

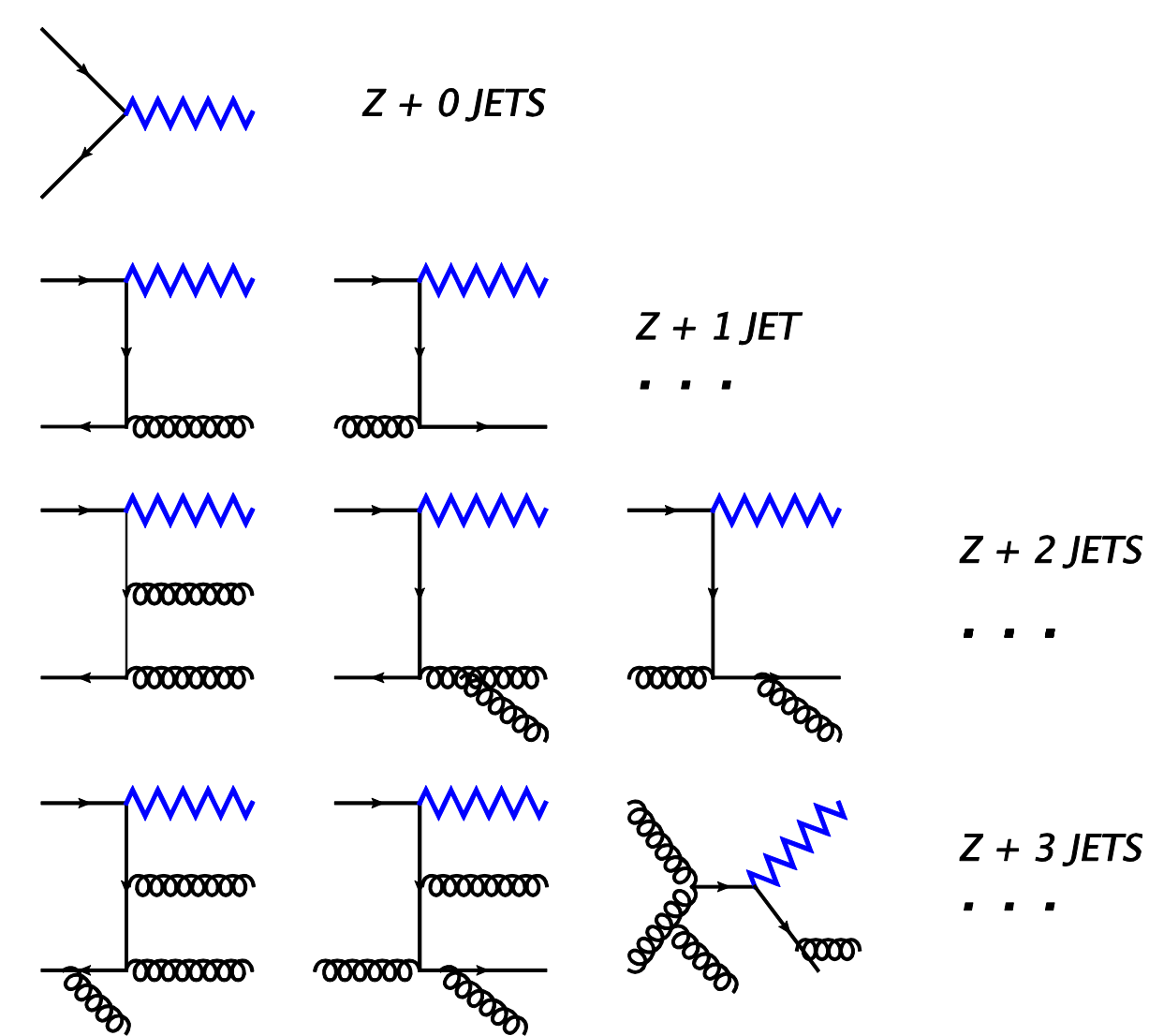


A Study of the Production of Vector Bosons and Jets at 7 TeV

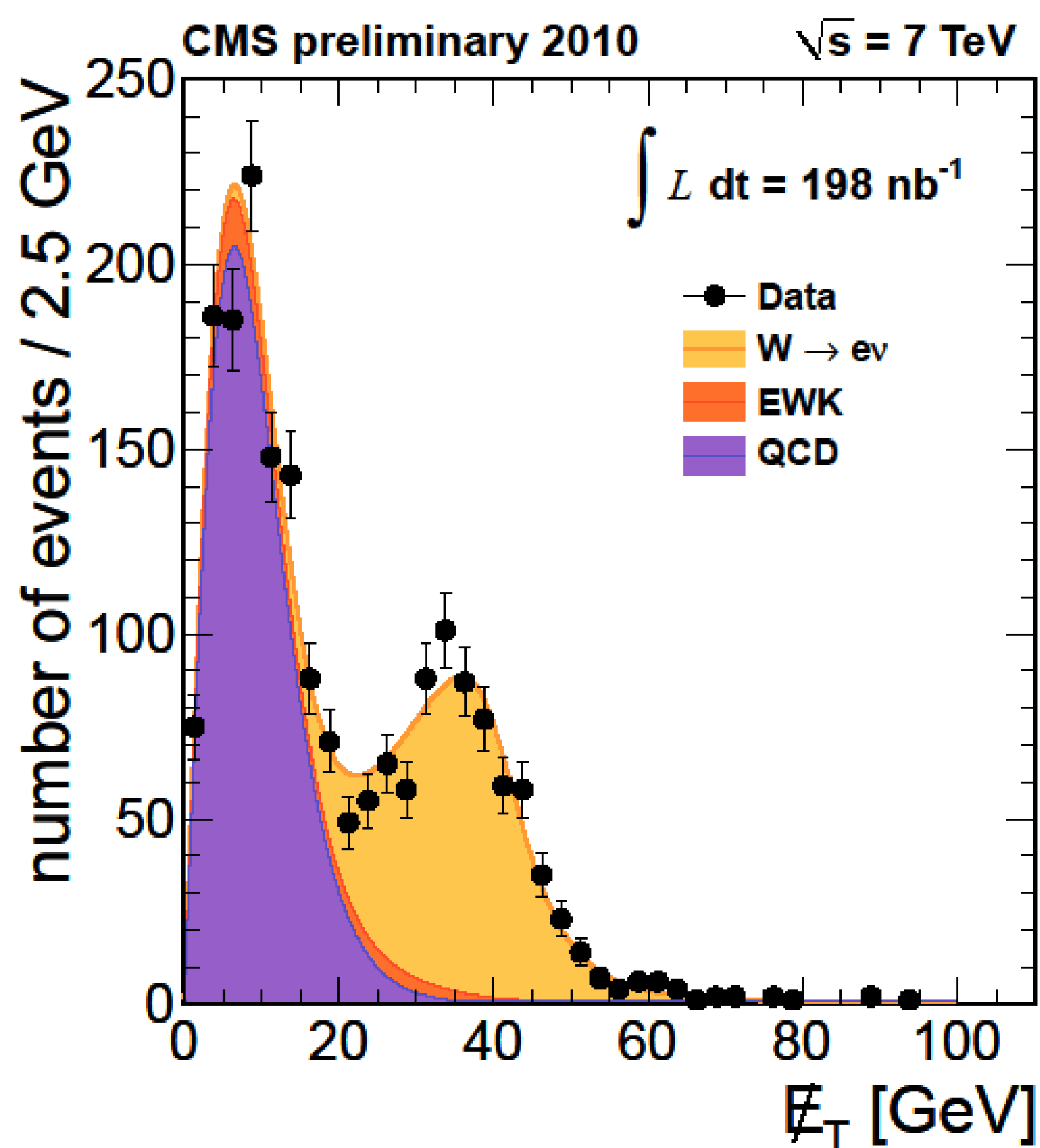
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Motivation

The associated production of W and Z plus jets allows for investigation and measurements in Standard Model and searches for new physics phenomena.

