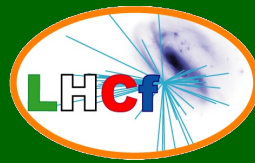


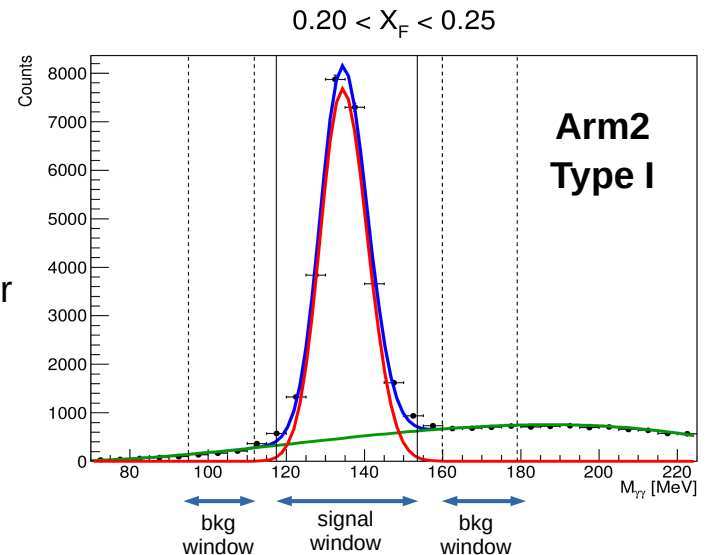
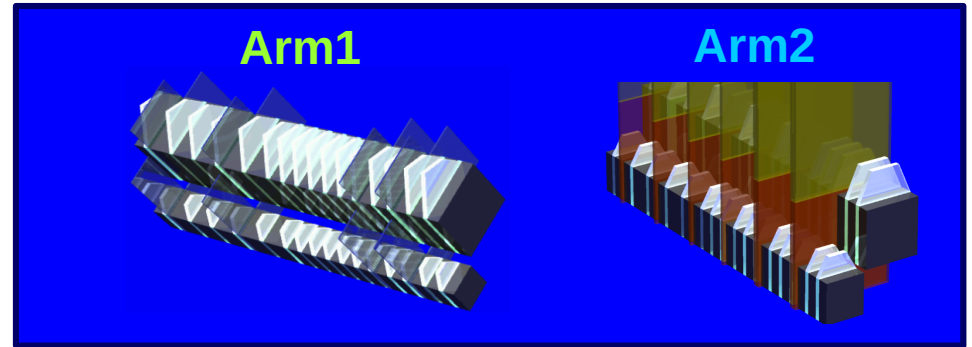
# Very-forward $\pi^0$ production cross section in proton-proton collisions at $\sqrt{s} = 13$ TeV measured with the LHCf experiment

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# The LHCf experiment



- ◆ Two detectors ~140 m from the IP1 (ATLAS) along the beam line on opposite sides: **Arm1** and **Arm2**
- ◆ Each detector is made of **two calorimeters** with thickness  $\sim 44 X_0$  ( $\sim 1.6 \lambda_I$ ) and different transverse dimensions
- ◆ Measurement of **very forward** neutral particles (photons, neutrons,  $\pi^0$ )
- ◆ Experimental data in the very forward region fundamental for the tuning of **hadronic interaction models**
- ◆ “**Type I**”  $\pi^0$  events: one photon in each calorimeter  
“**Type II**”  $\pi^0$  event: two photons in the same calorimeter
- ◆ Invariant mass fit: signal  $\rightarrow$  asymmetric Gaussian, background  $\rightarrow$  3<sup>rd</sup> order polynomial
- ◆ Signal window:  $3\sigma$  within the peak  
Background windows:  $4\sigma$ - $7\sigma$  from the peak on both sides
- ◆ Unfolding procedure to correct selection efficiency and energy/position resolution effects



# $\pi^0$ $p_T$ - $X_F$ spectrum in p-p collisions at 13 TeV



◆ **Good agreement** between Arm1 and Arm2 data and between “Type I” and “Type II” events

◆ Arm2 acceptance covers the gaps in Arm1 data for  $X_F < 0.6$  and extends the low- $p_T$  coverage for  $X_F > 0.6$ , while Arm1 extends the acceptance to higher  $p_T$

