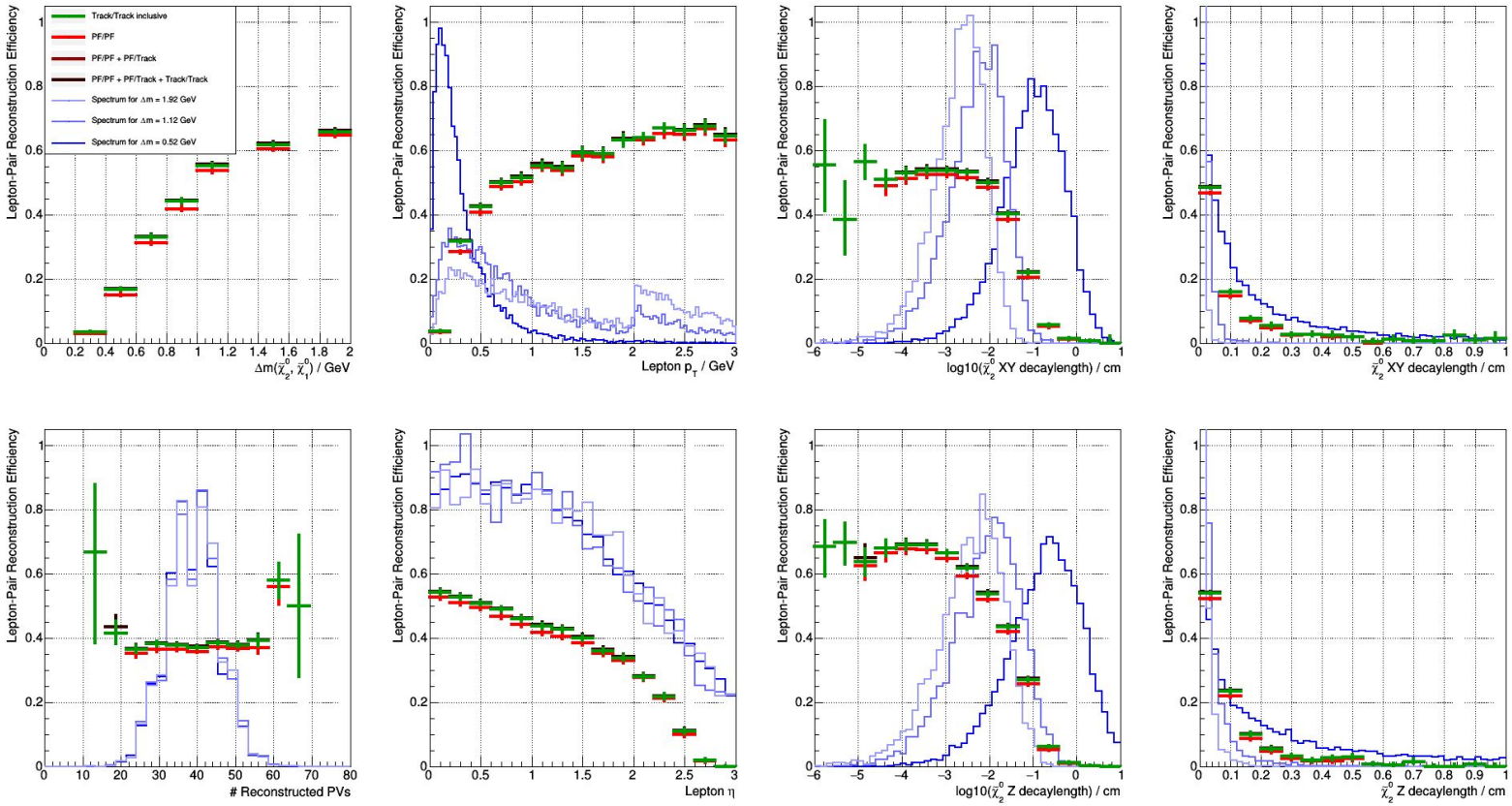
Reconstruction efficiencies - Chargino lepton