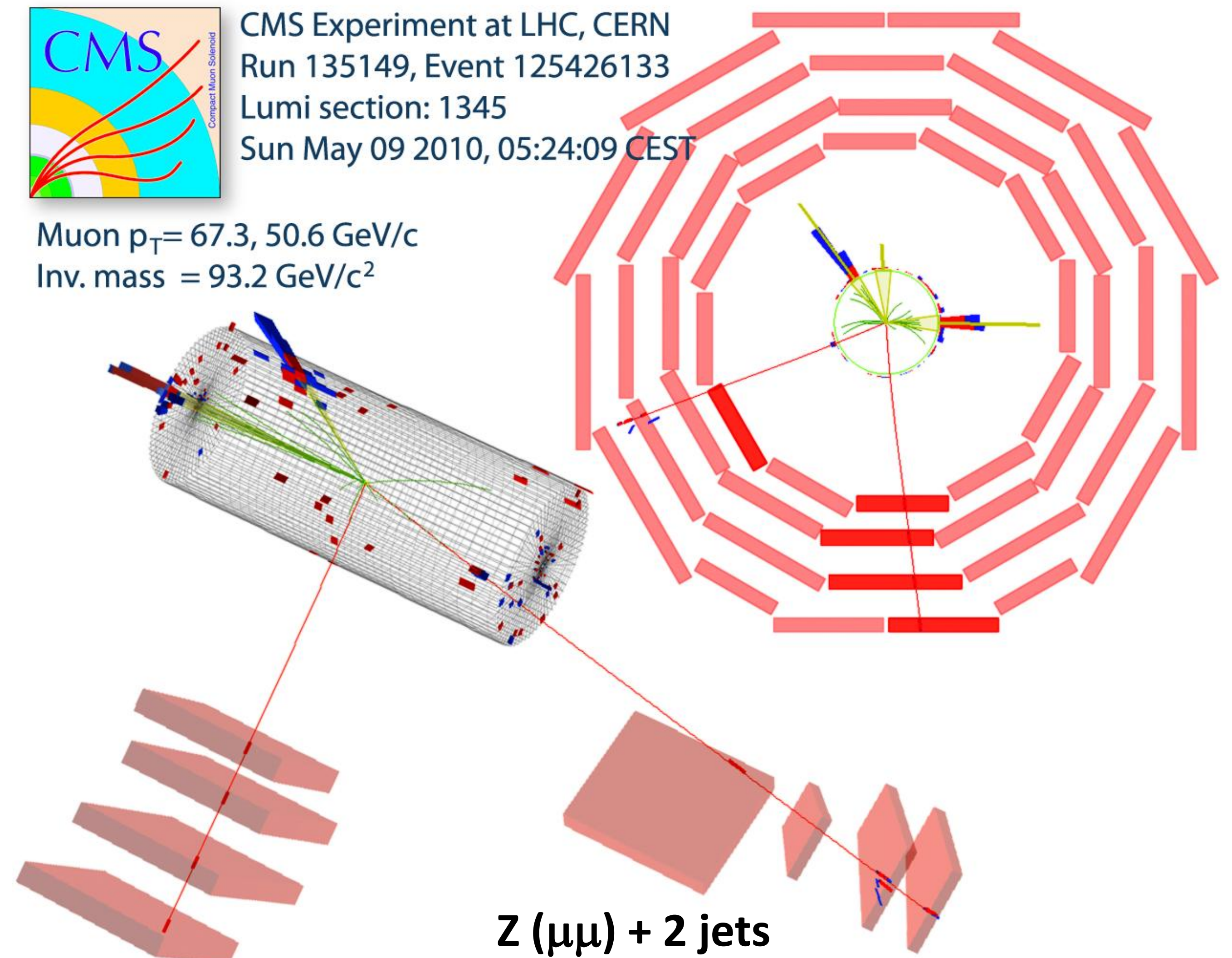


Missing Transverse Energy



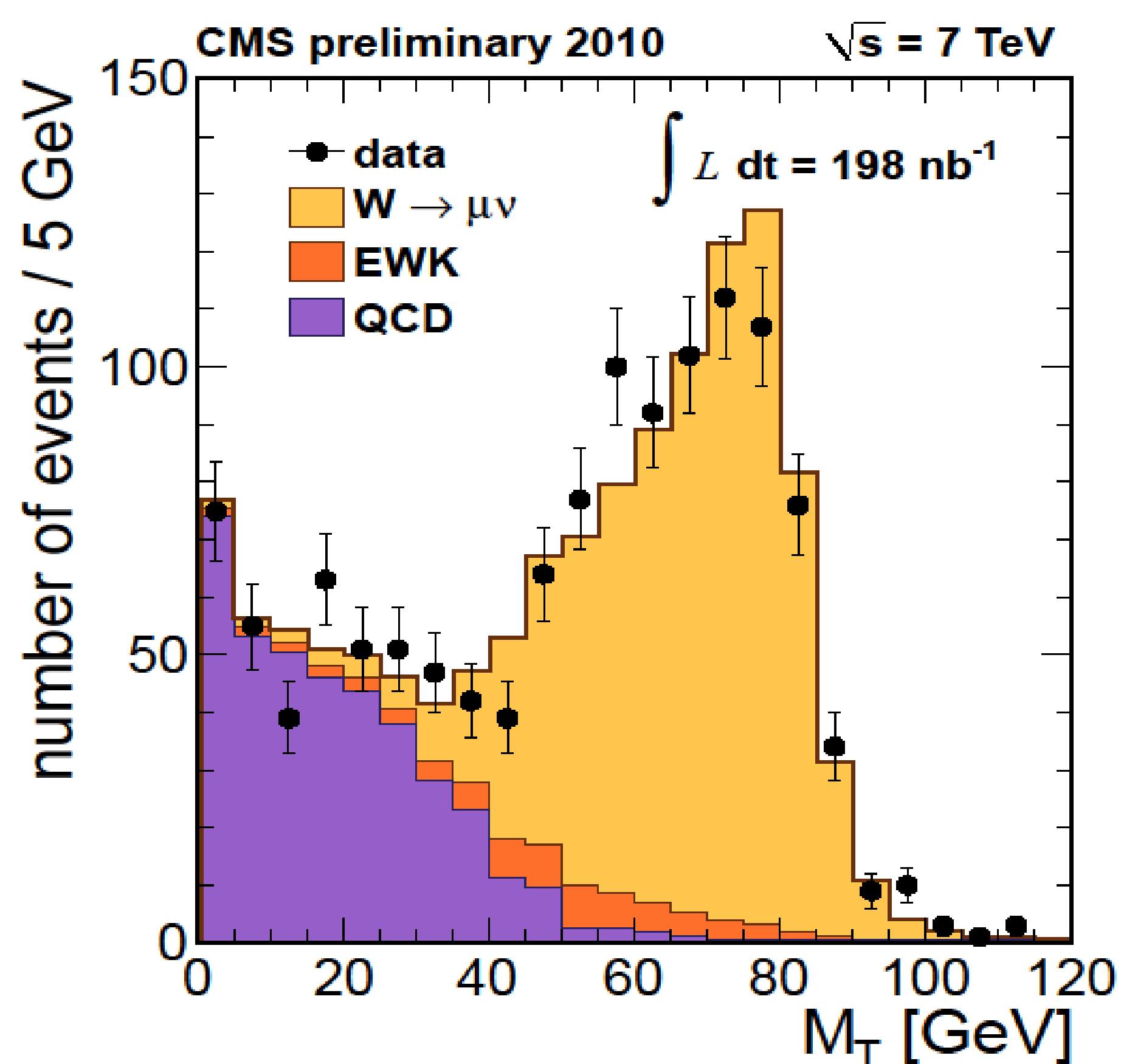
CMS Experiment at LHC, CERN
Run 135149, Event 125426133
Lumi section: 1345
Sun May 09 2010, 05:24:09 CEST

