

RivetHZTool – making HERA analyses available

RivetHZTool

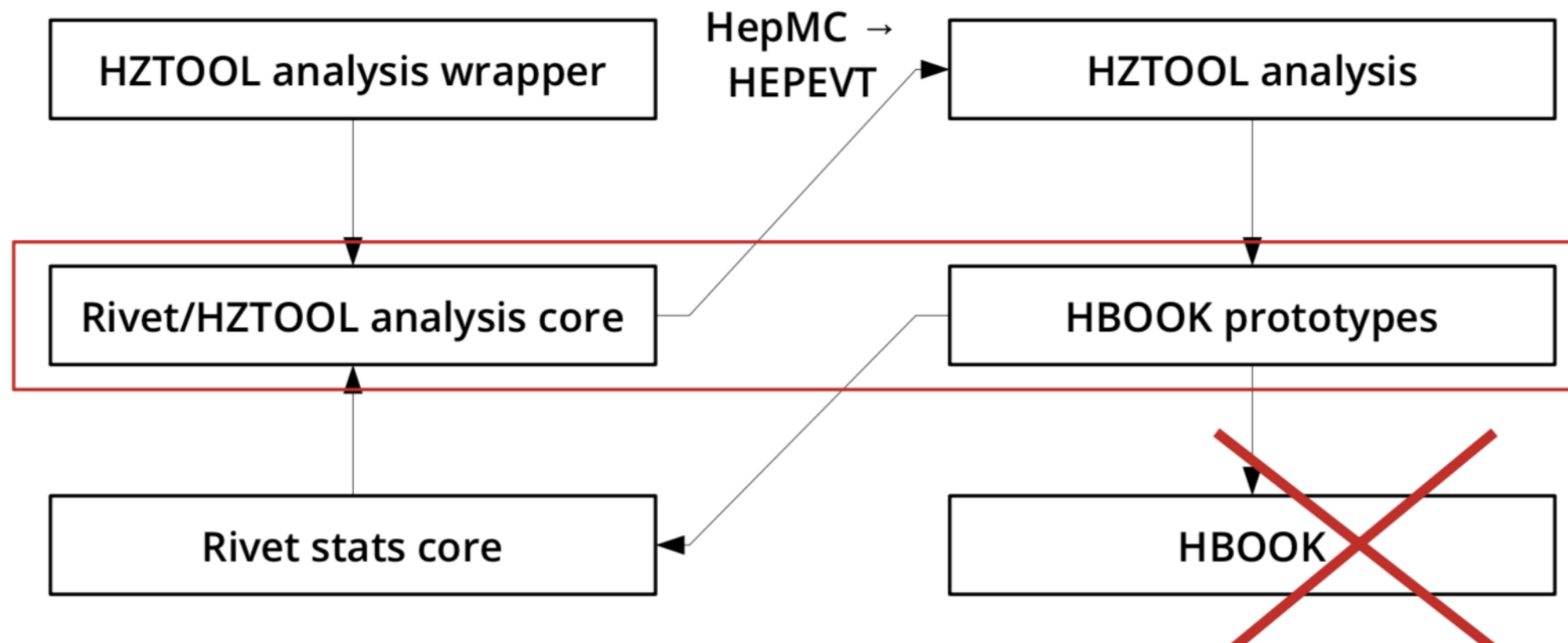
from S. Plaetzer, RivetHZToo, Rivet workshop Feb 2010!

Introduction & Overview



Make as many analyses available at the least workload.
Wrap HZTOOL into Rivet to use existing workflows as easy as possible.
Generator-unspecific, i.e. operational, definitions for new generators.

Look & feel as before: **rivet -a HZ01064 ...**



RivetHZTool

- Until end of HERA running, HERA analyses were mainly coded in HZTool frame
 - a FORTRAN based frame to allow easy Data – MC comparisons
 - > 80 HERA analyses implemented (and validated) in HZTOOL
 - HZTool made use of generator dependent infos
 -
- RivetHZTool:
 - attempt to wrap HZTool routines in Rivet frame
 - using histogramming from Rivet (Yoda)
 - using Rivet based DIS finder
 - no access to use generator dependent infos
- full HZTool and Rivet functionality available

