Long-range correlations in 13TeV pp collisions
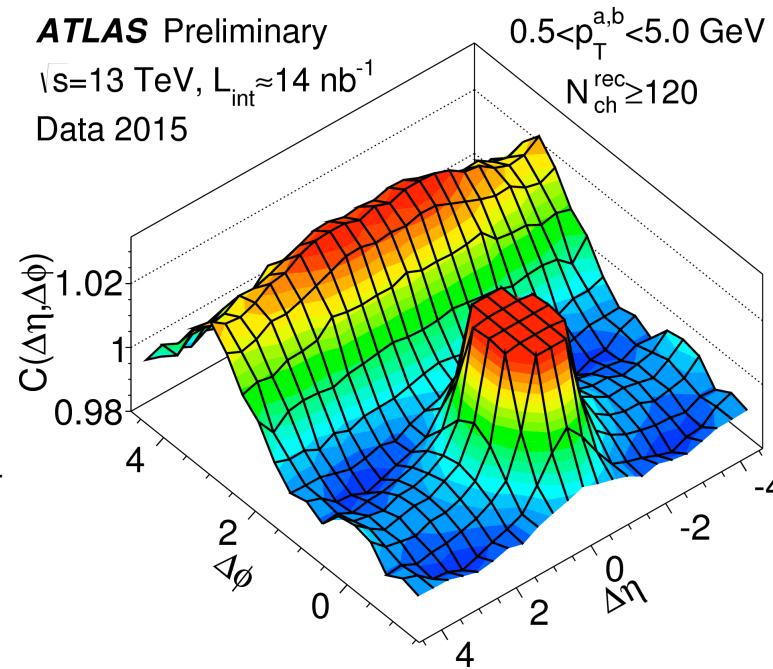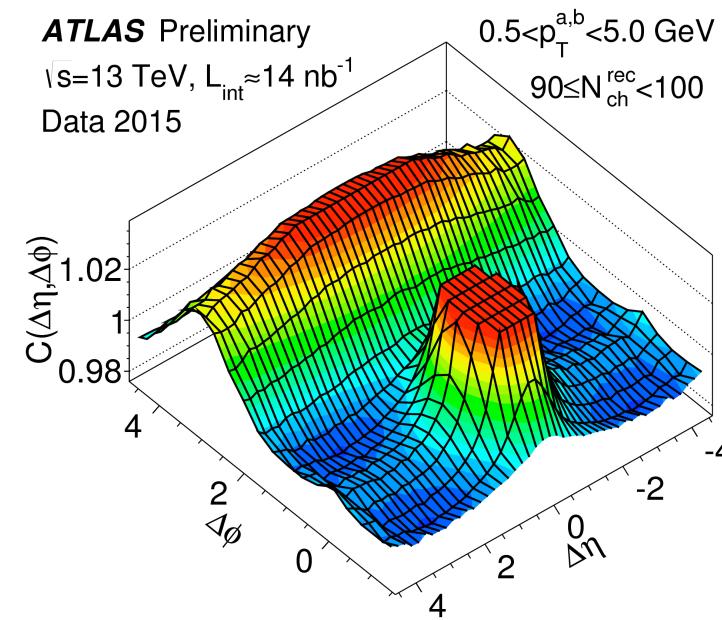