Muon $p_T = 67.3, 50.6$ GeV/c
Inv. mass = 93.2 GeV/ c^2



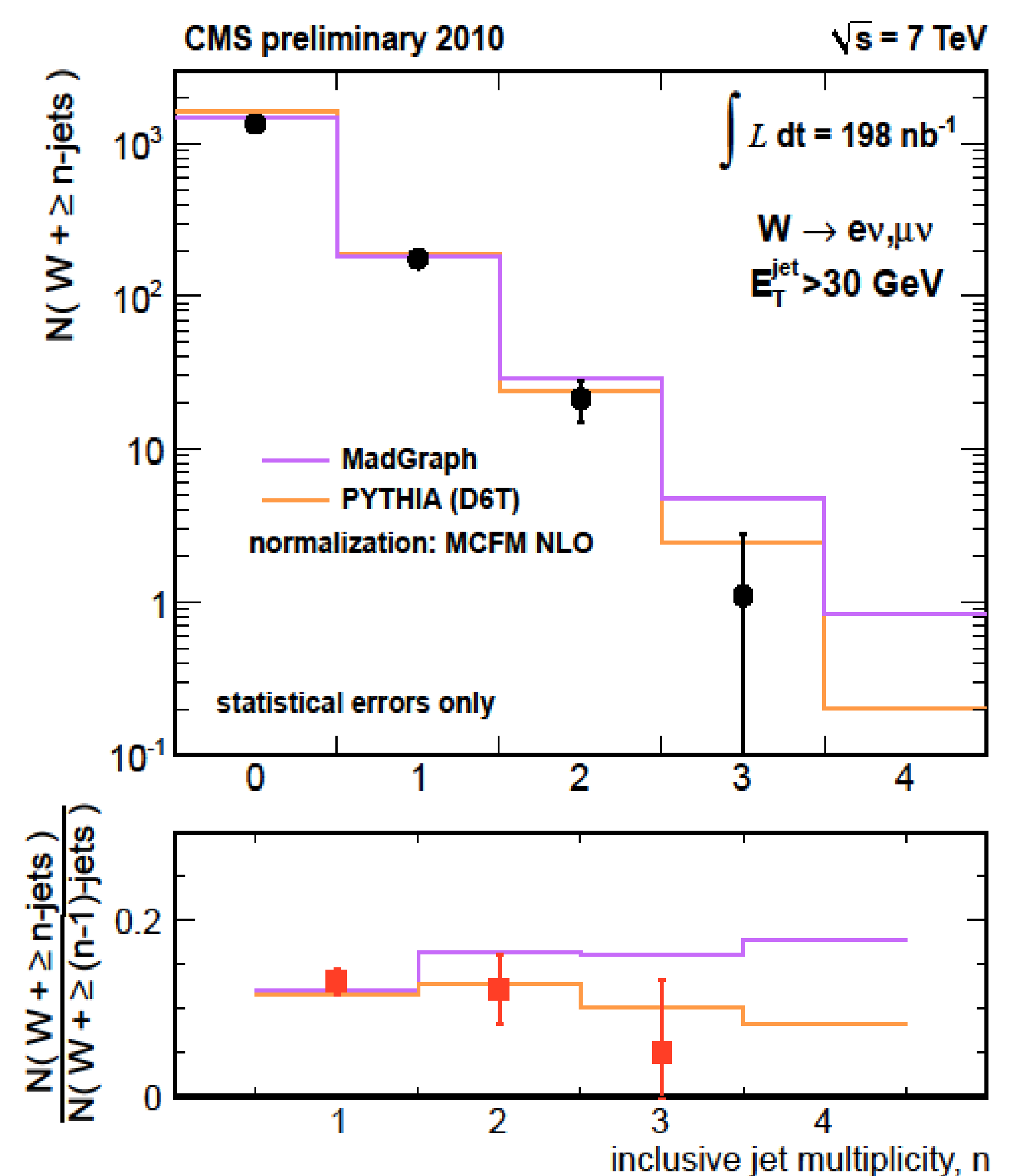
