CJ impact results: a first look & discussion

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IR4YR meeting

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Overview

- A look at the pseudodata
- First CJ impact results
  - **Impact summary:** u, d, g, sea quarks
  - **Charged Currents role** (and neutron tagging)
  - **Energy scan** and binning
- Interim conclusions, thoughts, questions

Projected data from txgrids/expdata

	NC		CC	
	Pessim	**Optim**	**Pessim**	**Optim**
# points	303	497	89	89
Target	p,d		p	p
Lumi	100/fb (top √s)		10/fb	
Stat %	0.007-0.5	0.007-0.6	2-20	2-20
Syst %	2.3	1.5	2	2
Norm %	4.3	2.5	5.8	2.3

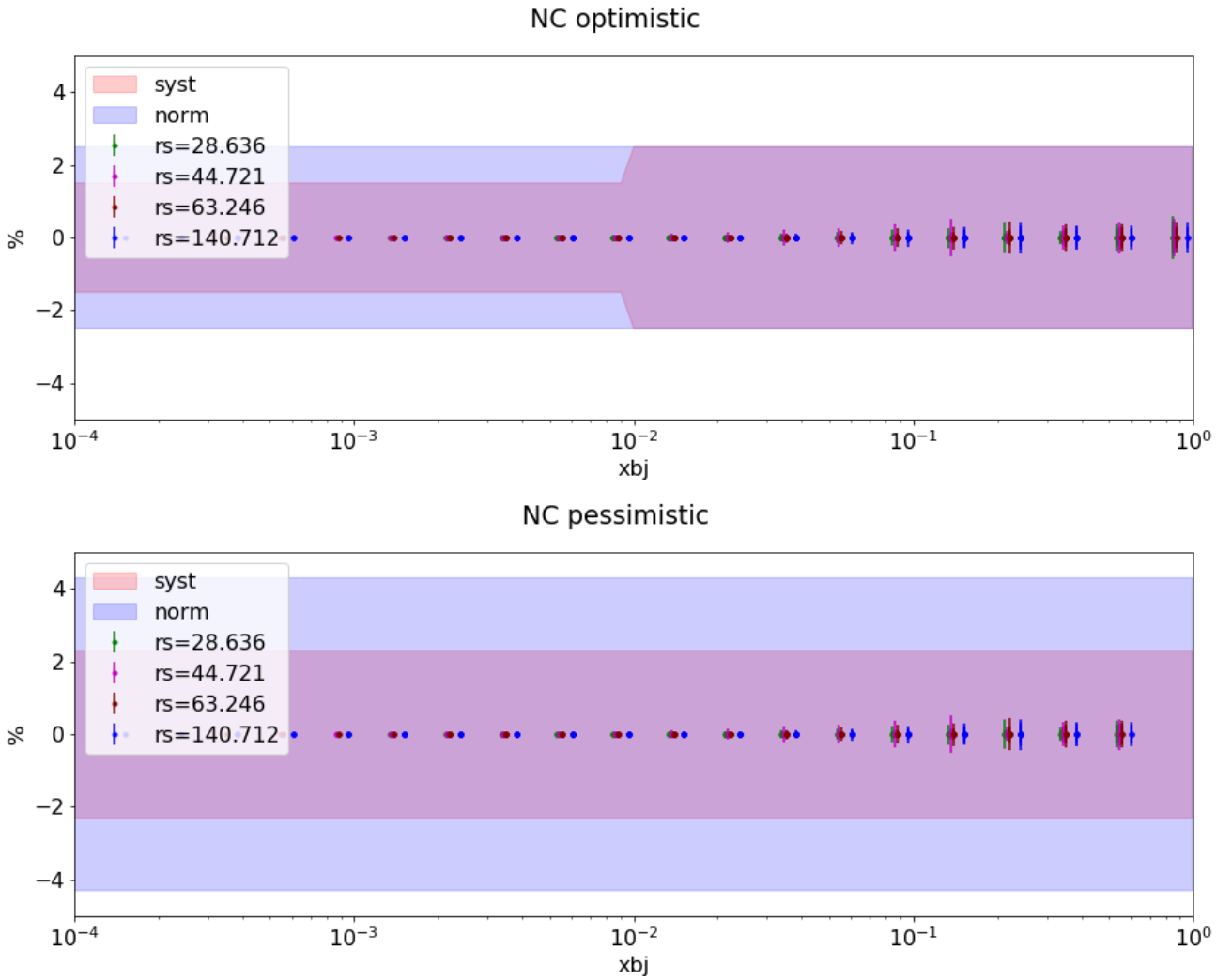
and also…
Super Optimistic:

Use 100/fb also for CC

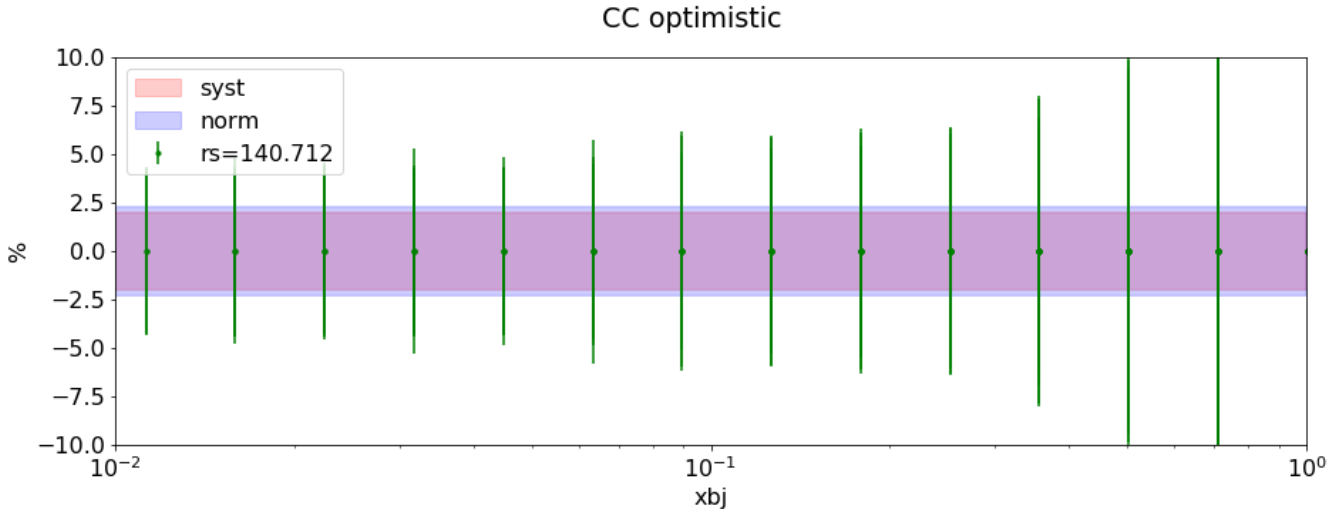
Half NC syst %

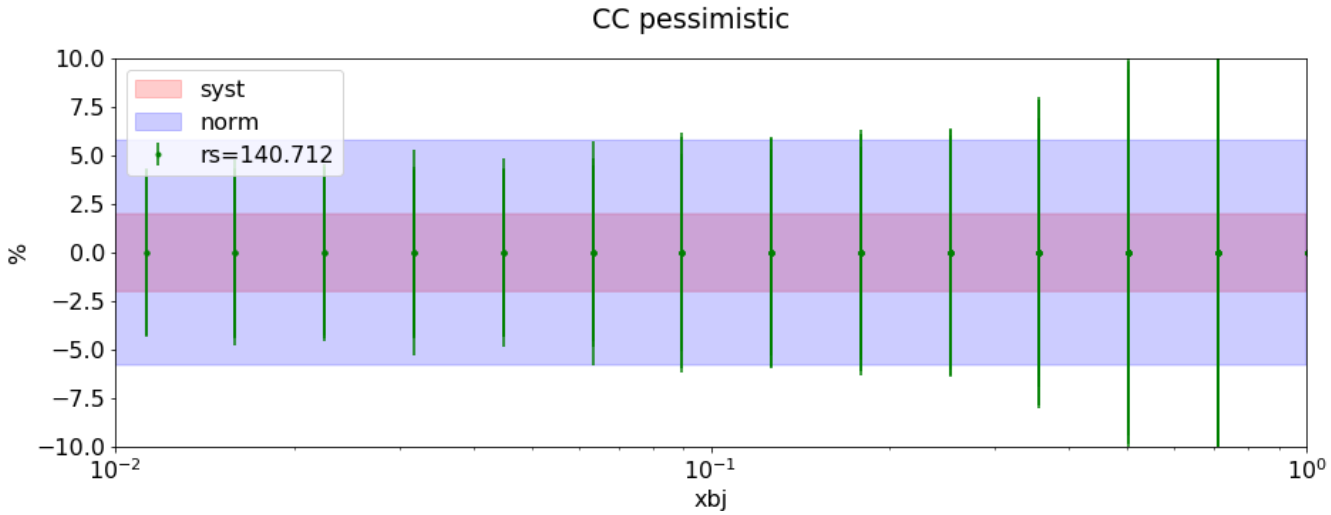
Note: electron only so far – we'll need to check the positron, too