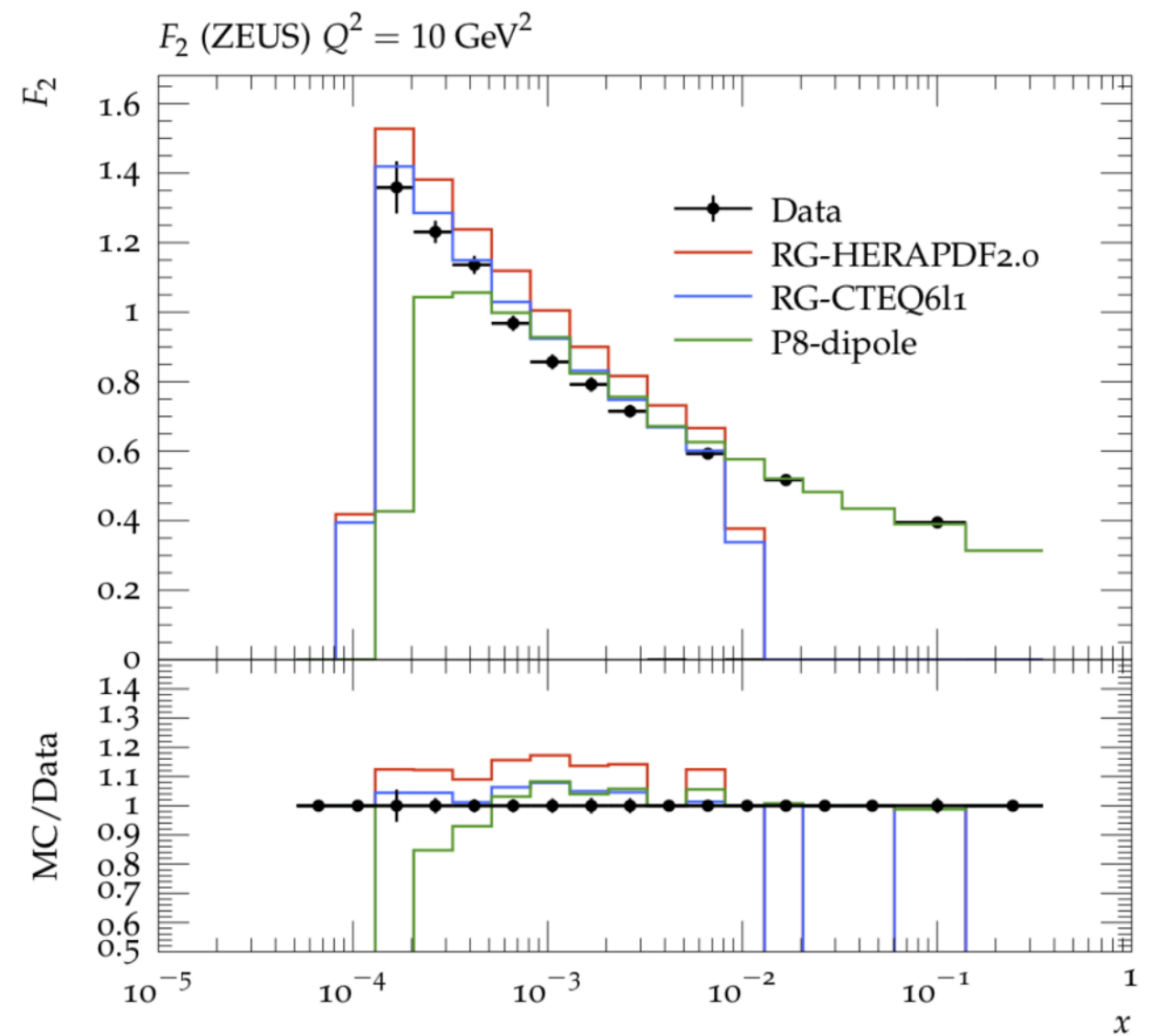
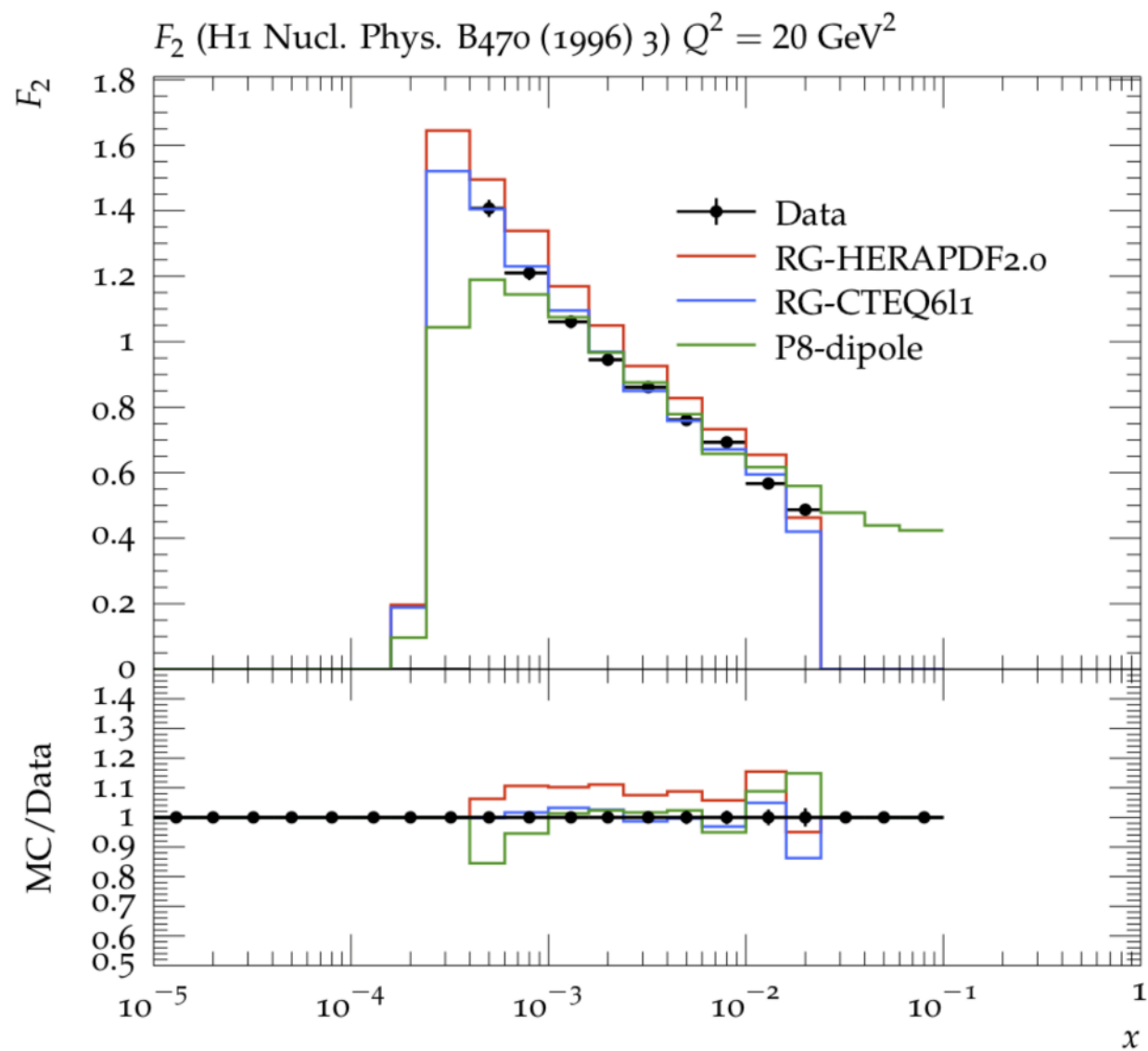
HZTool	Title	DIS	Energies	technical status	validation
HZH0408149	Inclusive Production of D+, D0, D+s and D*+ Mesons in Deep Inelastic Scattering at HERA (H1)	yes		ok	strange arrangement of data histos: does not fit MC histos
HZ97179	Low Q2 jet production at HERA and virtual photon structure (H1)	yes		ok	ok, too many auxillary histos
HZ95036	First measurement of the deep inelastic structure of proton diffraction (H1)	yes		ok	ok, but uncorrected data
HZh0701023	Production of D*+- Mesons with Dijets in Deep-Inelastic Scattering at HERA (H1)	yes		ok	ok
HZh0508055	Forward Jet Production in Deep Inelastic Scattering at HERA (H1)	yes		ok	ok
HZ98205	Measurement of dijet cross-sections at low Q2 and the extraction of an effective parton density for the virtual photon (H1)	yes		ok	ok
HZ98143	Forward jet and particle production at HERA (H1)	yes		ok	ok
HZ98121	ZEUS results on the measurement and phenomenology of F2 at low x and low Q2	yes		ok	ok
HZ97183	Observation of scaling violations in scaled momentum distributions at HERA (ZEUS)	yes		ok	ok
HZ96076	Measurement of the F2 structure function in deep inelastic e+ p scattering using 1994 data from the ZEUS detector at HERA	yes		ok	ok
HZ96039	A Measurement and QCD Analysis of the Proton Structure Function F2(x,Q2) at HERA (H1)	yes		ok	ok
HZ07062	Multijet production at low x(Bj) in deep inelastic scattering at HERA (ZEUS)	yes		ok	ok
HZ02079	Measurement of Inclusive Jet Cross-Sections in deep-inelastic e p scattering at HERA (H1)	yes		ok	ok
HZ01100	Measurement of D*+- Meson Production and F2c in deep inelastic scattering at HERA (H1)	yes		ok	ok
HZ01064	Measurement of the neutral current cross section and F2 structure function for deep inelastic e+ p scattering at HERA (ZEUS)	yes		ok	ok
HZ00181	Deep-inelastic inclusive e p scattering at low x and a determination of alpha'(s) (H1)	yes		ok	ok
HZh0512014	Measurement of Event Shape Variables in Deep-Inelastic Scattering at HERA (H1)			ok	ok
HZ98087	Multi-jet event rates in deep inelastic scattering and determination of the strong coupling constant (H1)			ok	ok

HZ98076	Di-jet event rates in deep-inelastic scattering at HERA (H1)			ok	ok
HZ98050	Forward jet production in deep inelastic scattering at HERA (ZEUS)			ok	ok
HZ97108	Evolution of e p fragmentation and multiplicity distributions in the Breit frame (H1)			ok	ok
HZ97098	Measurement of event shape variables in deep inelastic e p scattering (H1)			ok	ok
HZ96215	Measurement of charged particle transverse momentum spectra in deep inelastic scattering (H1)			ok	ok
HZ96122	Strangeness production in deep-inelastic positron proton scattering at HERA (H1)			ok	ok
HZ95108	Transverse energy and forward jet production in the low x regime at HERA (H1)			ok	ok
HZ95084	Neutral strange particle production in deep inelastic scattering at HERA (ZEUS)			ok	ok
HZ94033	Energy flow and charged particle spectrum in deep inelastic scattering at HERA (H1)			ok	ok
HZ00040	Measurement of azimuthal asymmetries in deep inelastic scattering (ZEUS)			ok	ok
HZ00017	The Q2 Dependence of Dijet Cross Sections in gamma p Interactions at HERA (ZEUS)			ok	ok
HZ98169	Measurement of leading proton and neutron production in deep inelastic scattering at HERA (H1)			ok	nothing filled
HZ96138	Inclusive D0 and D*+- production in neutral current deep inelastic e p scattering at HERA (H1)			HREBIN, hpaken	no histos written
HZh0401010	Measurement of Dijet Production at Low Q2 at HERA (H1)	yes		ok	no entries
HZh0307071	The Virtual photon structure at HERA	yes		ok	no data points, no entries
HZH0108047	D* Meson Production in Deep Inelastic Diffractive Interactions at HERA (H1)	yes			kpisflag missing
HZ95219	Incl. jet cross-section in Et and , and the transverse energy density outside of jets in p events (H1)	no		generator specific infos	intflag +1000
HZ00174	Diffractive Jet Production in Deep-Inelastic e+p Collisions at HERA (H1)	yes		ok	data histo do not match MC histo
HZ96160	Charged particle multiplicities in deep inelastic scattering at HERA (H1)			ok	data histo do not match MC histo