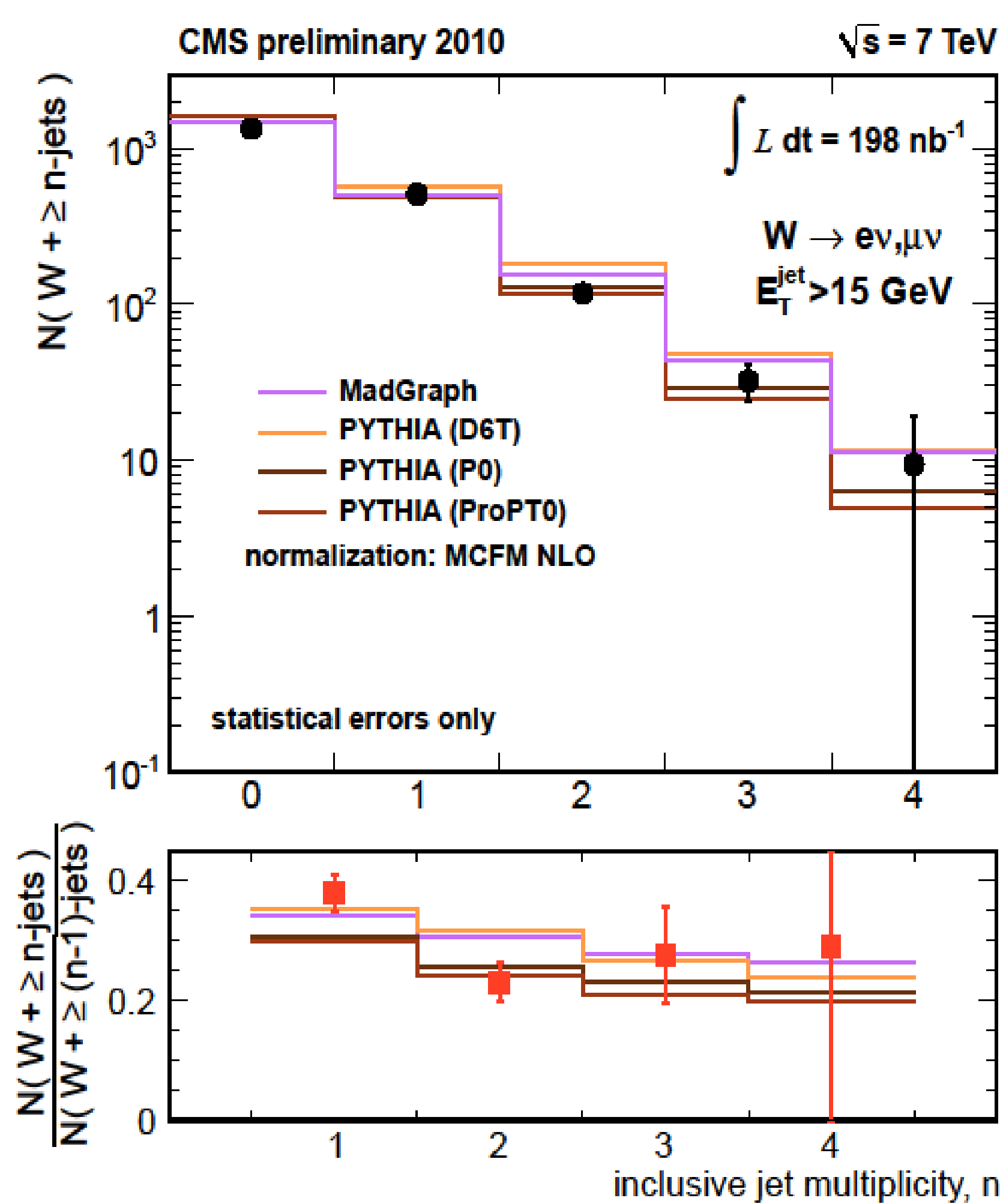
Transverse W Mass

