

W A_L Theoretical Curves Update

Jinlong Zhang

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Introduction

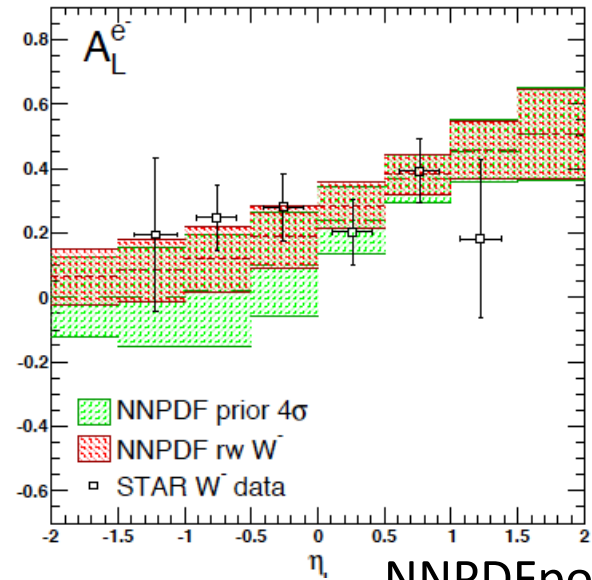
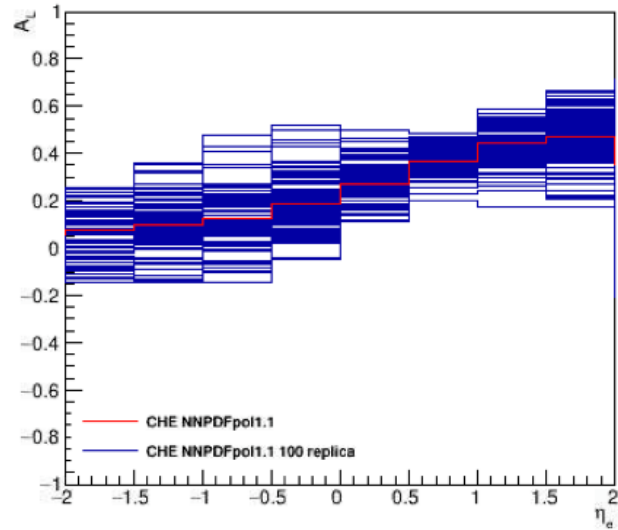
- Current theoretical curves for $W A_L$ are still those inherited from the published run11+12 paper
- NNPDFpol1.1 which contains important updates from RHIC W results should be included (unpolarized pdf -- NNPDF2.3)
- DSSV2014 which was mainly updated for gluon. (unpolarized pdf – MSTW2008)
- CHE scripts provides NLO calculations for $W A_L$