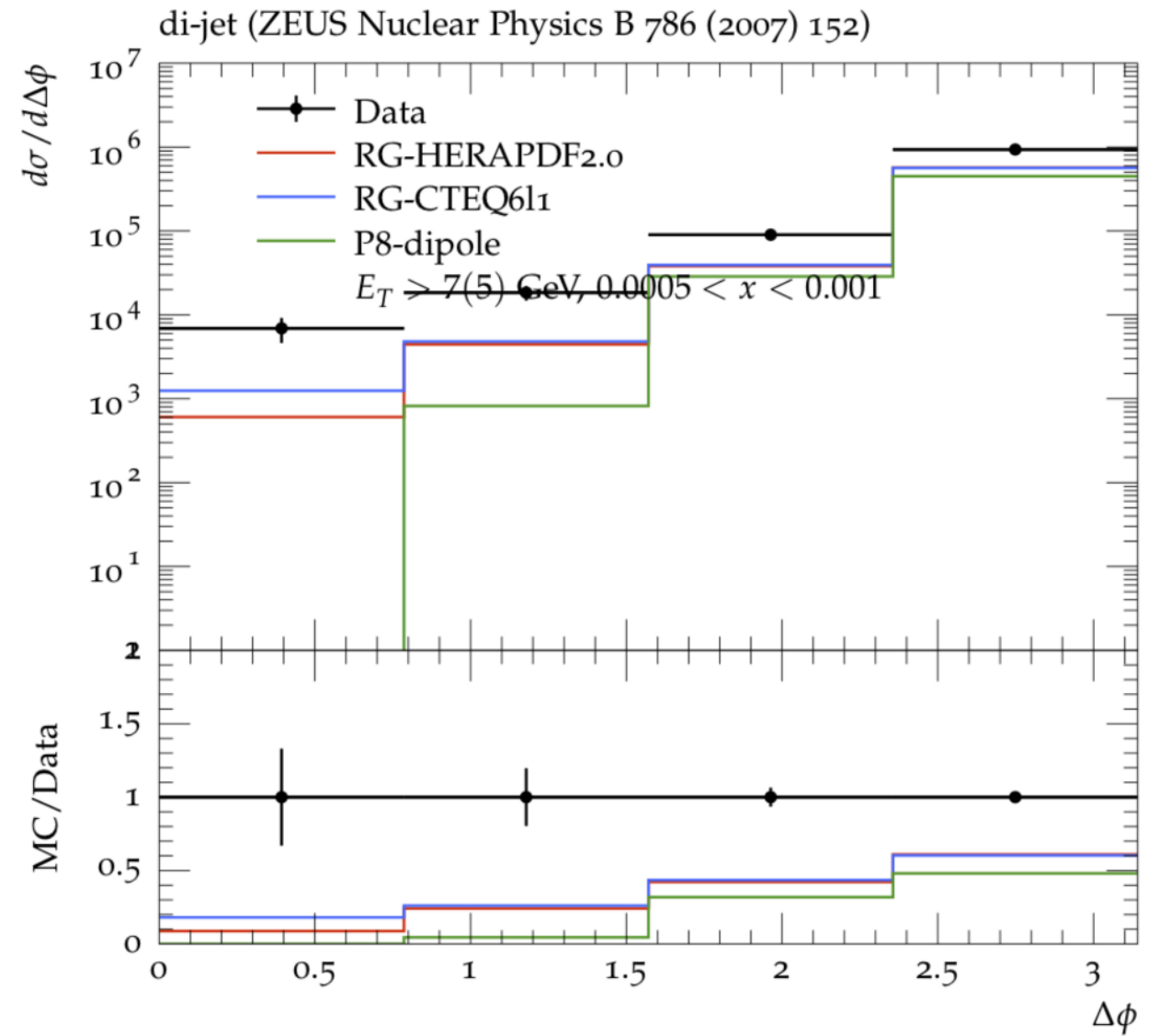
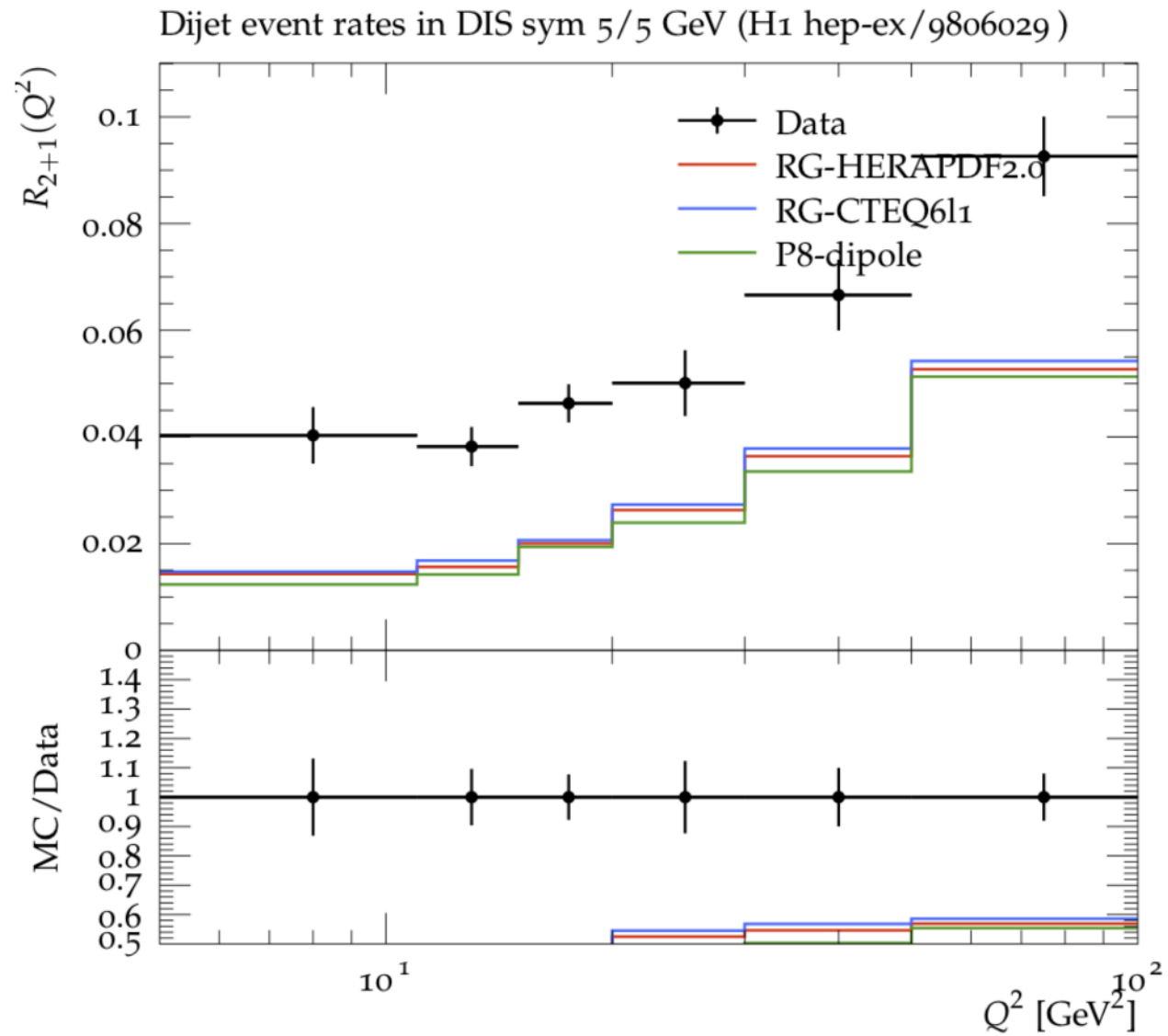
Benchmark comparisons