Selection on the transverse mass is used for the jet counting in the W channels ($M_T > 50$ GeV/ c^2).



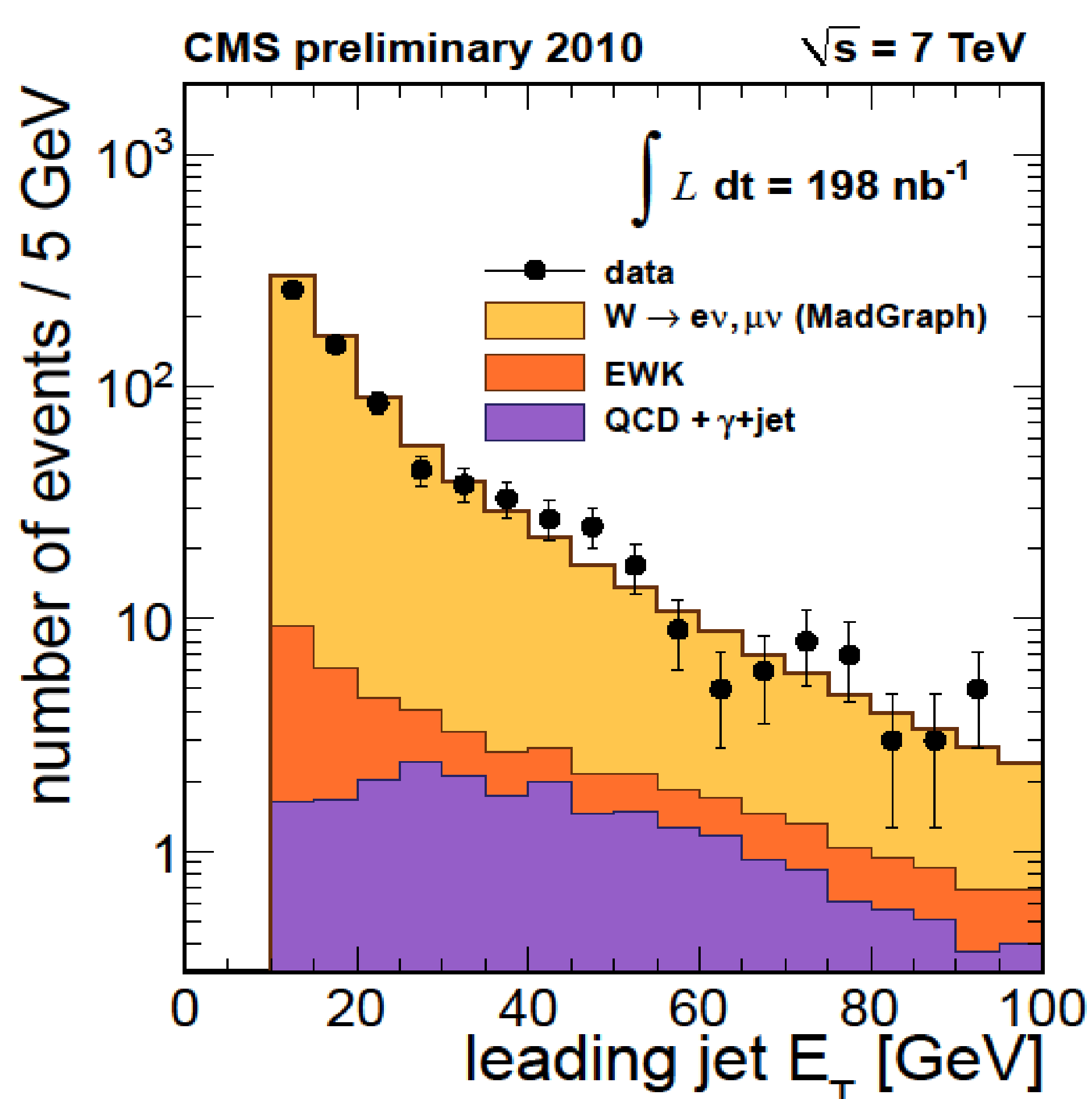
W Associated Jet Production

Inclusive jet multiplicity, produced in association with W . Predictions for inclusive jet multiplicity in association with W , obtained with *PYTHIA* and *MADGRAPH* are shown.



Leading Jet Transverse Momentum

Measured transverse momentum of the leading jet, produced in association with W .



Hadronic jets are reconstructed by clustering charged and neutral hadrons and photons identified by the Particle Flow method [1]. In the Particle Flow procedure stable particles result from combining information from all CMS sub-detectors and are calibrated depending on their type .

We consider jets within the tracker acceptance $|\eta| < 2.5$ with two different energy thresholds: $E_T > 15$ GeV and $E_T > 30$ GeV. Events are classified according the number of jets above a threshold : the jet multiplicity in bin n containing n jets or more.

The rate of low E_T jets is sensitive to the tuning of the parton shower generator. The rate of high E_T jets is sensitive directly to the matrix element of the hard scattering at the parton level.

The *systematic uncertainty* on the jet rate above a certain transverse energy threshold is dominated by the jet energy scale. Jet energy scale uncertainties are estimated at the level of $\pm 5\%$ on the absolute scale, and of $\pm 2\%$ on the relative scale over the range in pseudo-rapidity [2]. This leads to systematic uncertainties on event counts in the one- and two-jet multiplicity bins of, respectively, 10% and 20% for $E_T > 15$ GeV, and 11% and 15% for $E_T > 30$ GeV.

More details could be found at [3].

References

- [1] CMS Collaboration, "Commissioning of the Particle-Flow Event Reconstruction using high-energy LHC Collisions in the CMS Detector", CMS PAS PFT 1-002 (2010).
- [2] CMS Collaboration, "CMS Jet Performance in pp Collisions at $\sqrt{s} = 7$ TeV", CMS PAS JME-2010-003 (2010).
- [3] CMS Collaboration, "Measurements of Inclusive W and Z Cross Sections in pp Collisions at $\sqrt{s} = 7$ TeV", CMS PAS EWK-2010-002 (2010).