

Gap fraction

Gap fraction vs  $\Delta y$  (LJ) ( $240 < p_T < 270$ )

- ATLAS
- - □ Herwig 7.2.0 default
- - ▲ Pythia 8.180 default

2

1.5

1

0.5

0

ATLAS\_2011\_S9126244

Rivet 3.1.0,  $\geq 100k$  events

mcplots.cern.ch [arXiv:1306.3436]

Ratio to ATLAS

2

1

0.5

2

0.5

0 2 4 6

$|\Delta y|$

The figure consists of two vertically stacked panels sharing a common x-axis representing the absolute rapidity difference  $|\Delta y|$  from 0 to 6. The top panel shows the 'Gap fraction' on the y-axis (0 to 2). It displays ATLAS data points (black squares) and two Monte Carlo model predictions: Herwig 7.2.0 default (green dashed line with open squares) and Pythia 8.180 default (blue solid line with solid triangles). Both models show a decreasing trend in gap fraction as  $|\Delta y|$  increases, starting near 1.0 at  $|\Delta y| \approx 0.5$  and reaching approximately 0.35 at  $|\Delta y| \approx 4.8$ . The ATLAS data points generally follow this trend but show significant fluctuations, particularly a sharp dip at  $|\Delta y| \approx 4.2$  and a peak at  $|\Delta y| \approx 4.8$ . The bottom panel shows the 'Ratio to ATLAS' on the y-axis (0.5 to 2). It features the same data points and model lines as the top panel, along with shaded regions representing uncertainty bands: a yellow band for the Pythia model and a green band for the Herwig model. A horizontal line is drawn at a ratio of 1.0. The Pythia model's ratio is mostly above 1.0, while the Herwig model's ratio is mostly below 1.0. The ATLAS data points are scattered around the 1.0 ratio line.

| $ \Delta y $ | ATLAS Gap Fraction | Herwig 7.2.0 Gap Fraction | Pythia 8.180 Gap Fraction | Pythia Ratio to ATLAS | Herwig Ratio to ATLAS |
|--------------|--------------------|---------------------------|---------------------------|-----------------------|-----------------------|
| 0.5          | 0.95               | 0.95                      | 0.95                      | 1.0                   | 1.0                   |
| 1.0          | 0.80               | 0.80                      | 0.80                      | 1.0                   | 1.0                   |
| 1.5          | 0.65               | 0.65                      | 0.65                      | 1.0                   | 1.0                   |
| 2.0          | 0.55               | 0.55                      | 0.50                      | 1.0                   | 1.0                   |
| 2.5          | 0.45               | 0.45                      | 0.45                      | 0.9                   | 1.0                   |
| 3.0          | 0.35               | 0.35                      | 0.35                      | 0.9                   | 1.0                   |
| 3.5          | 0.30               | 0.30                      | 0.45                      | 1.5                   | 0.9                   |
| 4.0          | 0.30               | 0.25                      | 0.20                      | 0.6                   | 0.7                   |
| 4.5          | 0.35               | 0.20                      | 0.50                      | 1.5                   | 0.7                   |
| 4.8          | 0.00               | -                         | -                         | -                     | -                     |