

Inclusive vector boson production

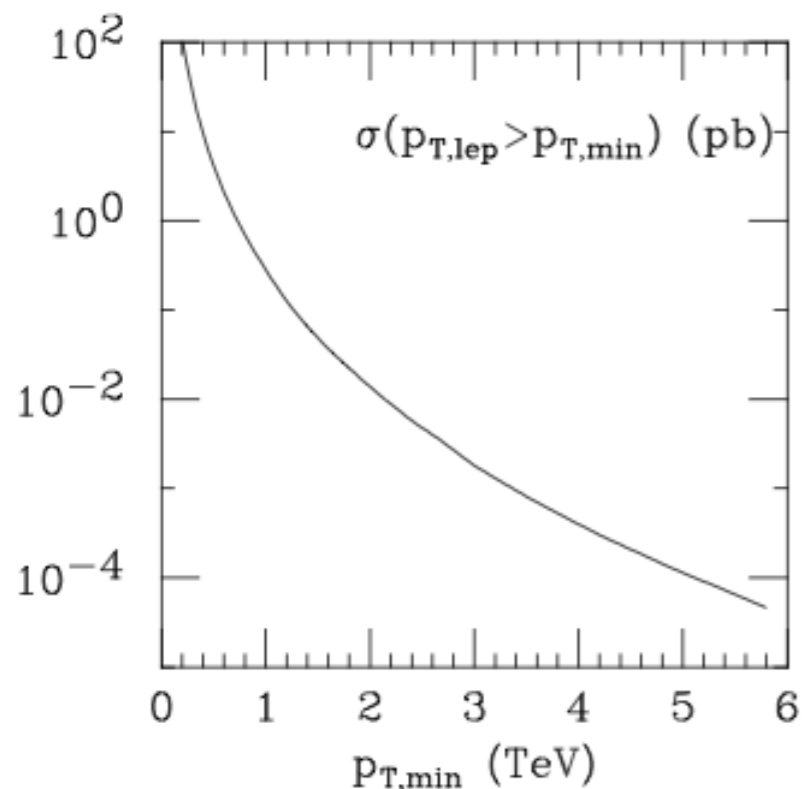
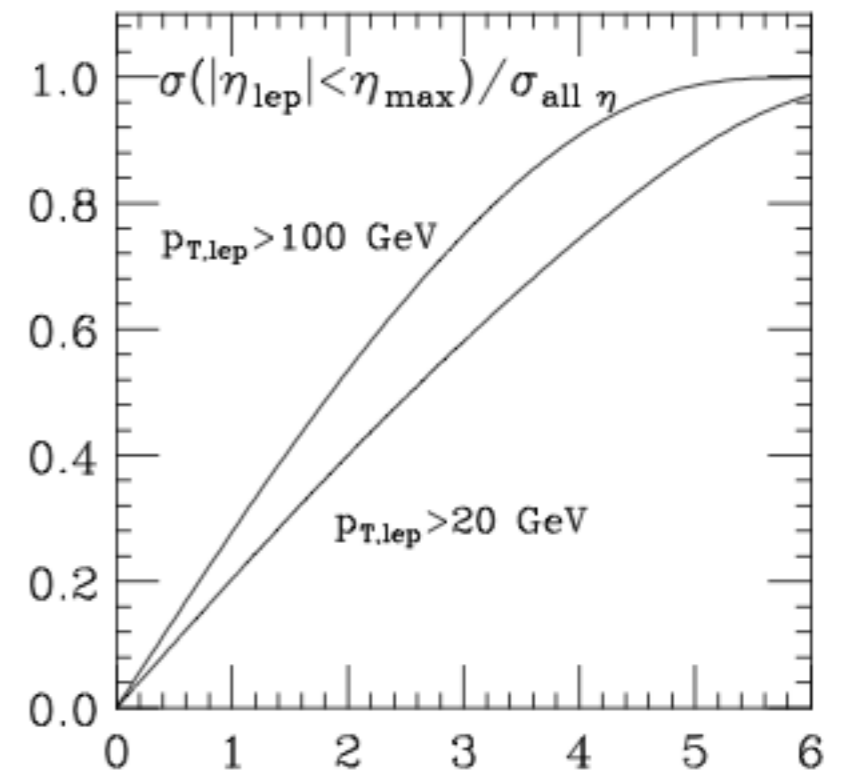
$\sigma(W^\pm) \sim 1.3 \mu\text{b}$, $\sigma(Z^0) \sim 0.4 \mu\text{b} \Rightarrow O(10^{12}, 10^{11})$ (e, μ) decays in 10 ab^{-1}