Reference

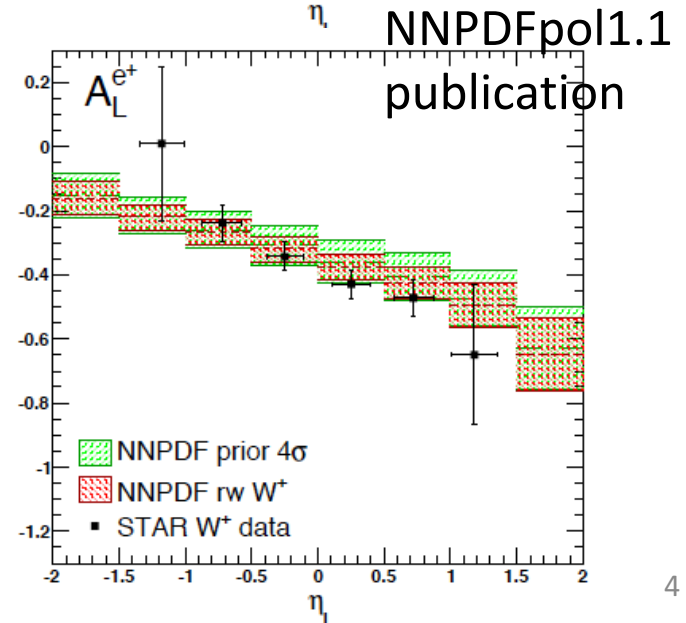
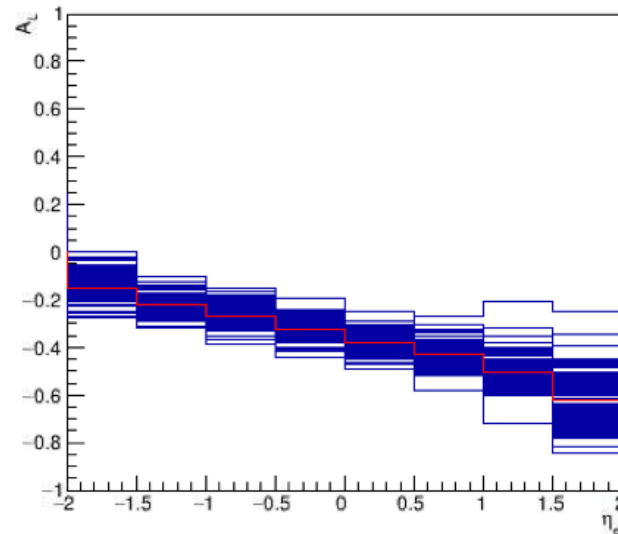
- CHE codes and instructions from Bernd's drupal blog:
<https://drupal.star.bnl.gov/STAR/blog/surrow/2012/jun/13/che-instructions>
- DSSV2014 grids from Zilong (from DSSV authors)
- MSTW2008 grids from MSTW official webpage
- NNPDFpol1.1, NNPDF2.3 from NNPDF official webpage
- NNPDF reweighting algorithm from NNPDF,
Nucl.Phys.B849:112-143,2011

NNPDFpol1.1 with 100 replicas

$W^- AL$



$W^+ AL$



Reweighting

Nucl.Phys.B849:112-143,2011

Chi2 between data and each NNPDF replicas:

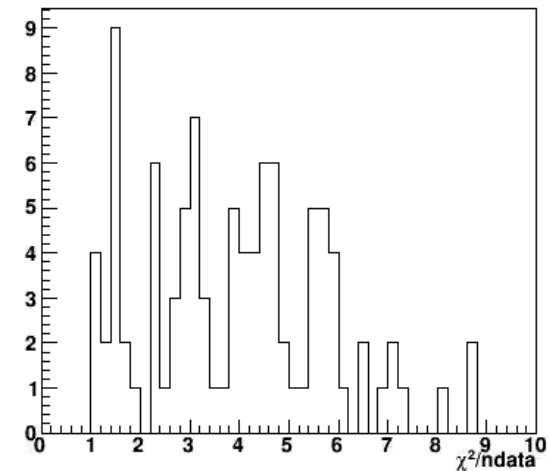
$$\chi^2(y, f) = \sum_{i,j=1}^n (y_i - y_i[f]) \sigma_{ij}^{-1} (y_j - y_j[f]).$$

Weight for each NNPDF replica :

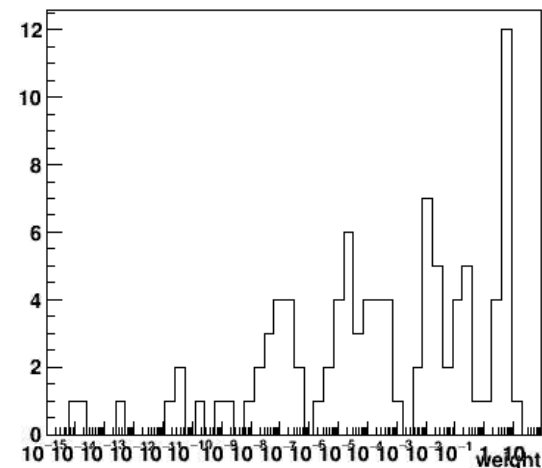
$$w_k = \frac{(\chi_k^2)^{\frac{1}{2}(n-1)} e^{-\frac{1}{2}\chi_k^2}}{\frac{1}{N} \sum_{k=1}^N (\chi_k^2)^{\frac{1}{2}(n-1)} e^{-\frac{1}{2}\chi_k^2}}.$$

- Data: 2013 preliminary, stat+syst.
- 100 NNPDFpol1.1 replicas (2011+2012 in)
- Take the mean and RMS as the curve and band width.