Projected data from txgrids/expdata



Projected data from txgrids/expdata





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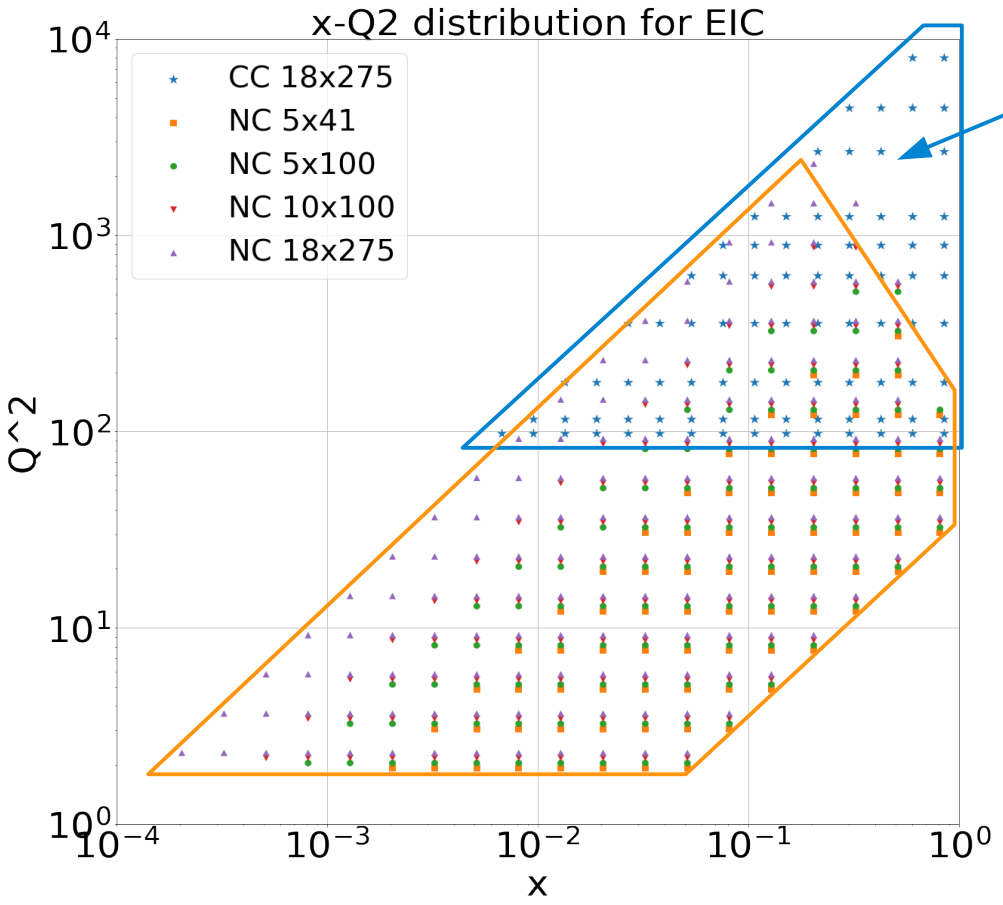
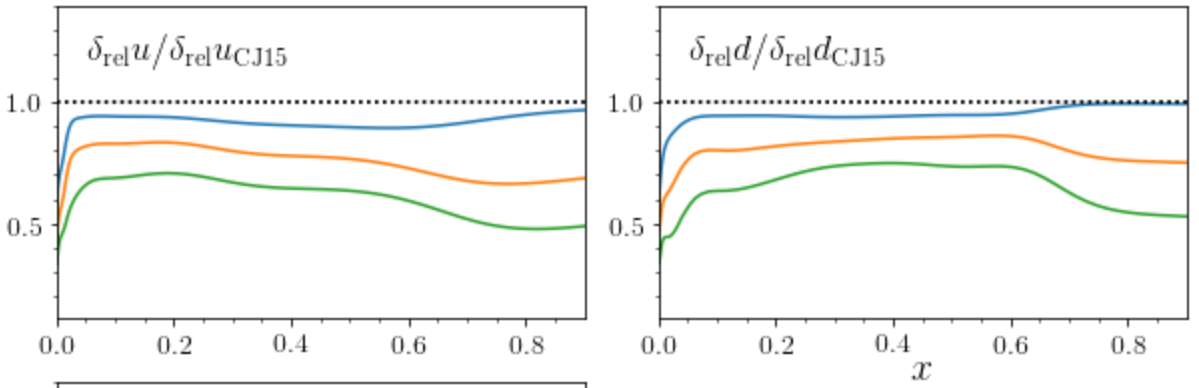
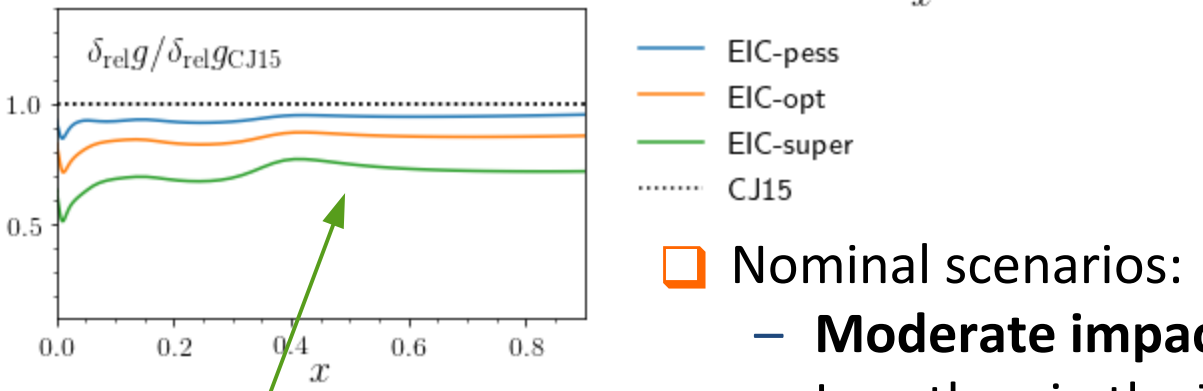