- Document:
 - rates vs lepton p_T , dilepton mass
 - acceptances vs p_T , eta
 - Impact of EW corrections at the highest energies

Ex: lepton acceptance in W production

More than 50% of the leptons with $p_T > 20 \text{ GeV}$ produced at $|\eta| > 2.5$ ($\sim 30\%$ at 14 TeV).

At $p_T > 100 \text{ GeV}$ about 40% at $|\eta| > 2.5$ ($\sim 10\%$ at 14 TeV)



Ex: lepton rate vs p_T in W (+jet) production

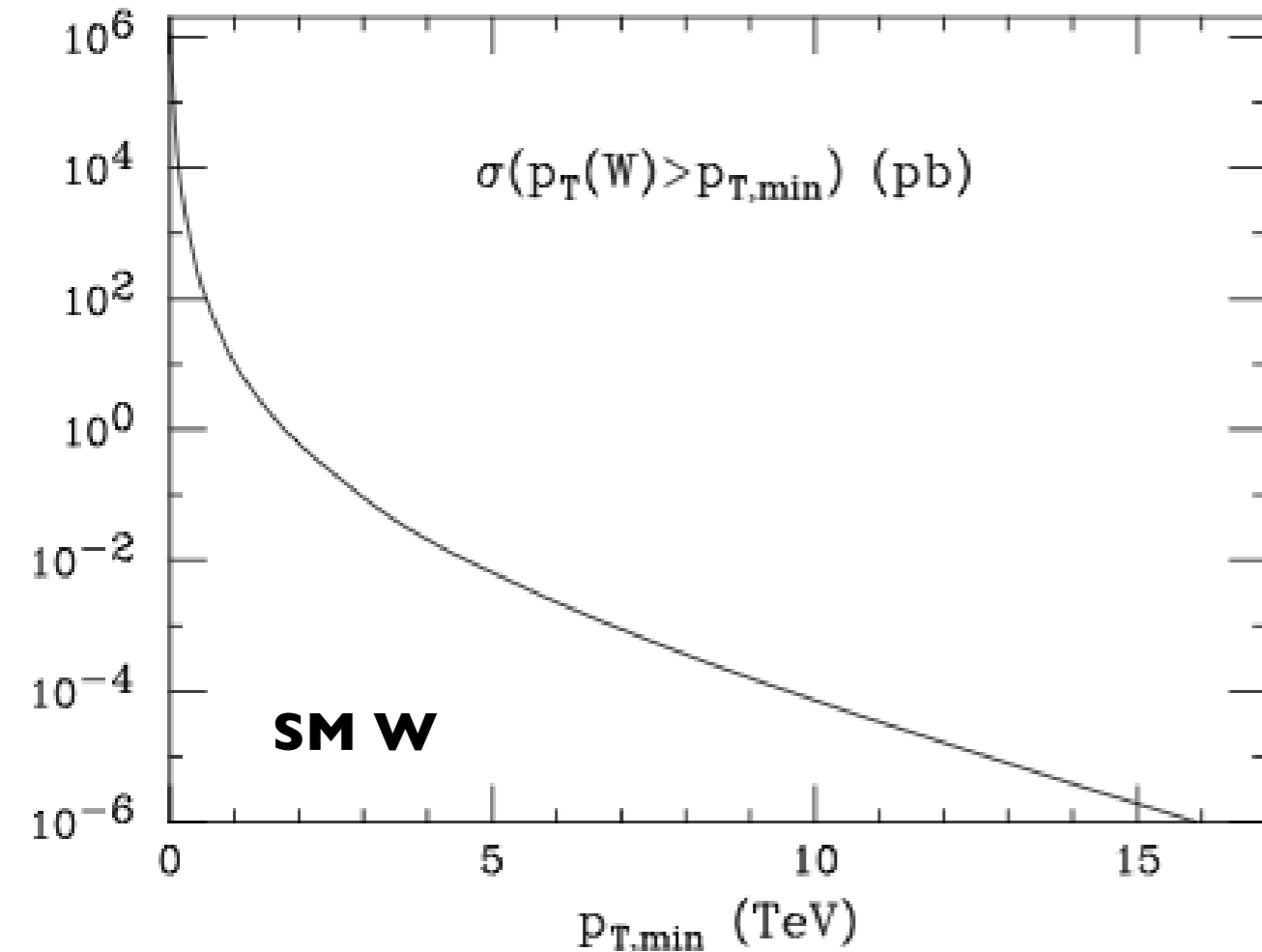
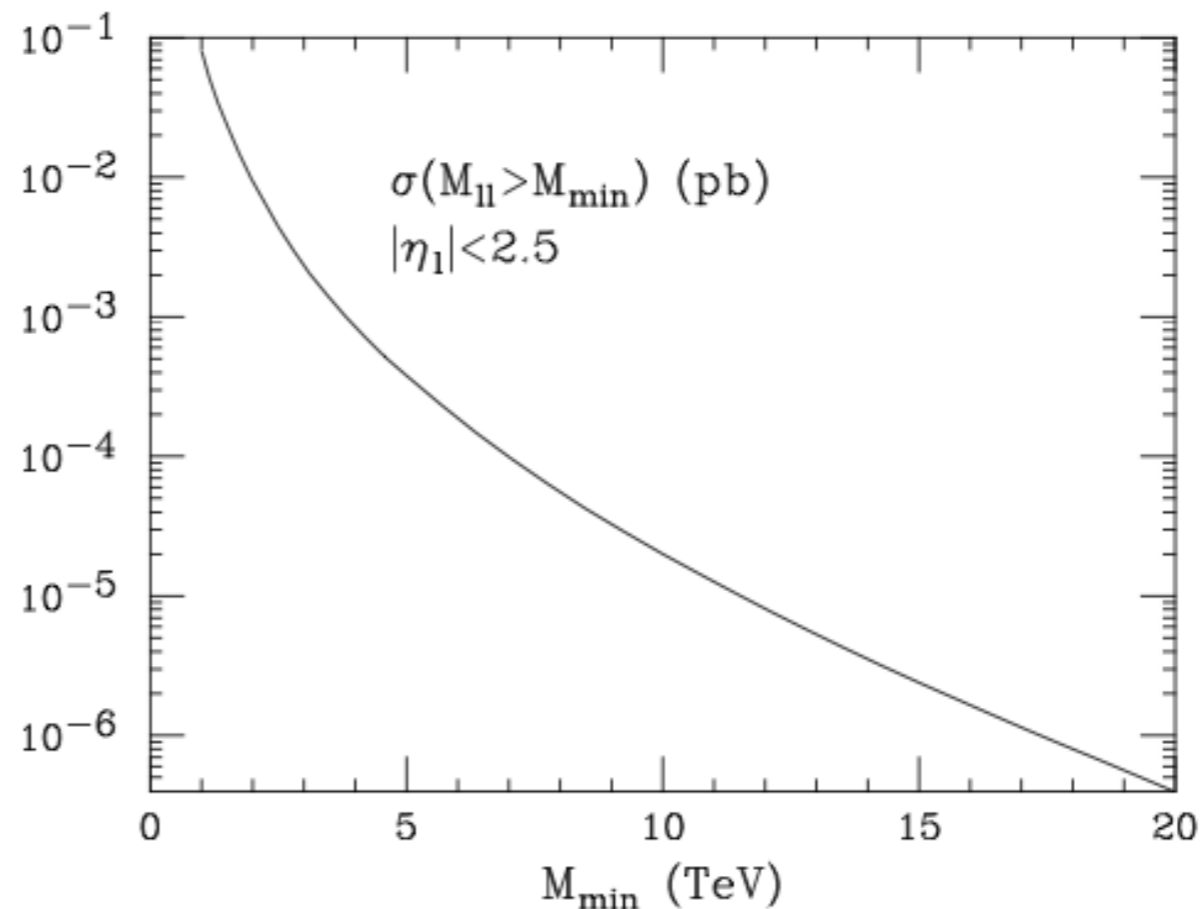
\Rightarrow dominated by large $p_T W$, interplay of large- $p_T W$ vs far off-shell W^* will determine MET rates

