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Spline production and BeRPA update

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Overview

- 2 Main packages used for spline production:
  - T2KReWeight and things that go into it, e.g. NIWGReWeight
  - XsecResponse
- Need a T2KReWeight freeze before spline production can progress
- Kendall has gone through most of the T2KReWeight status
- Will cover XsecResponse status and BeRPA progress in T2KReWeight

BeRPA

$$f(x) = \begin{cases} A(1-x)^3 + 3B(1-x)^2x + 3C(1-x)x^2 + Dx^3, q^2 < U \\ 1 + (D-1)\, e^{-E\left(q^2 - U\right)}, q^2 \geq U \end{cases}$$

- BeRPA implementation for Wing's tests done by Raj and Wing using 2015 splines T2KReWeight freeze
  - Event-by-event weight stored in mtuple for nominal value
  - Binned splines made for variations about that nominal
- As Kendall mentioned/s there is a BeRPA implementation in the current T2KReWeight
  - It does both of the above steps in one
  - May not perform as well due to large nominal→nominal+BeRPA weights
- 2 options: implement dial in T2KReWeight as Raj has or use current T2KReWeight dial and revalidate

Aside: BeRPA naming

- In presentations BeRPA parameters that vary are ABDEU
  - C is fixed by continuity
- In code, names of variables are often ABCDU
- These map to presented BeRPA parameters as A→A, B→B, C→D, D→E, U→U
- Awaiting TN309 for official naming

XsecResponse

- Takes weights from T2KReWeight as input and makes splines
- Already set up to make Erec-theta, Erec and p-theta splines
- T2KReWeight output is a set of weights for each 'tweak' in the order they were run in the T2KReWeight executable
  - Need to know the number of variations for each dial and the order they were run in the exec

Summary

- BeRPA implementation now understood
  - Need to decide which approach to use and put it into T2KReWeight
- XsecResponse work as far as it can be without some T2KReWeight details
- After these two are done will be ready to generate splines after T2KReWeight freeze