Q: why not also for NC?

Q: why not 100/fb for CC?

Impact - u,d,g summary





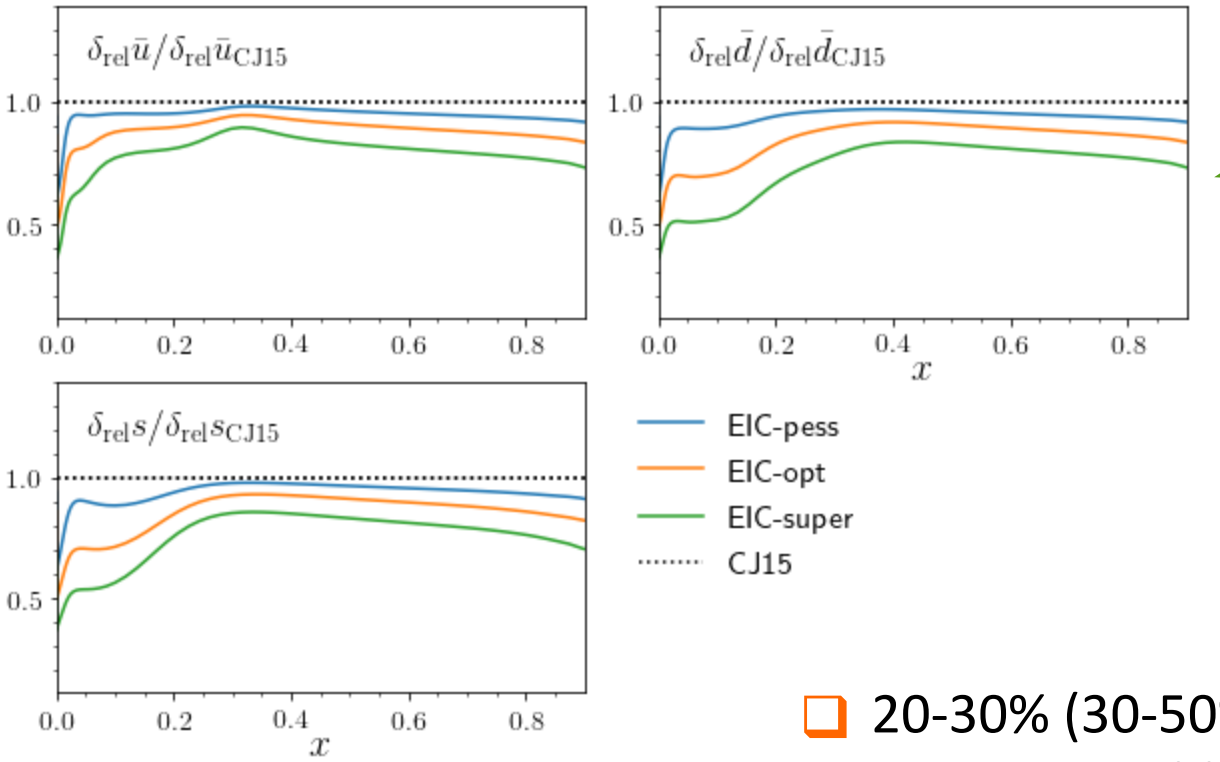
EIC-pess
EIC-opt
EIC-super
CJ15

Super Opti:
40-50% better
d-quarks

Super Optimistic:
30-50% better gluons

- Nominal scenarios:
  - **Moderate impact on d, g**
  - Less than in the Temple mtg. Projections
- **Substantial gains with "Super" scenario**
- In fact:
  - Deuteron essential for d-quark gains
  - **CC negligible** (see later)