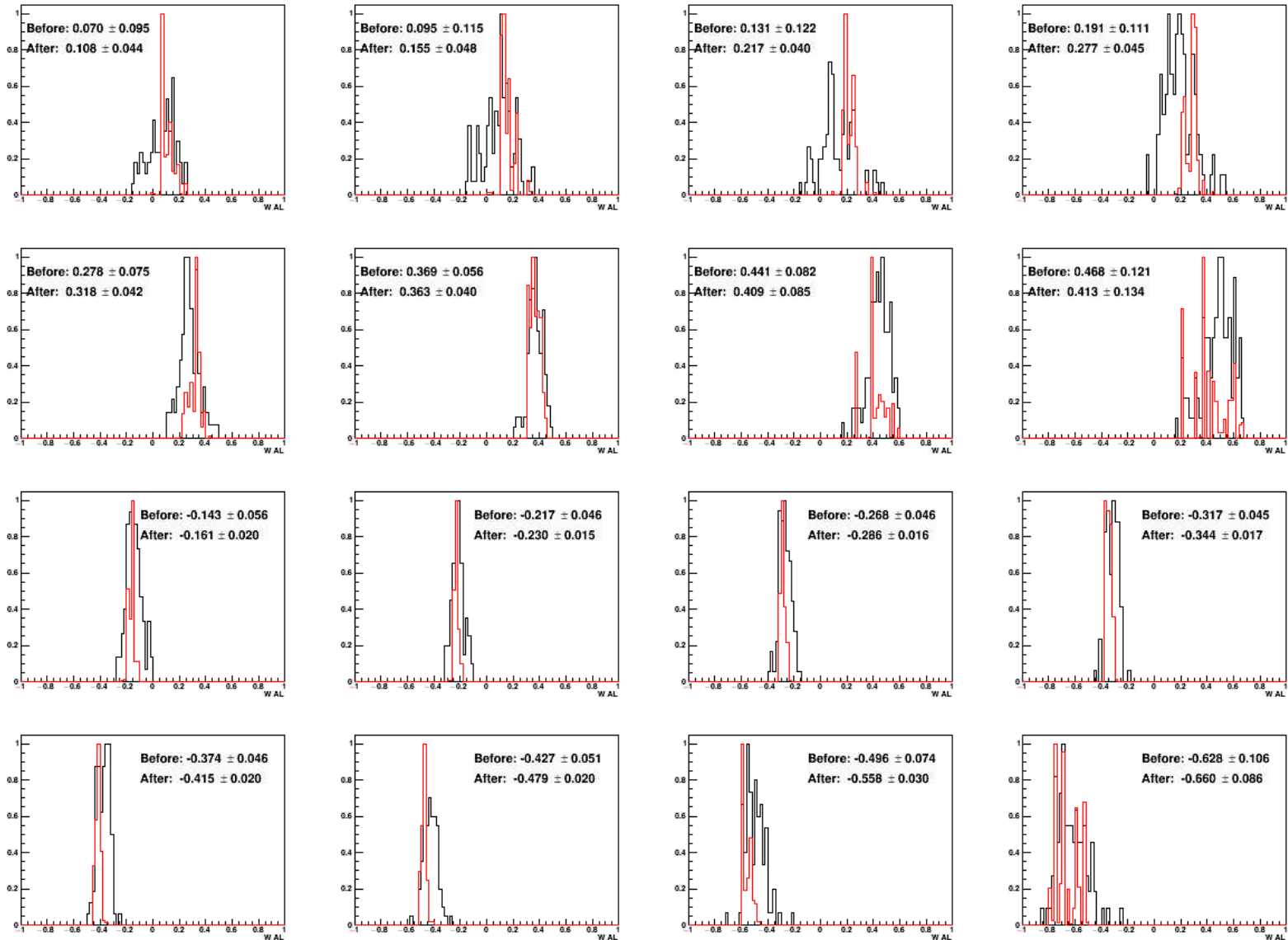
χ^2 per data point



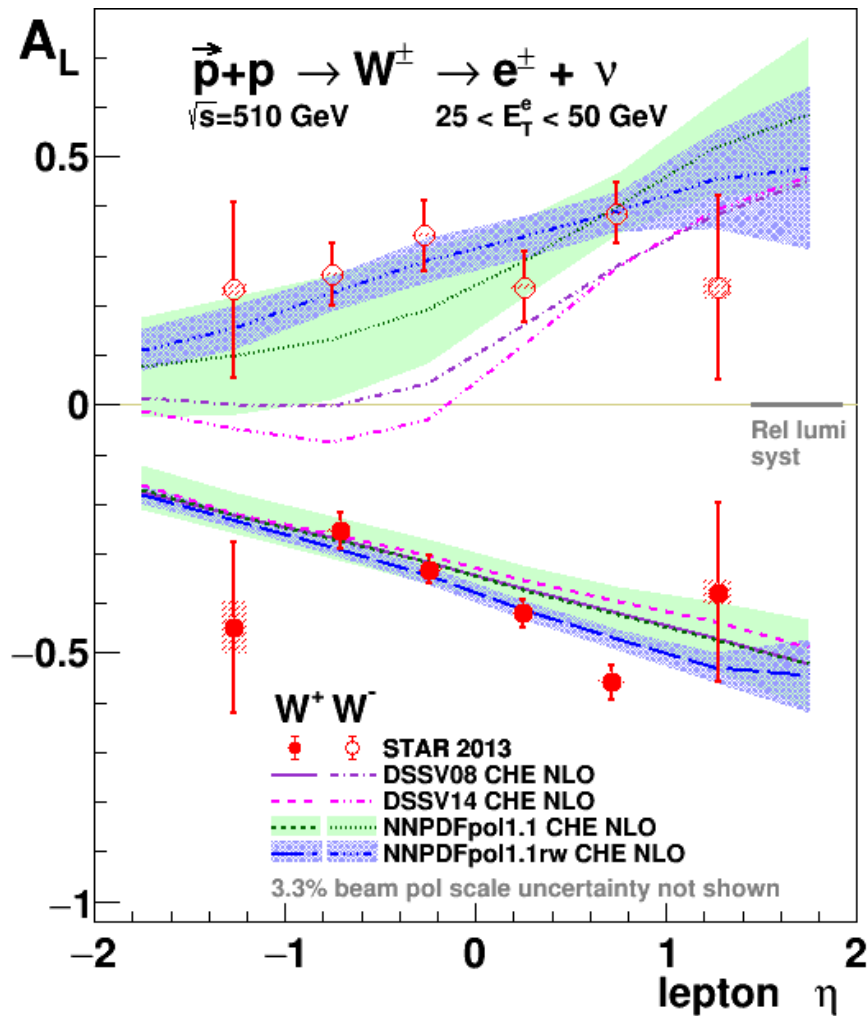
weight distribution



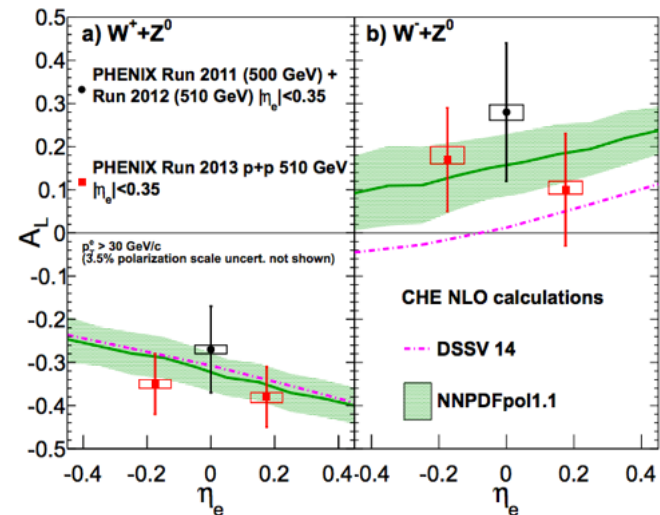
W AL for different electron eta bin, before and after reweighting



