\( \frac{d\sigma_{\mu^+}}{dy_{\text{cms}}} \) (nb)

- **Data**
- **MCFM + CT14 + isospin**
- **MCFM + CT14 + EPPS16**
- **FEWZ + nCTEQ15**
- **FEWZ + nCTEQ15WZ**
- **MCFM + nNNPDF2.0**

**Legend:**

- **\( \mu^+ \leftarrow W^+ \)**
- **\( p_T^{\mu} > 10 \text{ GeV/c} \)**
- **ALICE, p–Pb, \( \sqrt{s_{\text{NN}}} = 8.16 \text{ TeV} \)**

**Graph Details:**

- **Axes:**
  - **x-axis:** \( y_{\text{cms}} \)
  - **y-axis:** Ratio to data

- **Data Points:**
  - Black circles represent data points.
  - Different colors indicate various theoretical models.

- **Error Bars:**
  - Bars indicate the statistical uncertainty in the measurements.

- **Trends:**
  - The data points and theoretical model predictions are compared across different \( y_{\text{cms}} \) values.

- **Interpretation:**
  - The figure illustrates the comparison between the measured data and various theoretical predictions for the production of muons in association with W bosons in proton–lead collisions at \( \sqrt{s_{\text{NN}}} = 8.16 \text{ TeV} \).
  - The ratio of the theoretical predictions to the data is shown, with error bars indicating the uncertainty.

**Technical Notes:**

- **Physics Context:**
  - The production of muons in association with W bosons is a fundamental process in high-energy physics, particularly important for understanding the weak force and the behavior of quarks and gauge bosons in the Standard Model.
  - The data is collected using the ALICE detector at the LHC, providing insights into the partonic content of nuclei and the dynamics of strong interactions.

- **Theoretical Models:**
  - Various Monte Carlo simulations, such as MCFM and FEWZ, are used to predict the cross-sections and distributions of such processes, allowing for comparisons with experimental data to test theoretical predictions.

**Conclusion:**

The graph effectively visualizes the agreement between the experimental measurements and theoretical expectations, highlighting the precision and accuracy of the ALICE experiment in studying complex processes involving weak bosons and parton distributions.