Impact – sea quarks summary



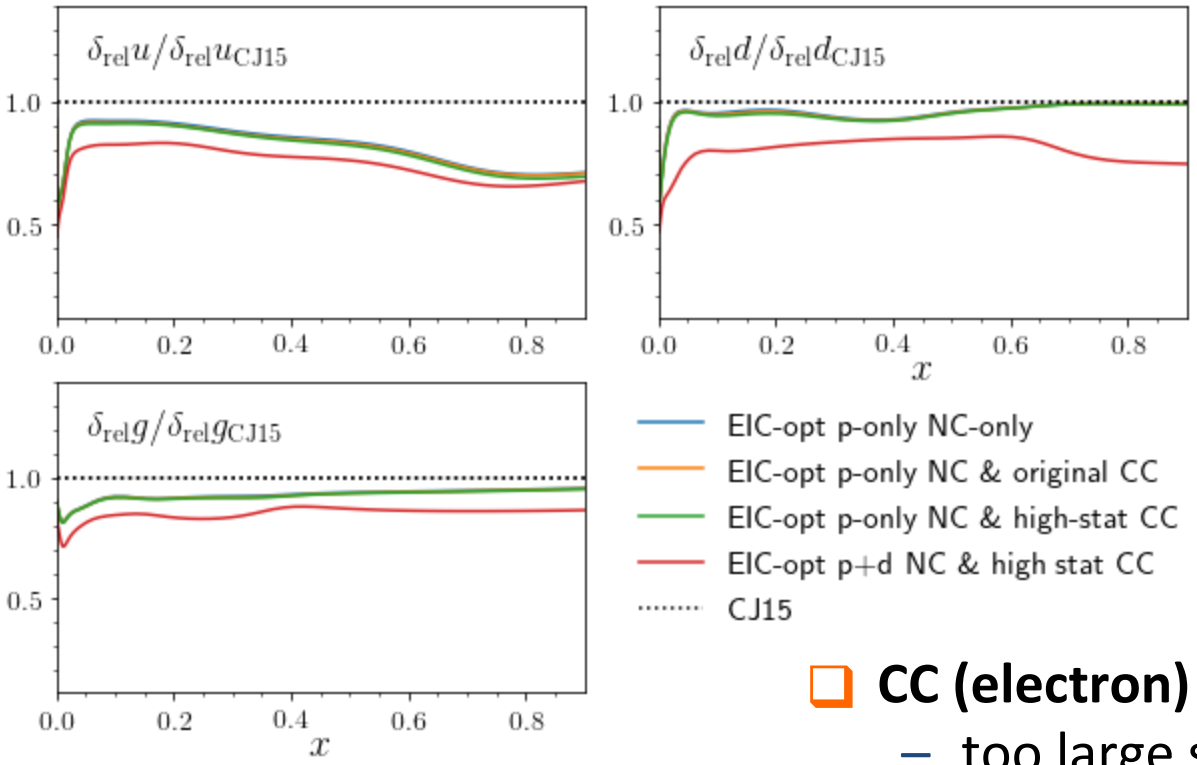
40-50% better sea quarks

Attention:
s = 0.2 * (ub+db) at Q_0=1.3 GeV
(will be freed when including **APV**)

Q: Are APV projections available as tables (or will be)?

- 20-30% (30-50%) better sea quarks
  - Comparable to the gluons
- Again:
  - Deuteron essential for gains
  - CC negligible (see later)