2D 2PC: Multiplicity dependence
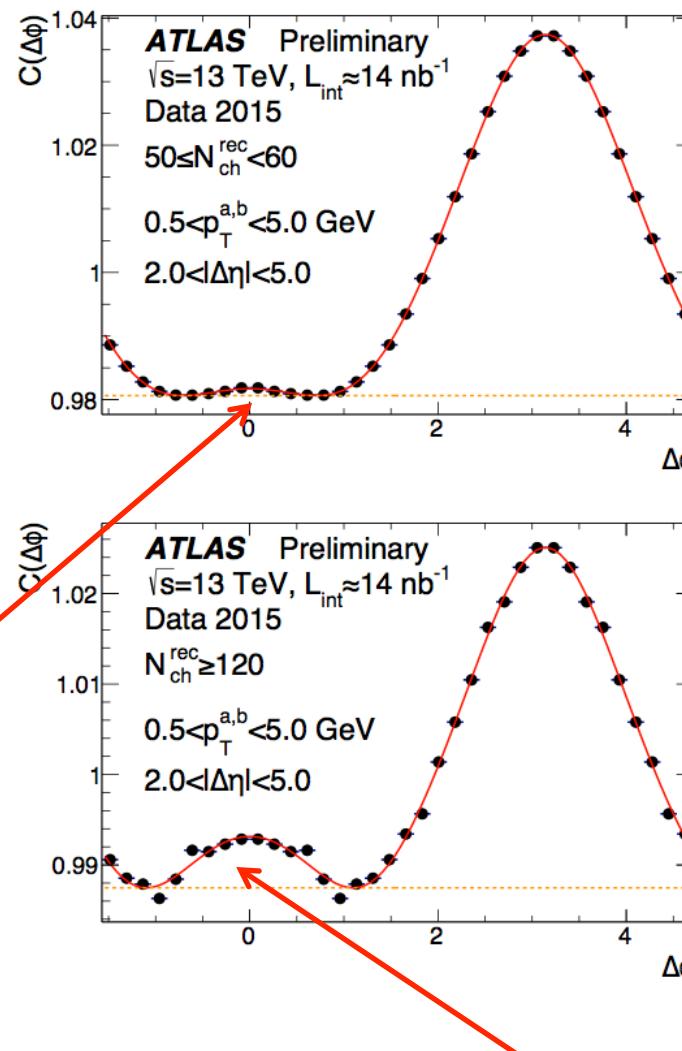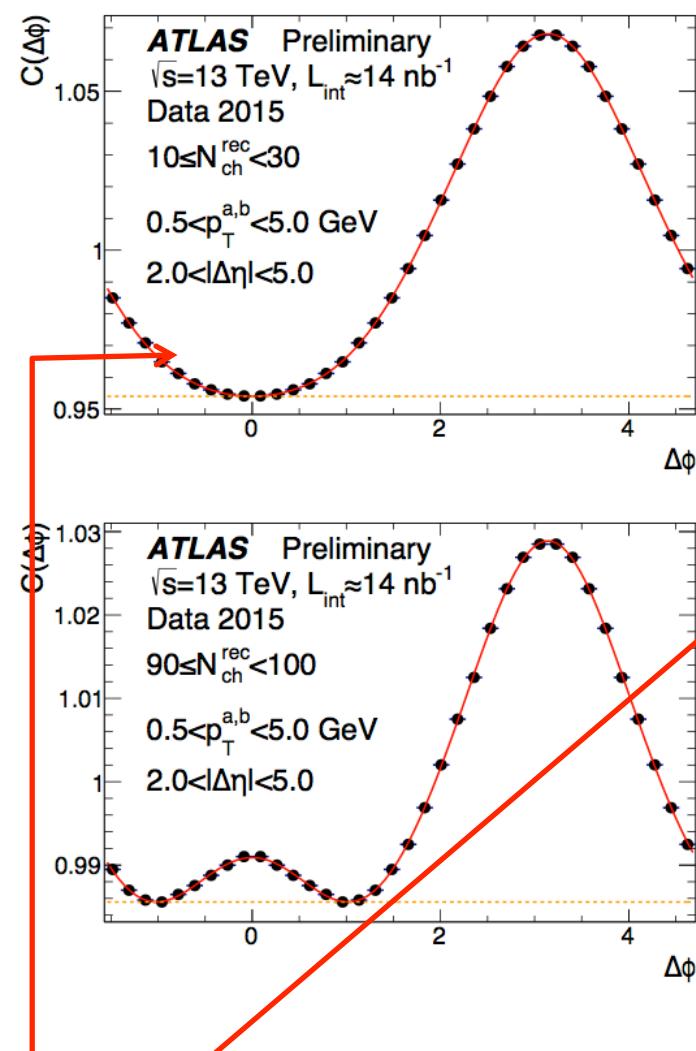
Both particles with 0.5<pT<5.0 GeV