- Use RAPGAP for DIS processes, as it was used in many HERA analyses
 - predictions for different observables
 - collinear pdfs: HERAPDF2.0 LO and CTEQ6L1
- Compare with PYTHIA82
 - `SpaceShower:dipoleRecoil = on`
 - collinear pdfs: HERAPDF2.0 LO

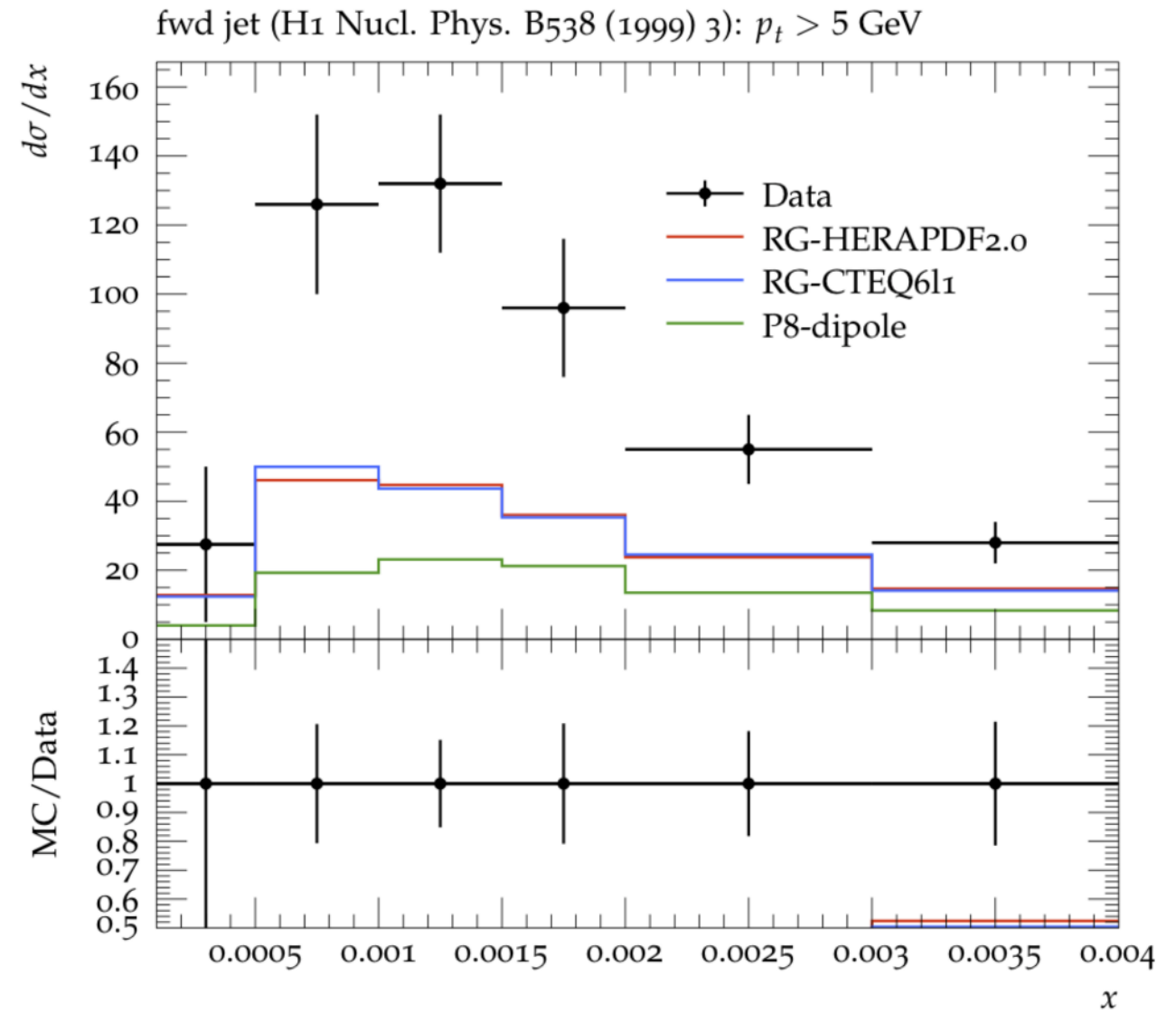
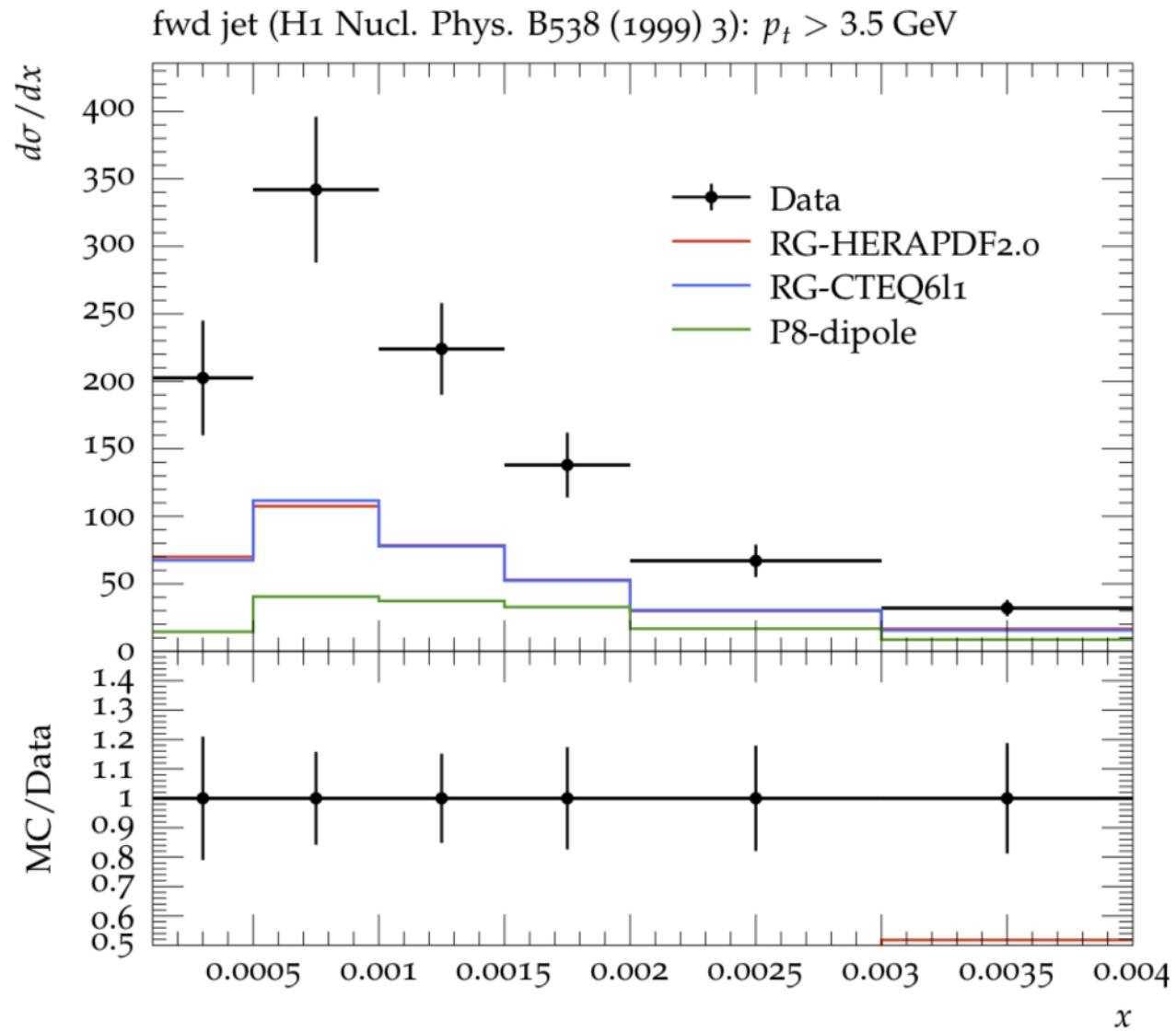
Inclusive DIS x-section: $F_2(x, Q^2)$