Reconstruction efficiencies - Chargino pion

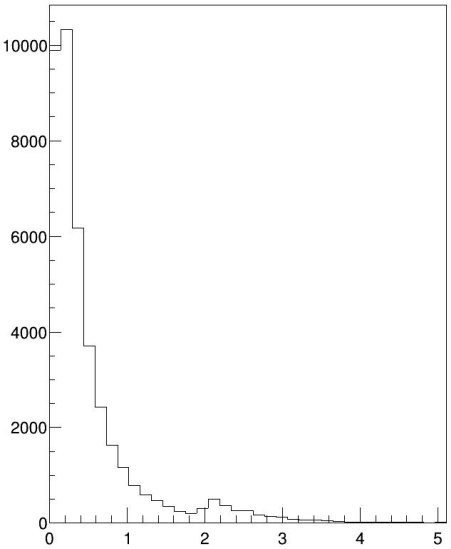


Reconstruction efficiencies - Neutralino leptons

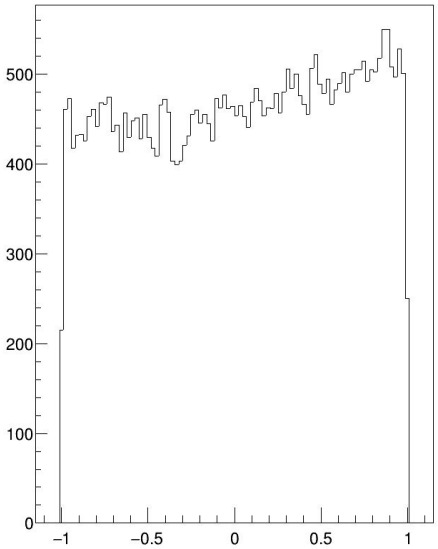


Bump for muons at pt ~ 2 GeV

muons

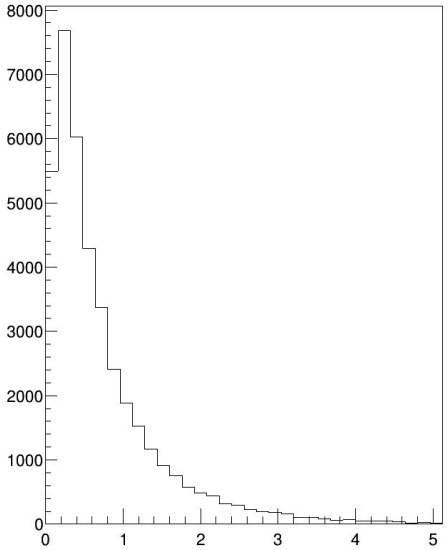


pT

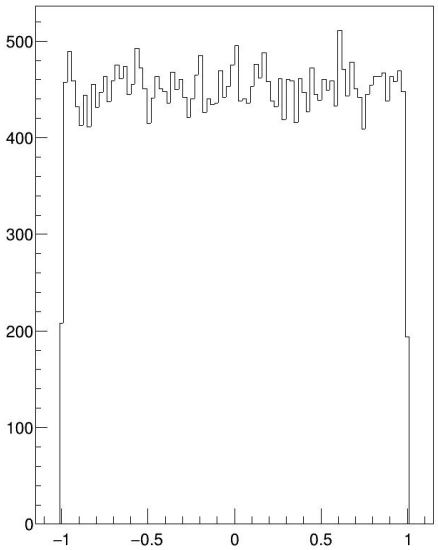


cos(theta*)

pions



pT



cos(theta*)

Track helix parametrization

```
r = 87.78  # radius [cm] for particle with pT=1GeV in B=3.8T

phi = phi - 0.5 * np.pi

x = vx + r * q * pt * (np.cos(phi) - np.cos(phi + t))

y = vy + r * q * pt * (np.sin(phi) - np.sin(phi + t))

z = vz + t * r * pt / np.tan(2 * np.arctan(np.exp(-eta)))
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