No ridge structure seen For peripheral events

Long-range correlation shape is concave-up on near-side

Long-range structure becomes flat and then ridge develops

1D 2PC : Multiplicity dependence

Same bins as 2D corrs but for |Δη|>2
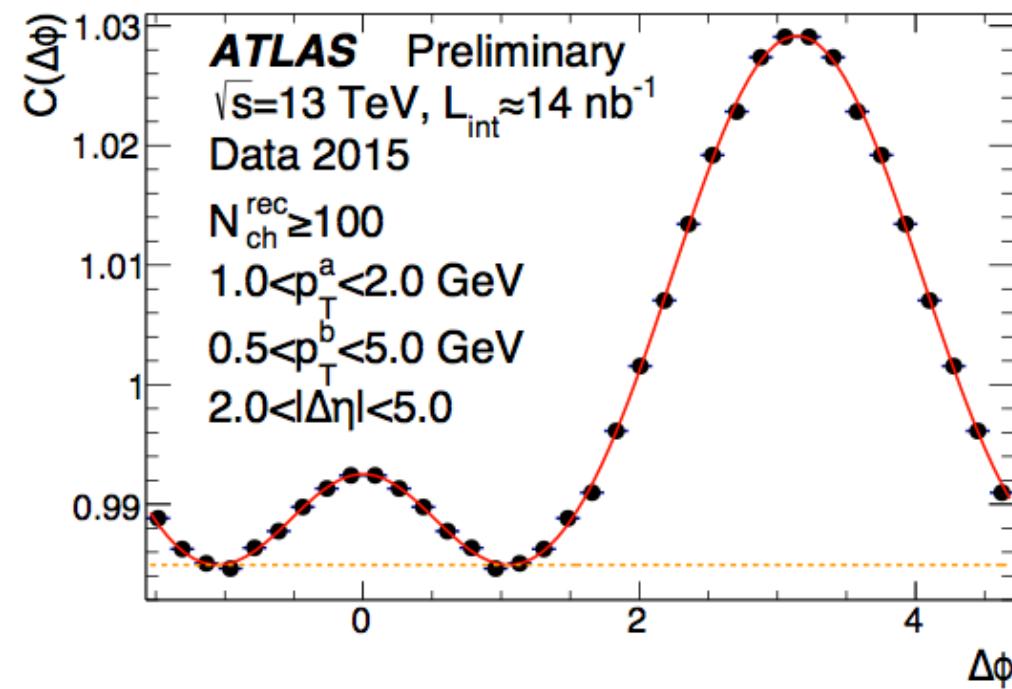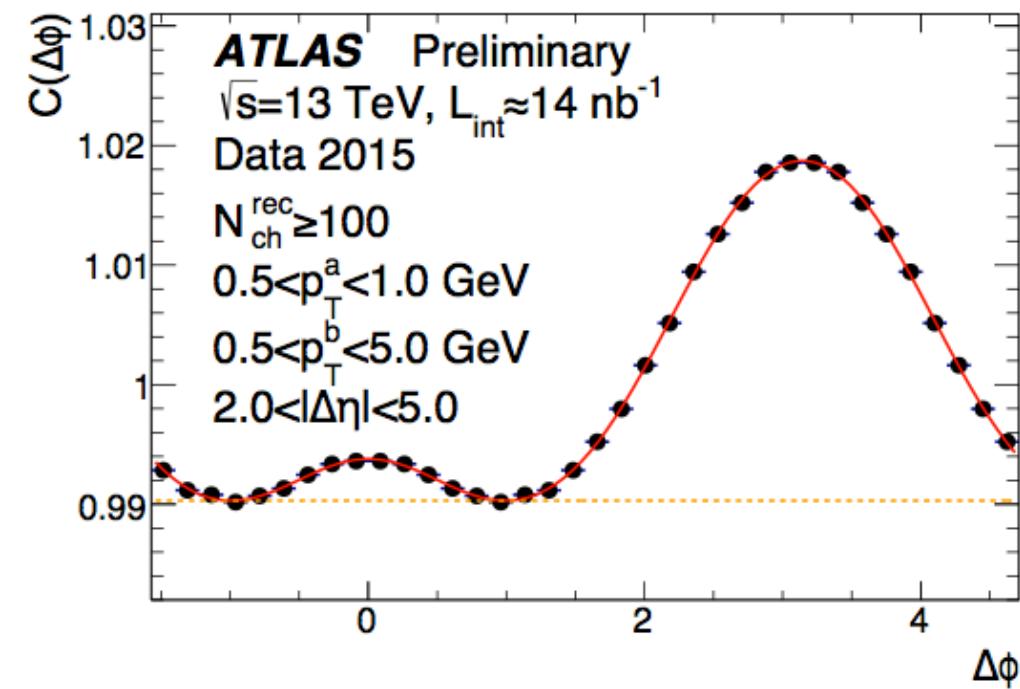
Concave up shape clear in lowest multiplicity bin