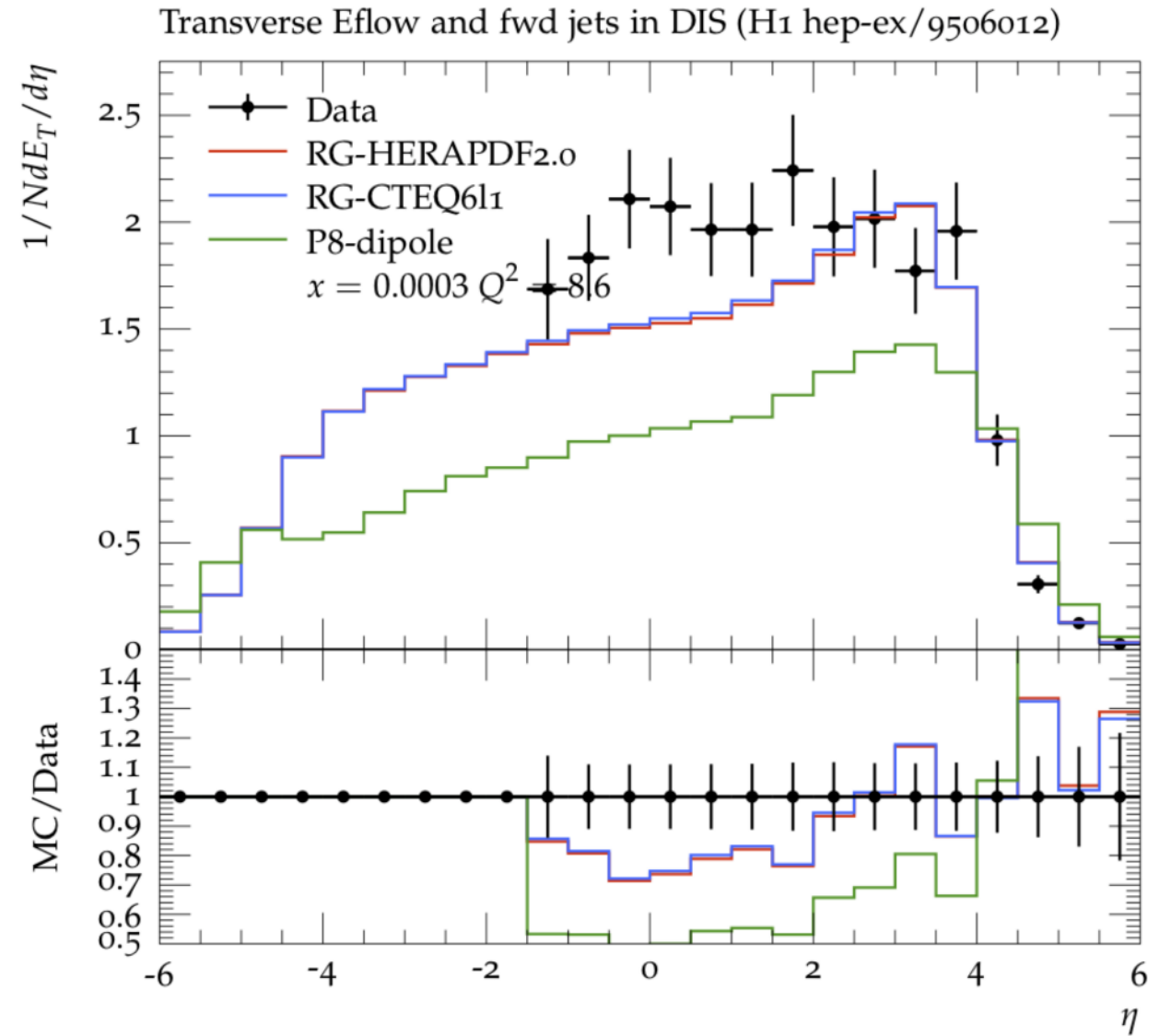
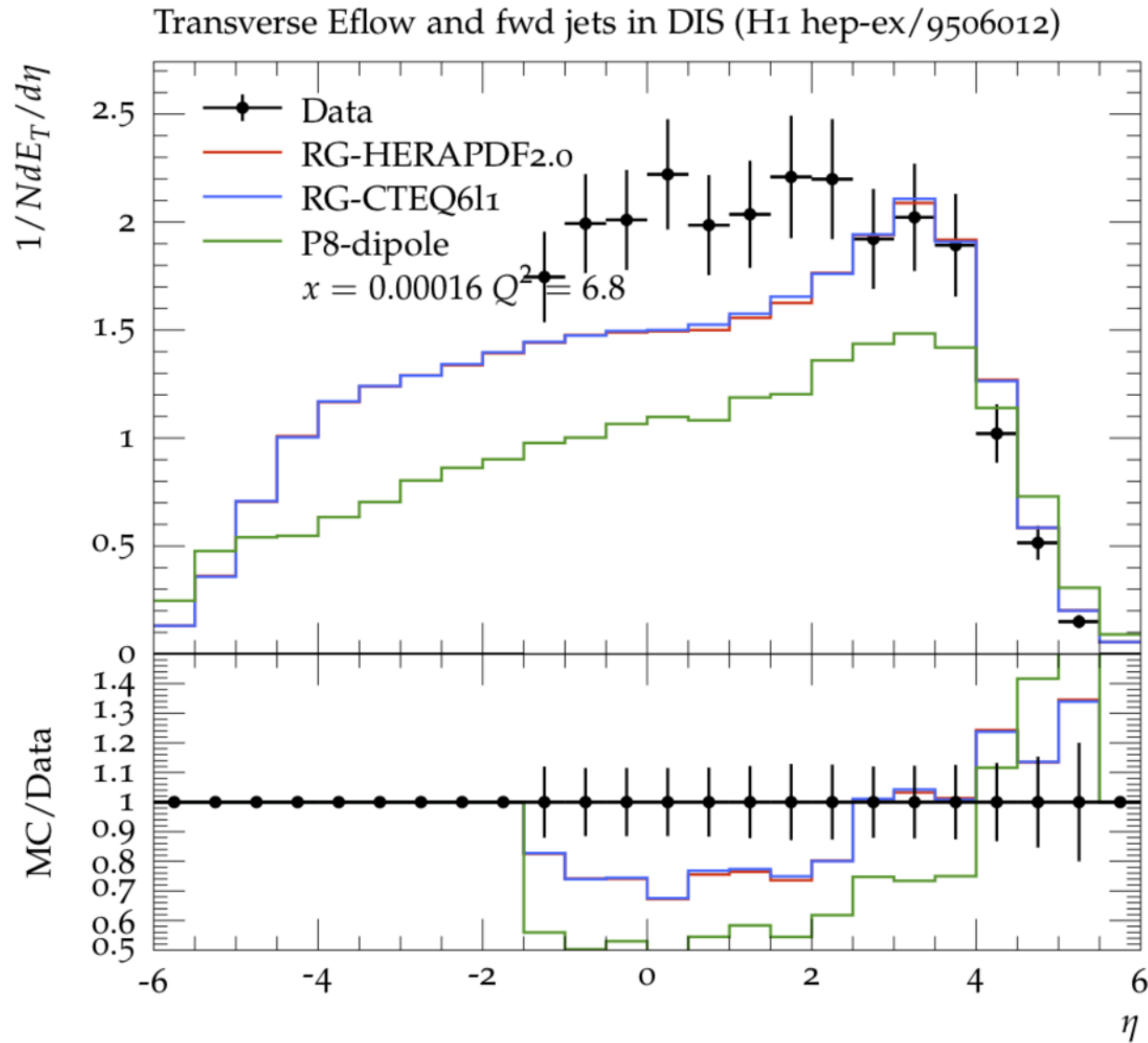
Dijets in DIS