Ex: DY dilepton rate vs mass

With 10 ab^{-1} there will be events out to 20 TeV

\Rightarrow show LO vs NLO vs NNLO, w and w/out EW

virtual corrections. Keep separate weak from pure EM radiative effects



Ex: W's at large p_T

With 10 ab^{-1} there will be events out to $p_T(W) > 15 \text{ TeV}$

Show LO vs NLO vs NNLO, w and w/out EW virtual corrections. Keep separate weak from pure EM radiative effects

Inclusive vector boson production

- Applications:
 - impact of distributions like W charge asymmetry for PDF fits
 - high-mass DY and W production to probe running of EW coupling [Alves et al, arXiv:1410.6810](#)
 - rare/forbidden Z decays (e.g. $Z \rightarrow \mu \tau$) ?
 - Precision EW measurements:
 - A_{FB} and $\sin^2\theta_W$?
 - Don't expect to discuss M_W
 - Other interesting issues?
- Gauge boson pairs:
 - $VV, V\gamma$:
 - inclusive production
 - production at large $M_{VV, V\gamma}$
 - sensitivity to TGC's: probe SM EW radiative corrections to TGC's ?
 - complementarity of anomalous TGC's with Higgs studies
 - issues related to bg's for precision Higgs studies

Inclusive vector boson production

- Di-photons:
 - Cover both issues of relevance to the Higgs backgrounds (e.g. diphoton production in the Higgs-mass region, as a function of p_T , up to very large p_T), as well as diphoton production at large invariant masses, up to the multi-TeV kinematic limit. Anything known about EW corrections?
- Multiple gauge boson production:
 - higher-order (quartic, quintic, etc) couplings?
 - which interesting observables, distributions?

Proc	WWW	WWZ	WZZ	ZZZ
$\sigma(\text{fb})$	4.3×10^3	4.0×10^3	1.4×10^3	2.6×10^2

Proc	$WWWW$	$WWWZ$	$WWZZ$	$WZZZ$	$ZZZZ$
$\sigma(\text{fb})$	41	60	33	7.1	0.8

Vector bosons in the report

5	Inclusive vector boson production ⁵
5.1	High mass Z and W production
5.2	Diboson production (with discussion of anomalous couplings) .
5.3	Diphoton production
7	Vector bosons and jets ⁷
7.1	Inclusive rates
7.2	Scaling behaviour of V plus multi-jet production
7.3	Photons and multi-jet production
7.4	Diboson plus jet production
7.5	Production of gauge bosons at the highest energies
10	Vector boson and heavy flavours ¹¹
11	Production of multiple heavy objects ¹²
11.1	Production of multiple gauge bosons
14	Vector Boson fusion gauge boson production ¹³
14.1	Z and W production
14.2	ZZ and WW production
14.3	Same sign WW production
14.4	Anomalous couplings
15	Sources of missing transverse energy ¹⁴

we may decide to
reshuffle things/
reorganize sections
following discussion,
or once we see the
material available