Becomes flat in the next two plots

ZYAM method wont give any ridge here

Here Long-range correlation sitting above concave-structure. ZYAM method wont give any long-range correlation here.
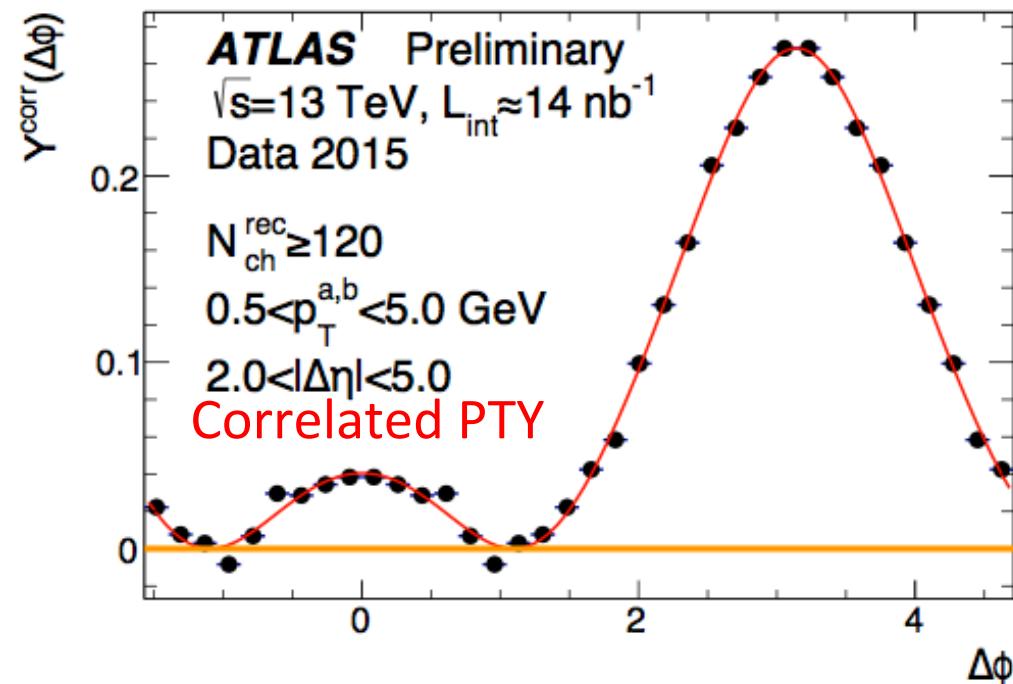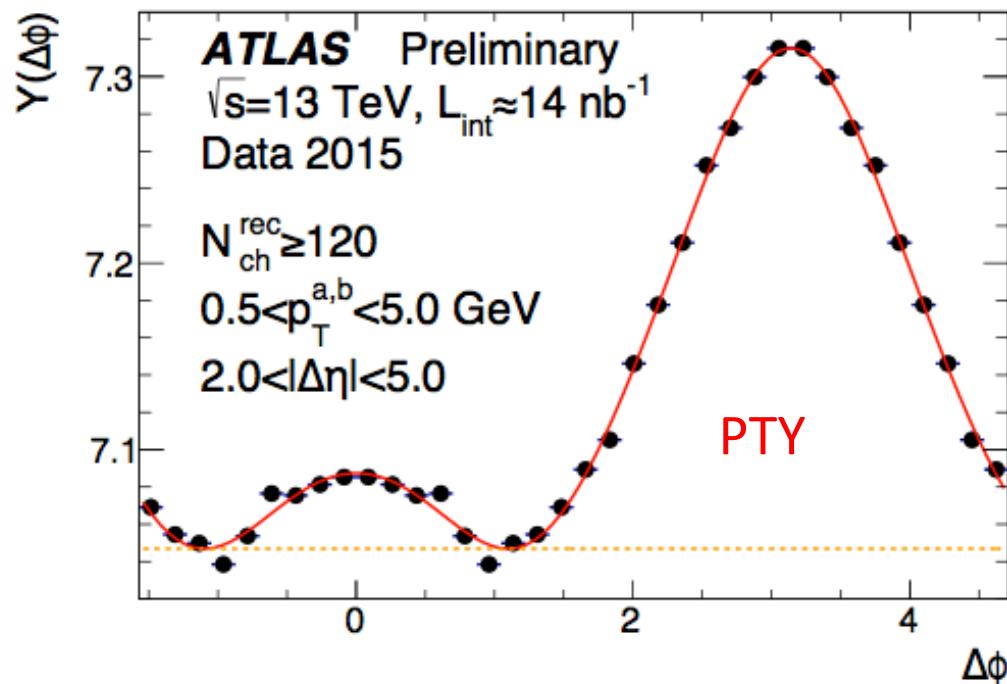
Here Long-range correlation is stronger that what is seen visually. ZYAM method severely underestimates the correlation here.