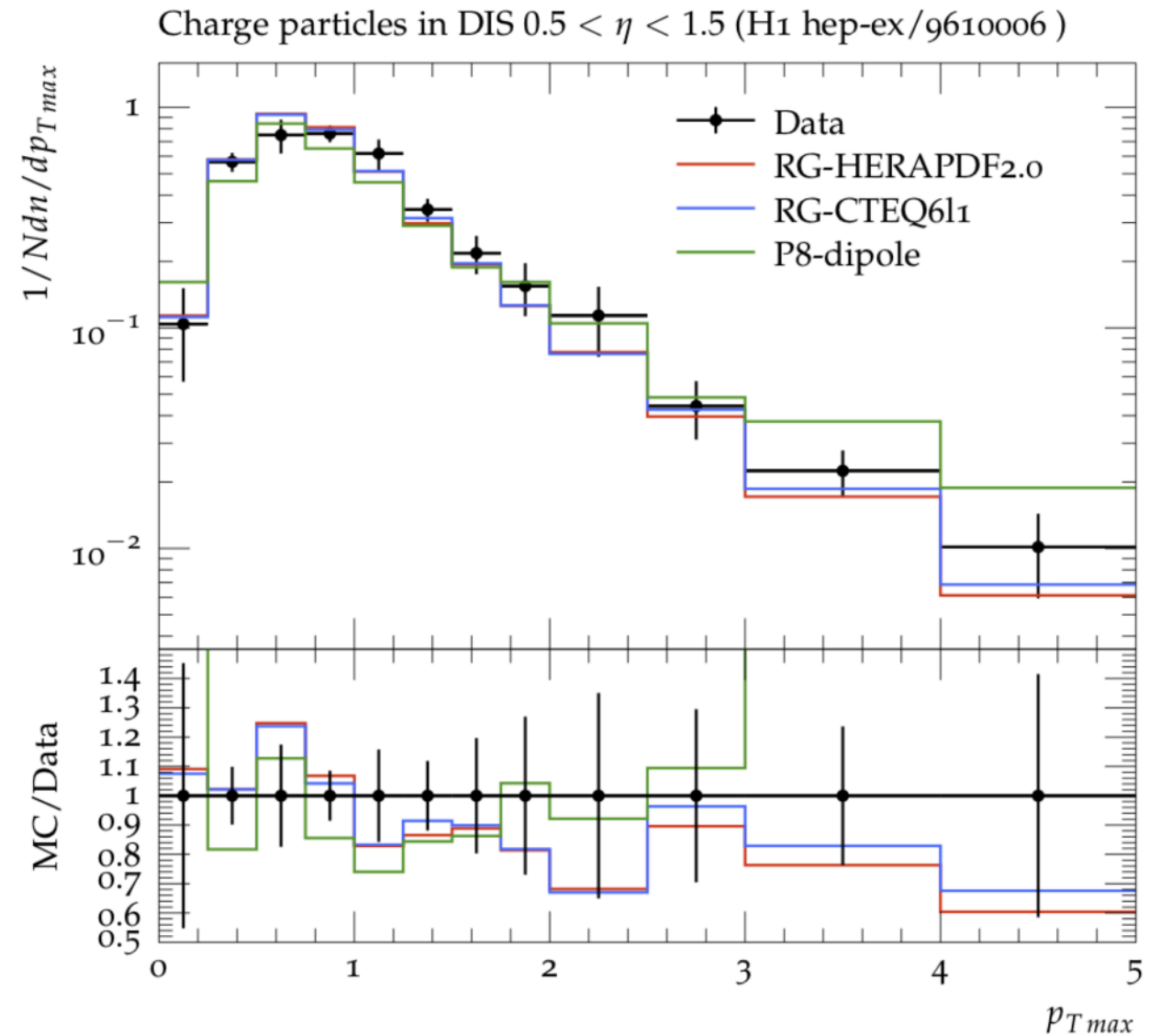
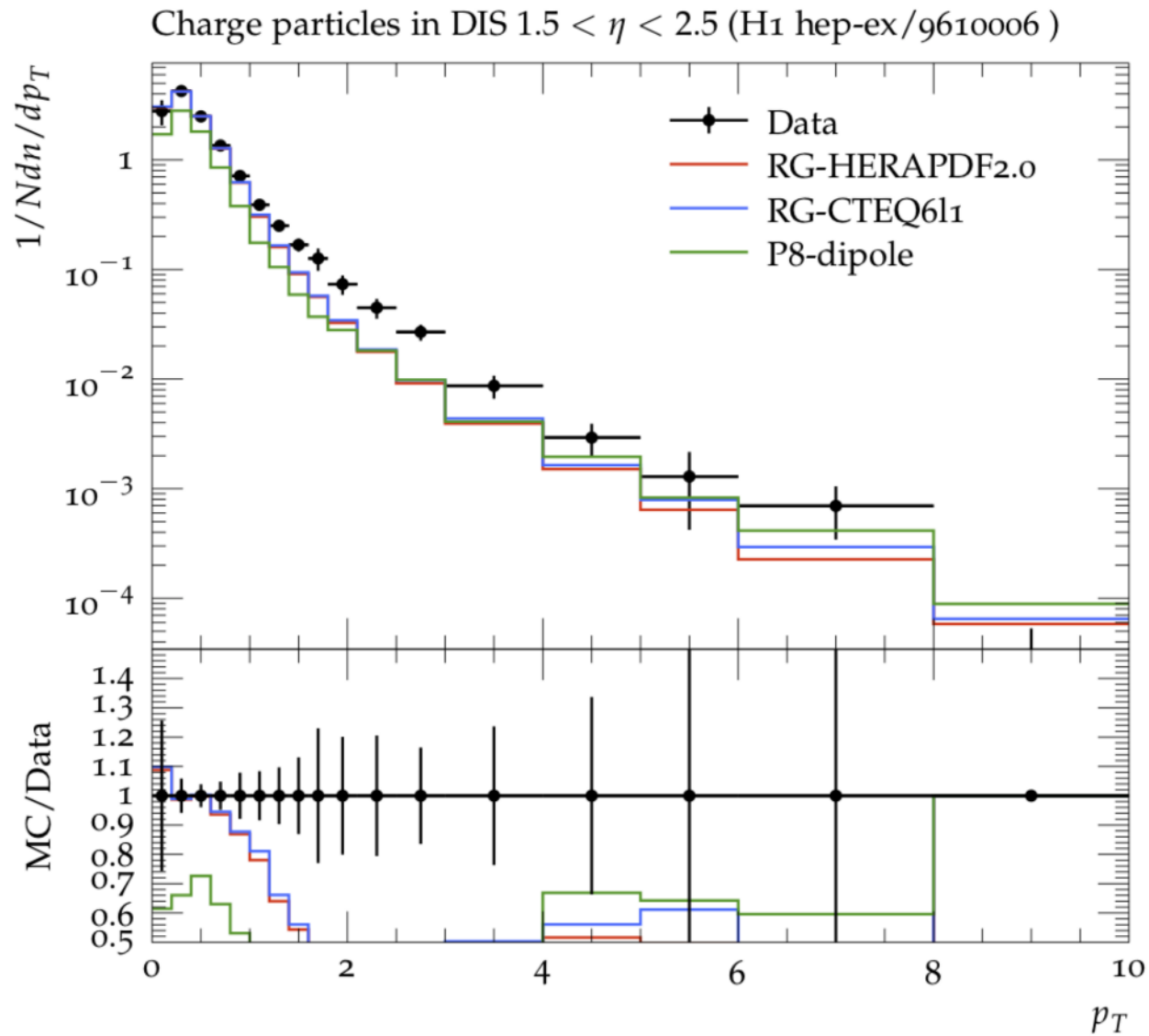
Forward Jets in DIS