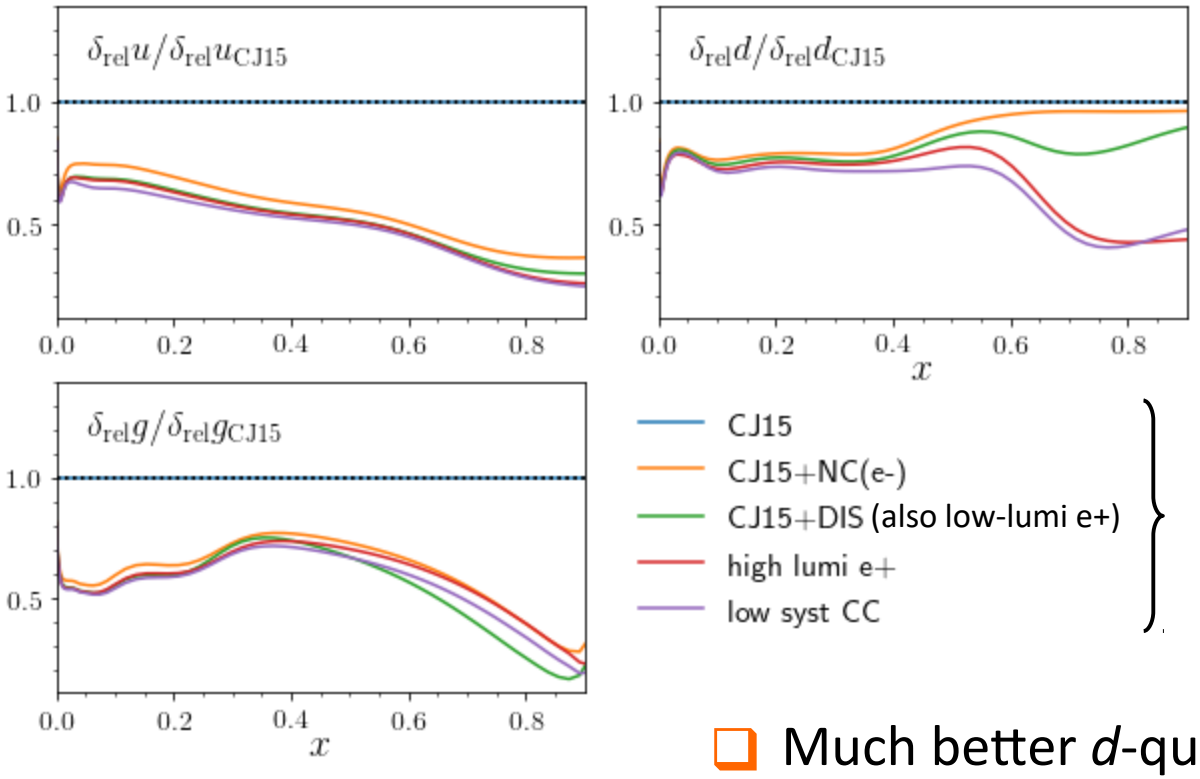
CC vs. Deuteron NC



no impact from CC!

- **CC (electron) have no impacts on fits**
  - too large syst & stat errors
  - Fit too constrained?
    (s-quark not fitted in CJ15, yet)
- Confirms Temple projections (next slide):
  - Need e+, or super-low CC syst
  - and/or p-tagged F2n