1D 2PC: pT Dependence

- Correlation Increases with pT
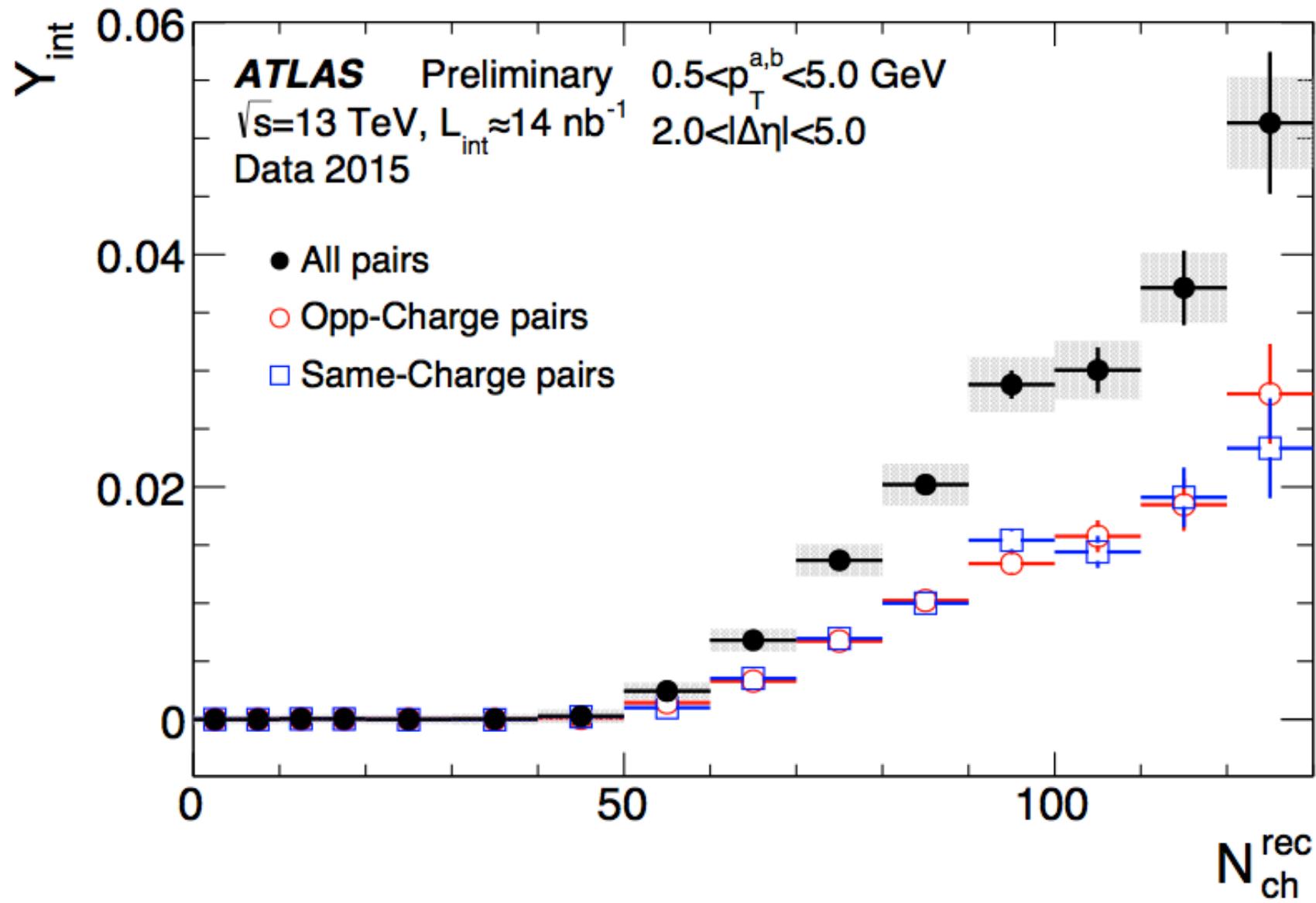
Per-Trigger Yields, and correlated Yield