Transverse energy flow

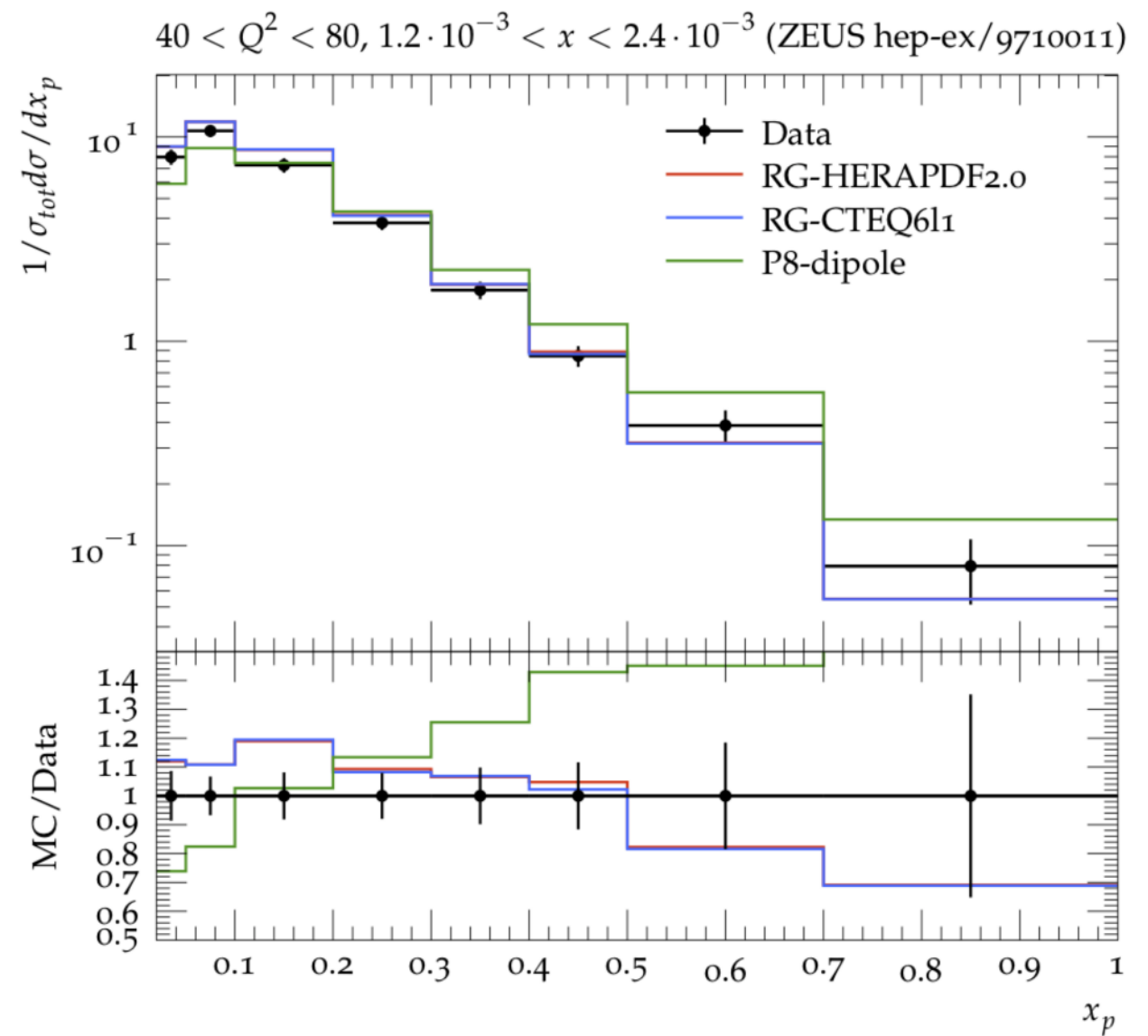
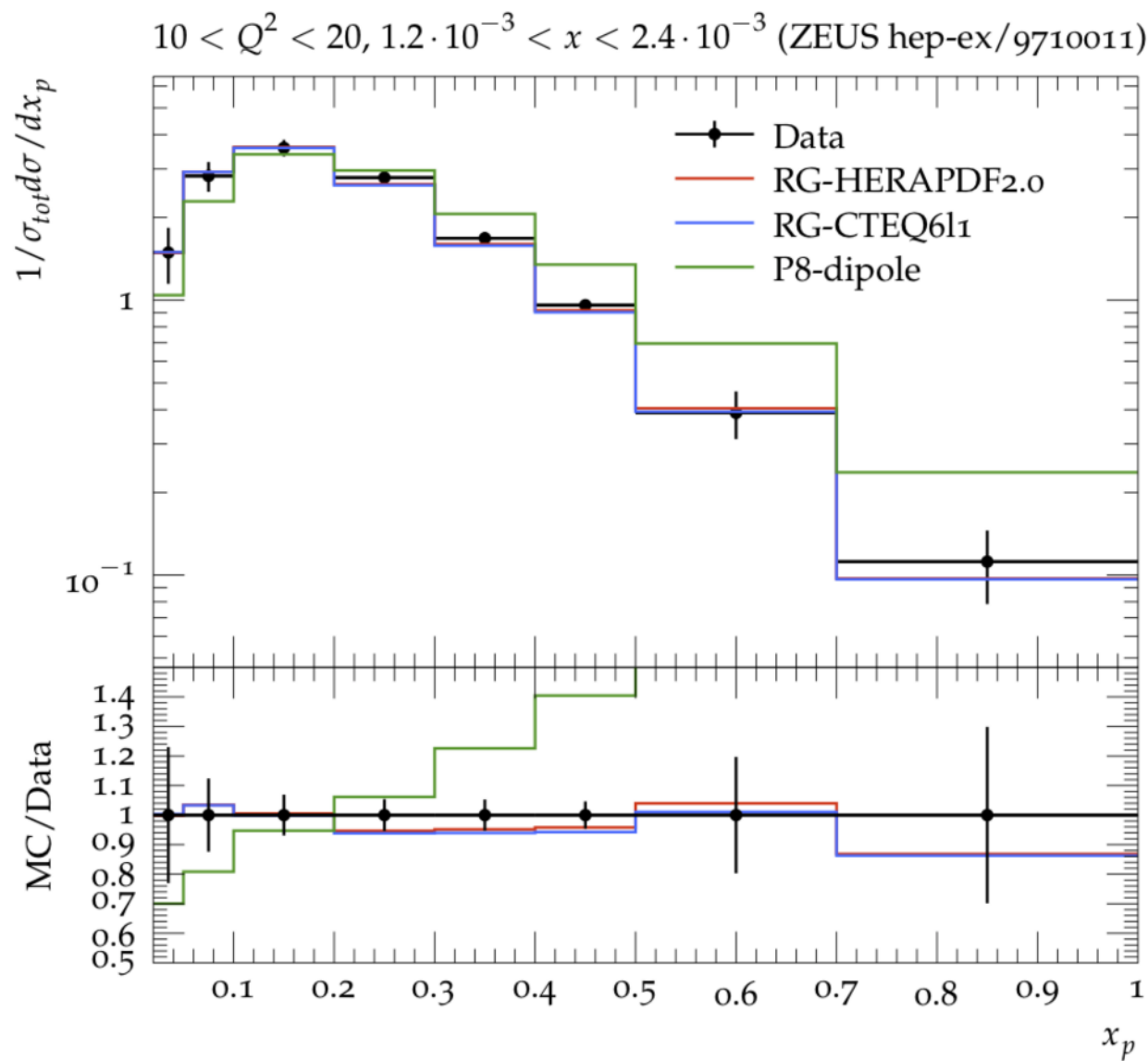