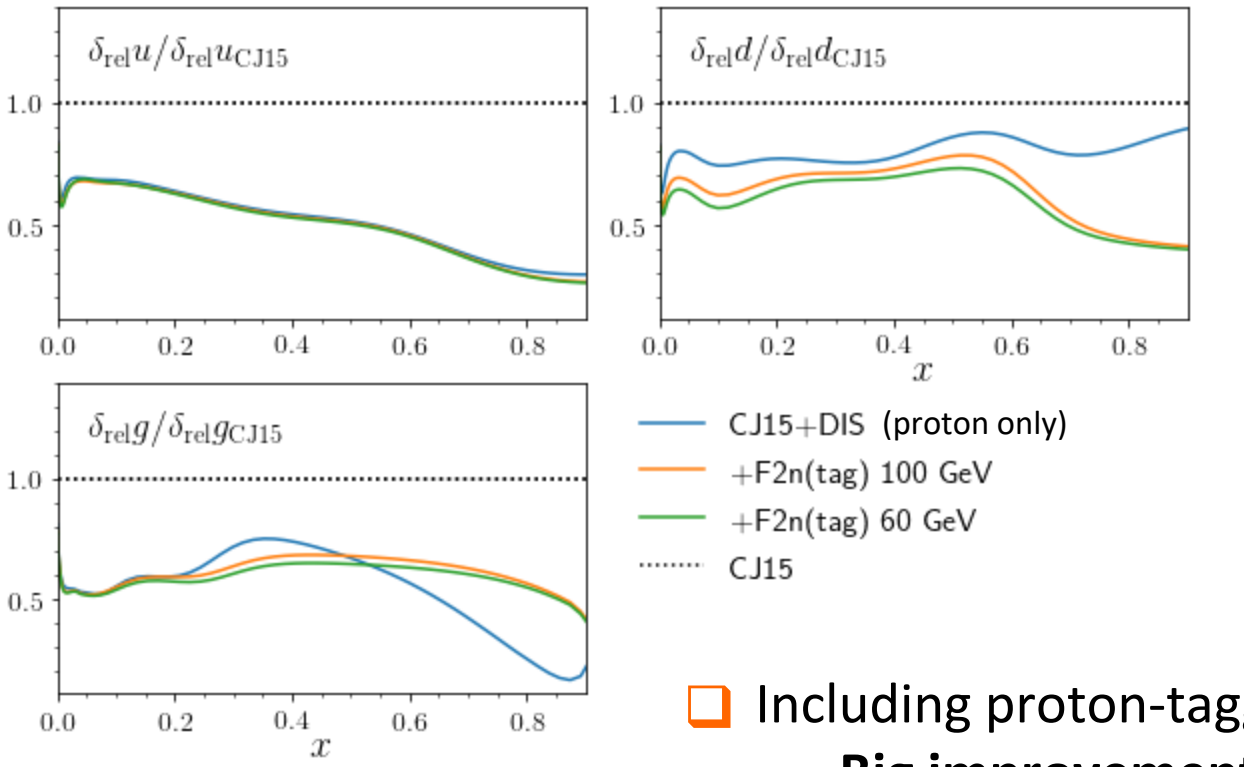
CC: compare to Temple's projections



Note: Proton target only

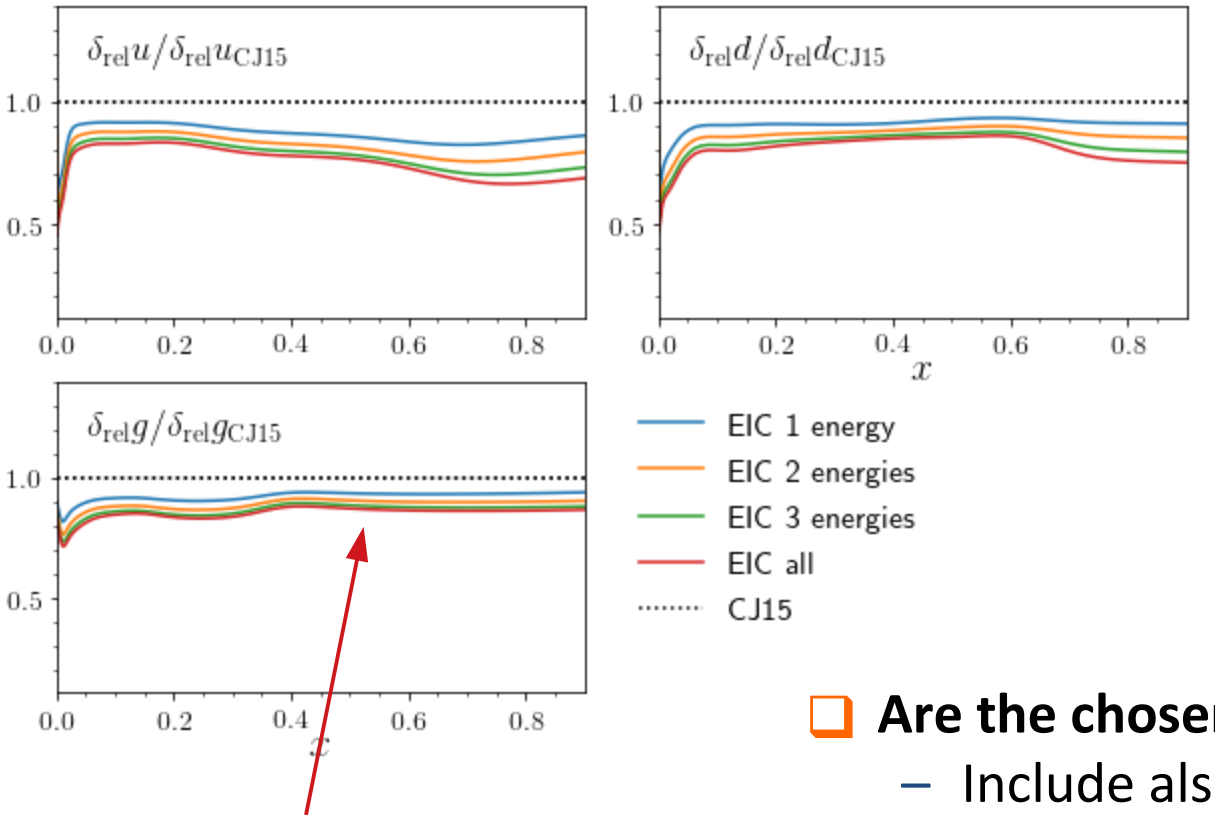
- Much better *d*-quark separation if:
  - **Including positrons (100/fb)**, or
  - **Low CC systematics** (1% everywhere)
- It may be worthwhile pushing the detector envelope

Neutron tagging (Temple projections)



- Including proton-tagged F2n:
  - **Big improvement on *d* quark**
- **Need to interface with SIDIS group**
  - **Ask for projections**
  - CJ ready to fit F2n(tag)

Energy scan



Small impact on gluons

- **Are the chosen √s too far apart?**
  - Include also a few intermediate values to improve the "L/T" scan ?
- Or should we **optimize the binning**
  - For example, ***y* and *x*** instead of x, Q^2 ?