**ATLAS** Preliminary
$\sqrt{s}=13$ TeV, $L_{int} \approx 14$ nb^{-1}
Data 2015

$N_{ch}^{rec} \geq 120$
$0.5 < p_T^{a,b} < 5.0$ GeV
$2.0 < |\Delta\eta| < 5.0$

PTY

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$\sqrt{s}=13$ TeV, $L_{int} \approx 14$ nb^{-1}
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Correlated PTY

$$Y(\Delta\phi) = \left(\frac{\int B(\Delta\phi)d\Delta\phi}{N^a \int d\Delta\phi} \right) C(\Delta\phi), \qquad Y^{corr}(\Delta\phi) = Y(\Delta\phi) - b_{ZYAM}$$
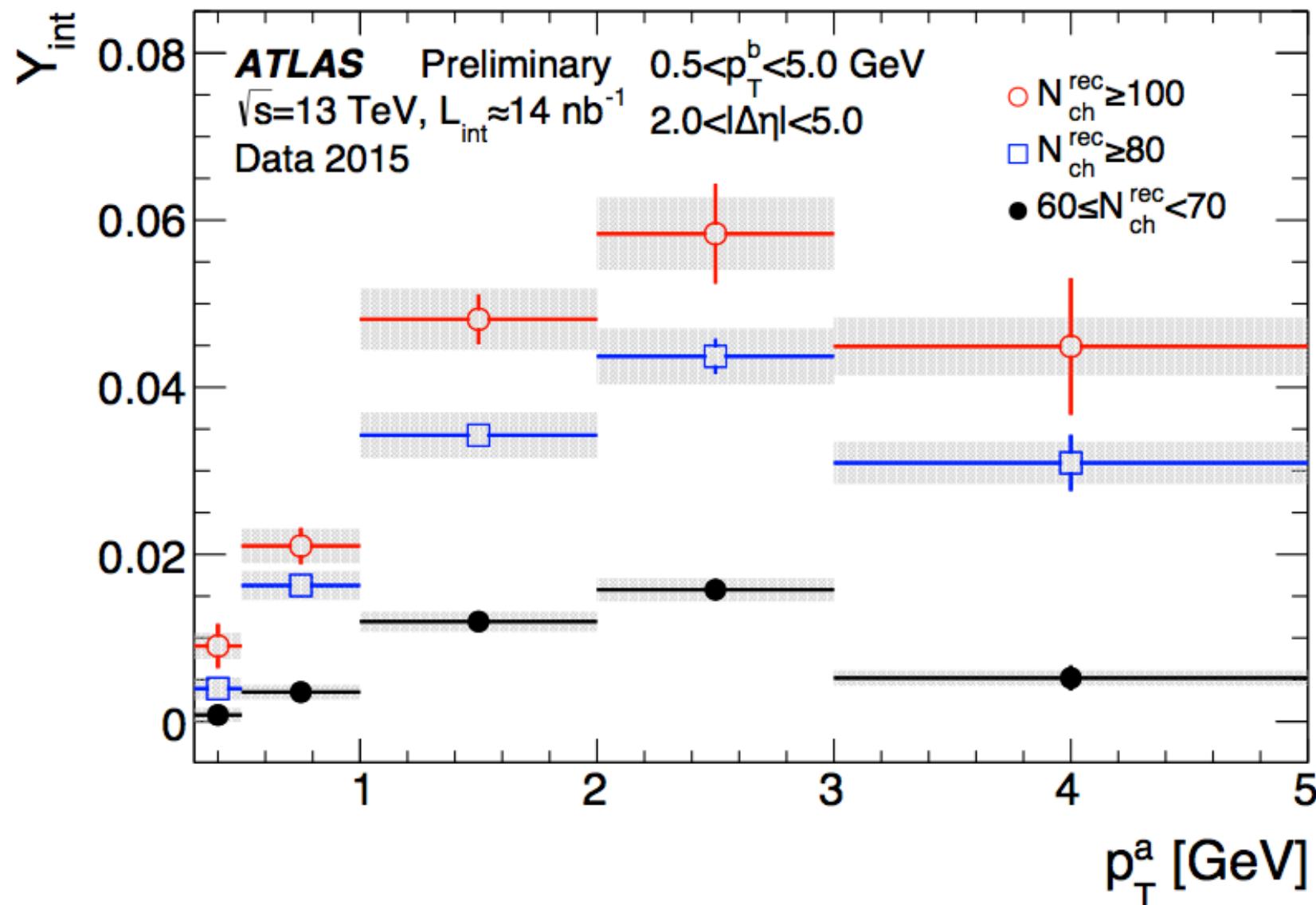
- Correlated yield obtained using ZYAM procedure
- ZYAM point determined from 5th order Fourier fit
 - Band indicates ZYAM uncertainty