Charged particle spectra in DIS

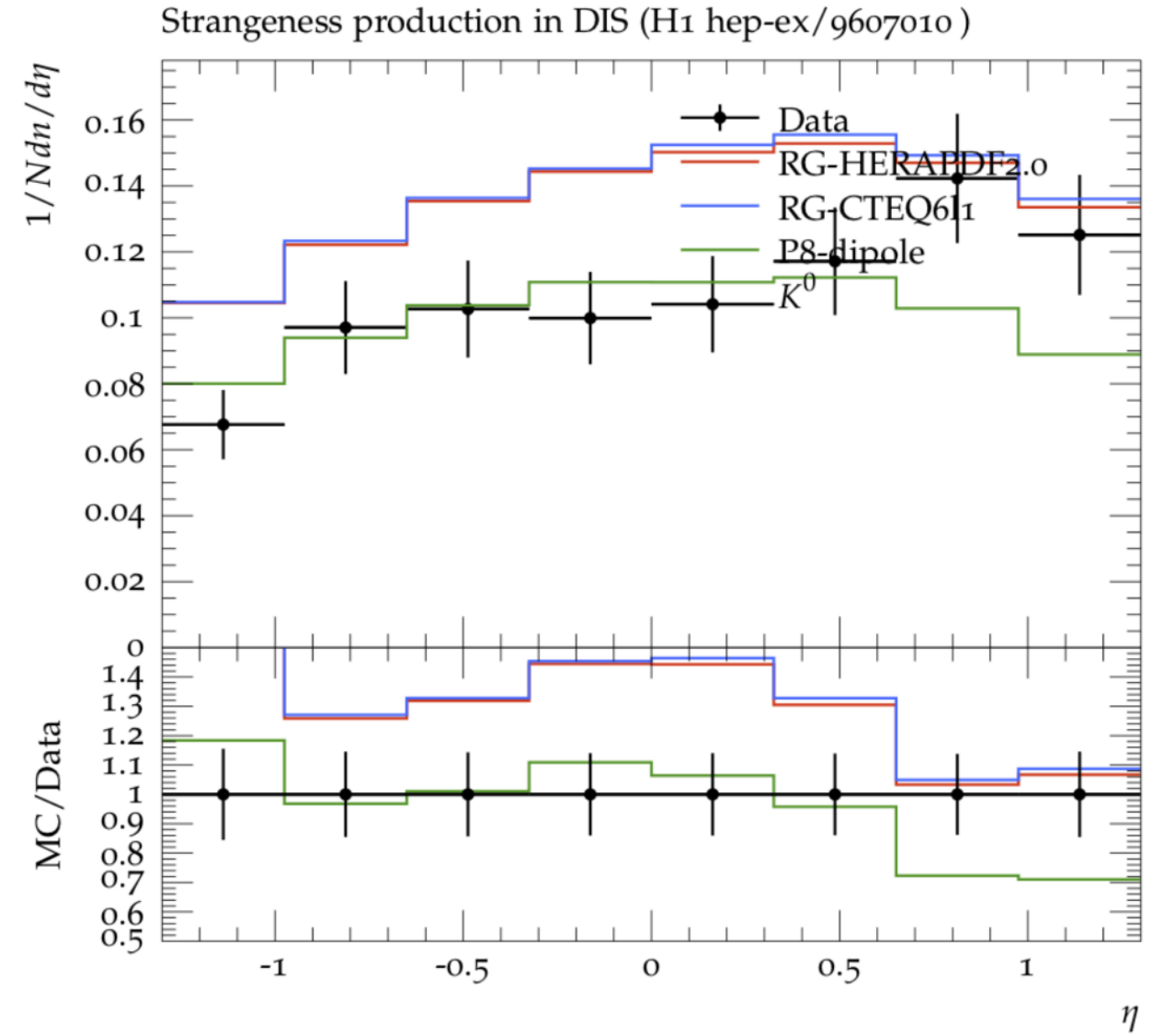
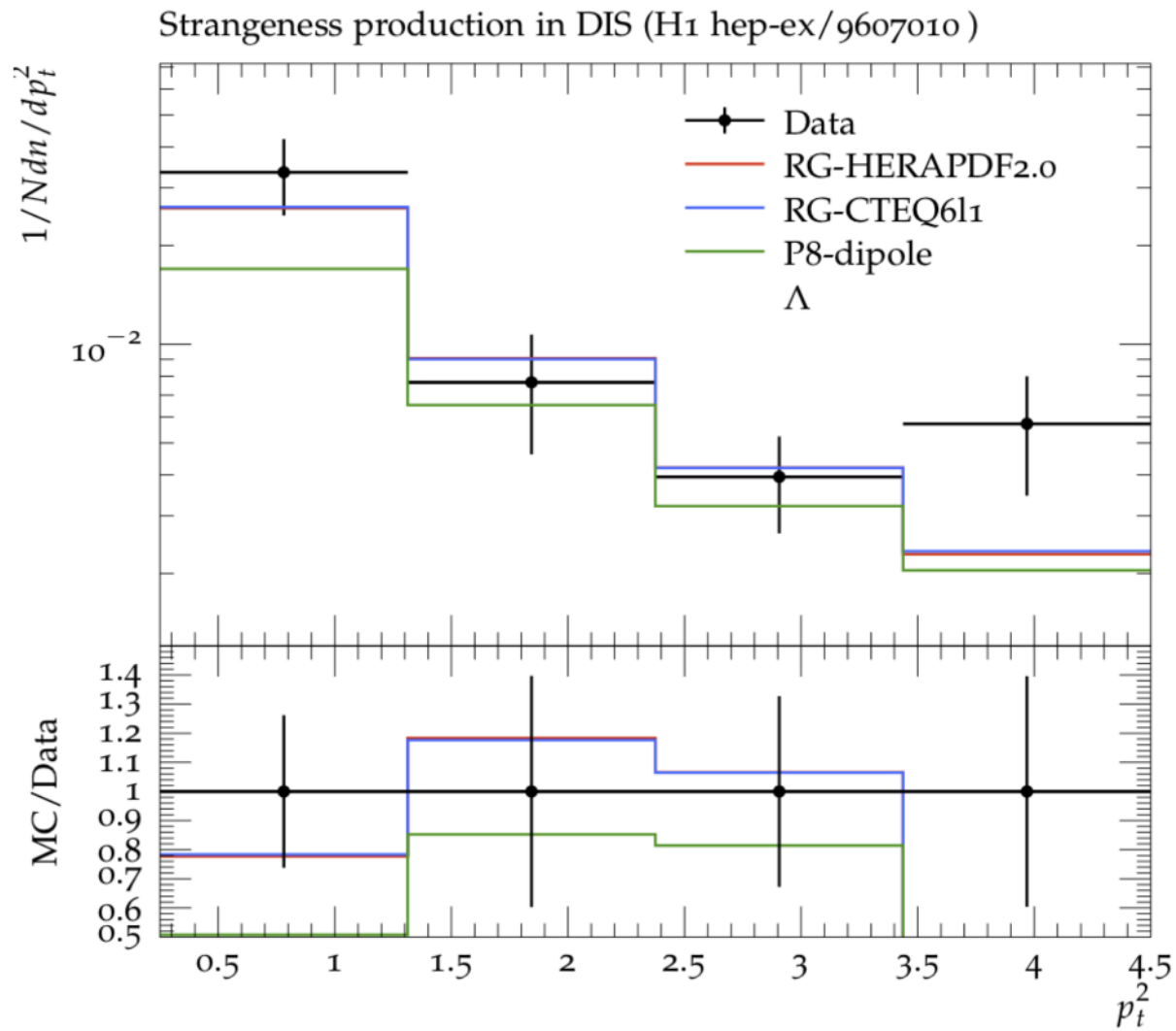


Scaling Violations in charged particle spectra

$$x_p = \frac{2p_T^{Breit}}{Q}$$



Strangeness



Conclusion

- RivetHZTool is now ready for use
 - most of the DIS plugins are ready and validated
 - using as much as possible Rivet tools
 - runs with $>$ Rivet 2.7.X
- differences between generators can be studied (and understood)
- use for benchmarking and tuning