Comparisons

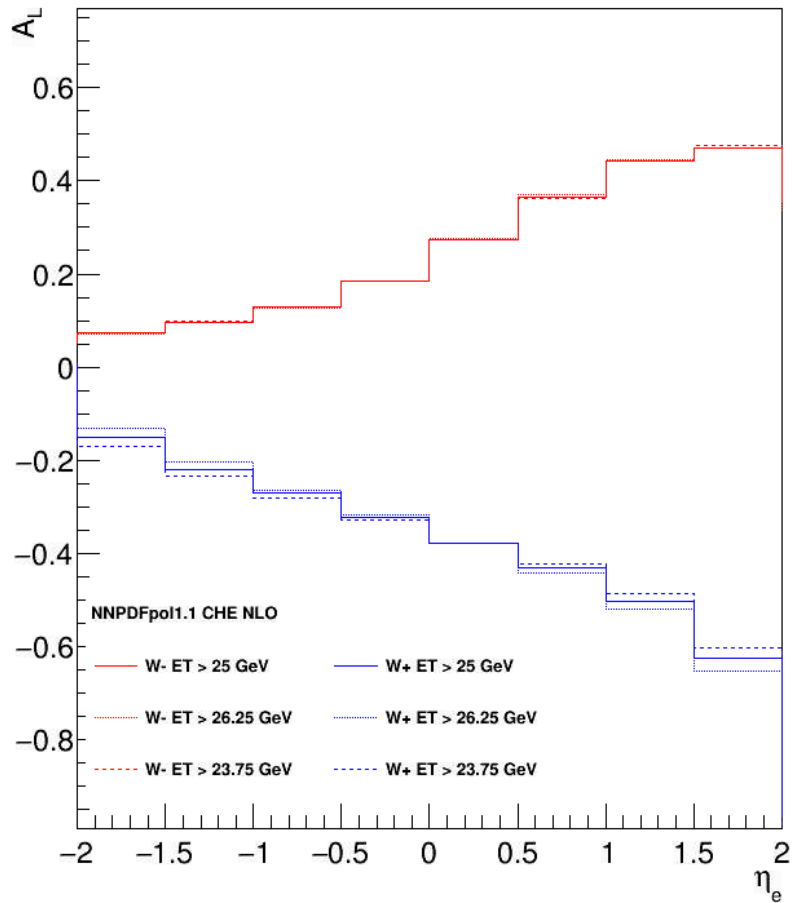


- NNPDFpol1.1 and the reweighted curves look reasonable (with limited replicas, only 100)
- DSSV14 looks weird, maybe no run11+12 (or run12 preliminary) included. Need to confirm with the authors. consistent with PHENIX's



W AL changes with ET lower threshold 5% up and down

W^\pm AL with different ET thresholds



	η_e	25GeV	26.25GeV	23.75GeV	Diff/2	From Data
W-	-1.25	0.097	0.095	0.098	0.002	0.014
	-0.75	0.128	0.127	0.129	0.001	0.004
	-0.25	0.184	0.184	0.186	0.001	0.004
	0.25	0.274	0.277	0.273	0.002	0.004
	0.75	0.366	0.37	0.362	0.004	0.004
	1.25	0.442	0.445	0.442	0.002	0.022
W+	-1.25	-0.221	-0.202	-0.232	0.015	0.053
	-0.75	-0.269	-0.263	-0.281	0.009	0.003
	-0.25	-0.321	-0.316	-0.328	0.006	0.003
	0.25	-0.378	-0.379	-0.379	0.000	0.003
	0.75	-0.431	-0.443	-0.421	0.011	0.003
	1.25	-0.502	-0.518	-0.487	0.016	0.028