- Integrate to obtain correlated Yields: $\quad Y_{int} \equiv \int_{-\Delta\phi_{ZYAM}}^{\Delta\phi_{ZYAM}} d\Delta\phi \, Y^{corr}(\Delta\phi).$
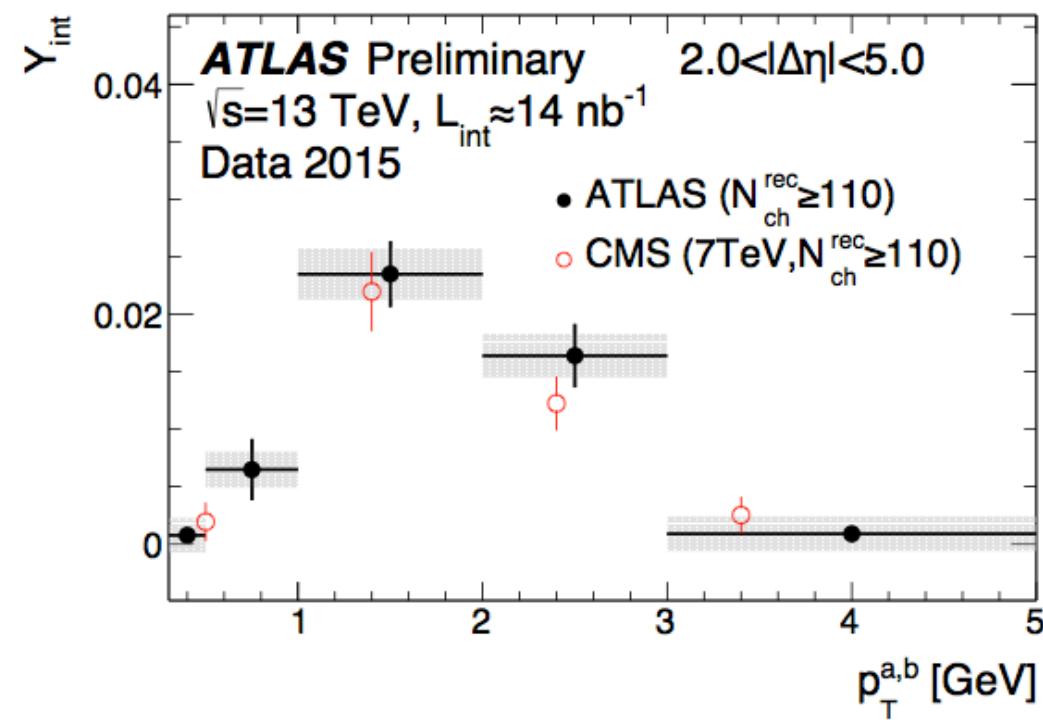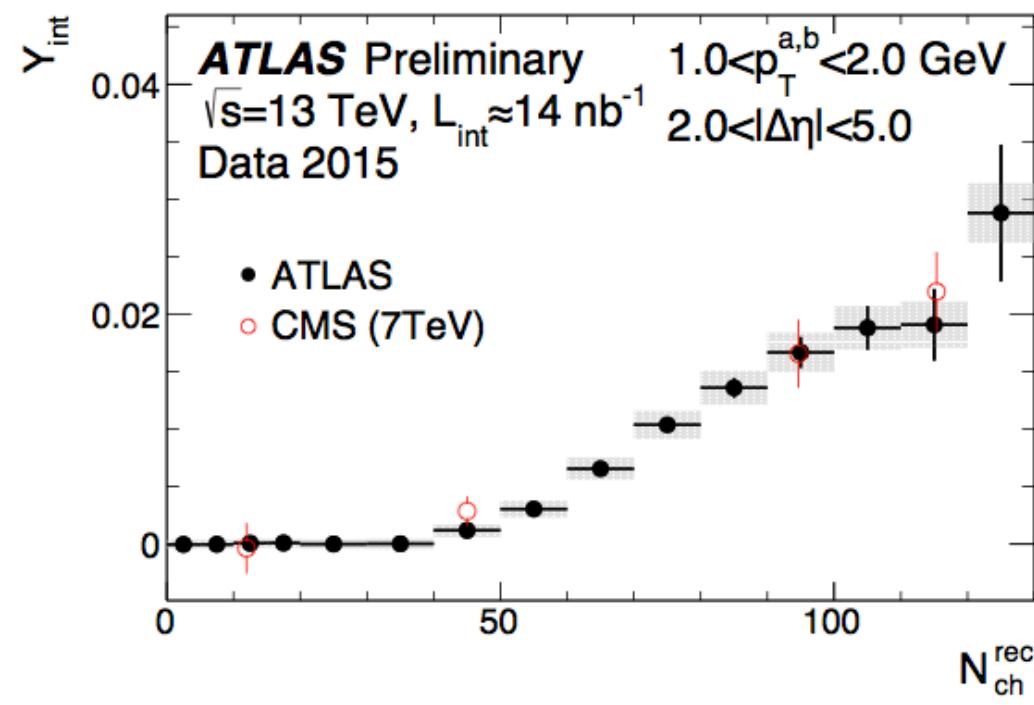
Integrated yields extracted by integrating from |Δφ|=0 to ZYAM minimum

- Plotted for trigger particle pT with associated pT fixed
- Increase with pT then decrease: similar to behavior in p+Pb and Pb+Pb

- Ridge strength consistent with CMS
  - When looking at same multiplicity and same pT!

- Long-range correlations seen on the near-side in pp collisions at 13TeV

- Strength quantified via Yint, with pedestal determined by ZYAM procedure
  - Strength increases with multiplicity
  - Increases and then decreases with pT
  - Present and consistent for both same-charge and opposite charge cases

- Strength similar to CMS measurements at 7TeV