Interim conclusions and thoughts

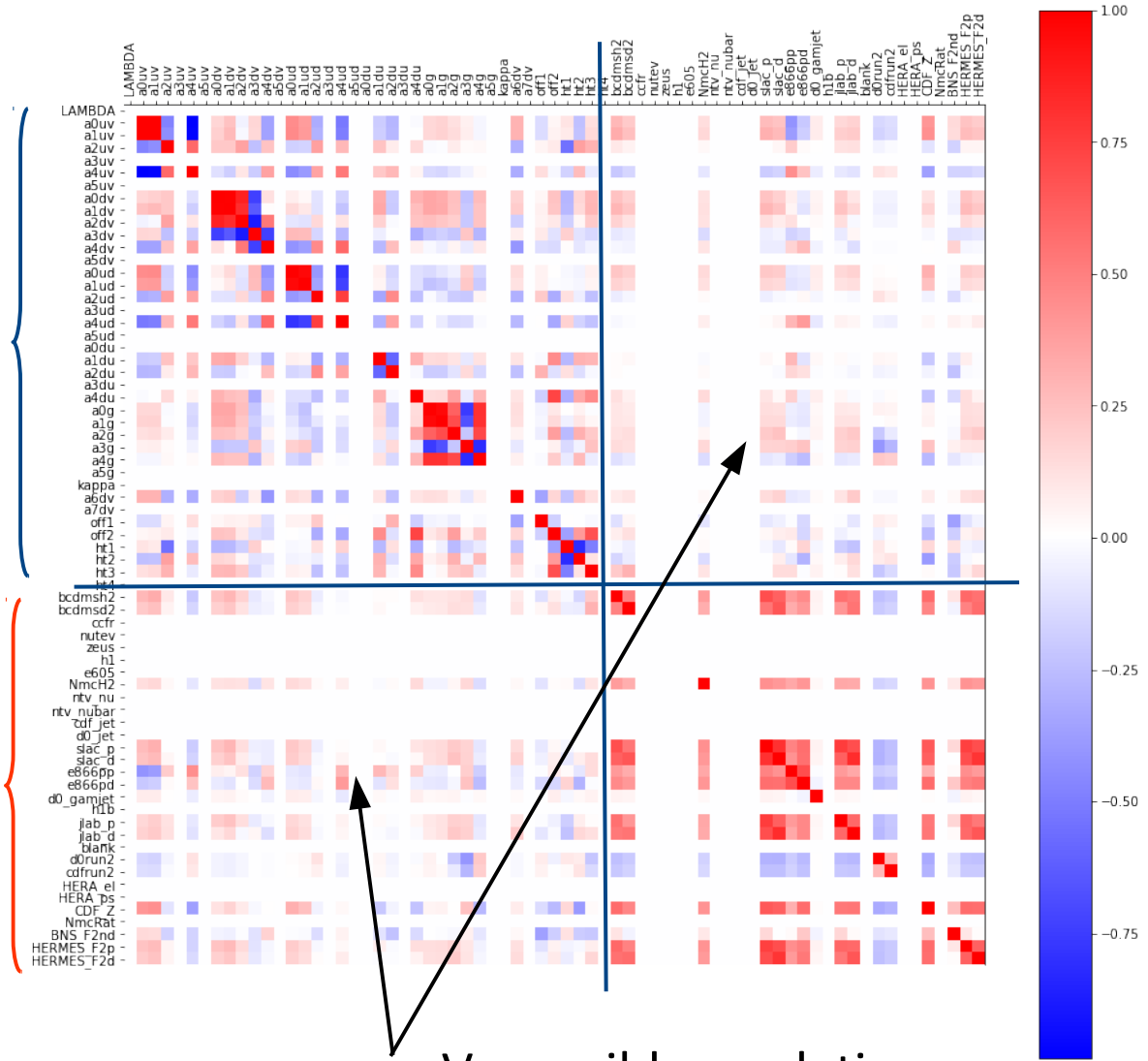
- Smaller impact on PDFs than in previous projections
  - b/c less bins in xB, larger uncorr syst
  - **Substantial gains in gluons require "Super" scenario**
    - or, possibly, higher xB resolution → more xB bins
- **CC(e–) irrelevant for d-quark separation**
  - Unless super-low syst can be reached...
    - Can we push the detector envelope?
  - ...or we also use e+
    - Need positron projections
  - Alternative: Proton tagging in NC F2(D)
    - Need to ask SIDIS group for projections (CJ is ready to fit these)
- **Is the energy scan optimized for gluon fitting?**
  - More √s choices, or *(x,y)* binning ??
- **Future**: s-quarks with APV
    - Where can we find APV projection tables?

BACKUP

Overall normalizations and PDF uncertainties

PDF params.

Experimental norm. factors



Very mild correlation

Overall normalizations and PDF uncertainties

PDF params.

Experimental norm. factors