

Table of Contents

First measurement of Bose-Einstein Correlations in Proton-Proton Collisions at 0.9 and 2.36 TeV at LHC.....	1
Abstract.....	1
Results.....	1

First measurement of Bose-Einstein Correlations in Proton-Proton Collisions at 0.9 and 2.36 TeV at LHC

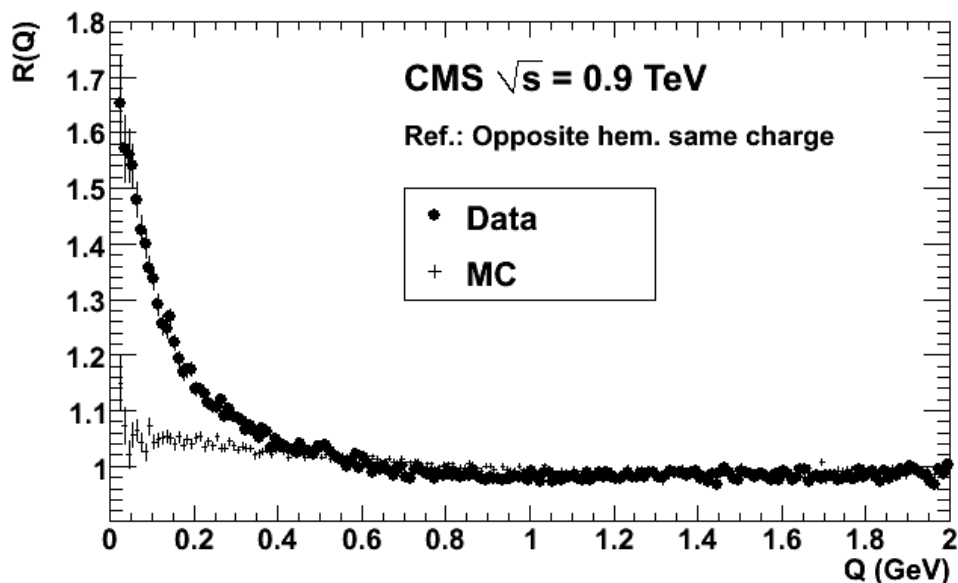
Abstract

Bose-Einstein correlations have been measured using samples of proton-proton collisions at 0.9 and 2.36 TeV center-of-mass energies, recorded by the CMS experiment at the CERN Large Hadron Collider. The signal is observed in the form of an enhancement of pairs of same-sign charged particles with small relative four-momentum. The size of the correlated particle emission region is seen to increase significantly with the particle multiplicity of the event.

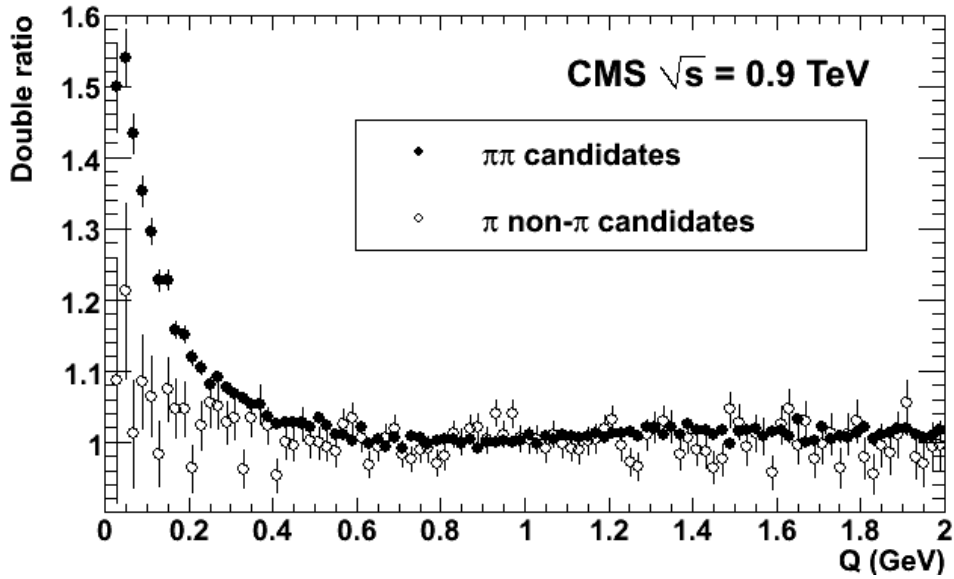
Results

The BEC parameters extracted from fits using an exponential form are: $r=1.59 \pm 0.05$ (stat.) ± 0.19 (syst.) fm and $\lambda=0.625 \pm 0.021$ (stat.) ± 0.046 (syst.) at 0.9 TeV, and $r=1.99 \pm 0.18$ (stat.) ± 0.24 (syst.) fm and $\lambda=0.663 \pm 0.073$ (stat.) ± 0.048 (syst.) at 2.36 TeV. An increase of the parameter r with charged-particle multiplicity in the event is observed.

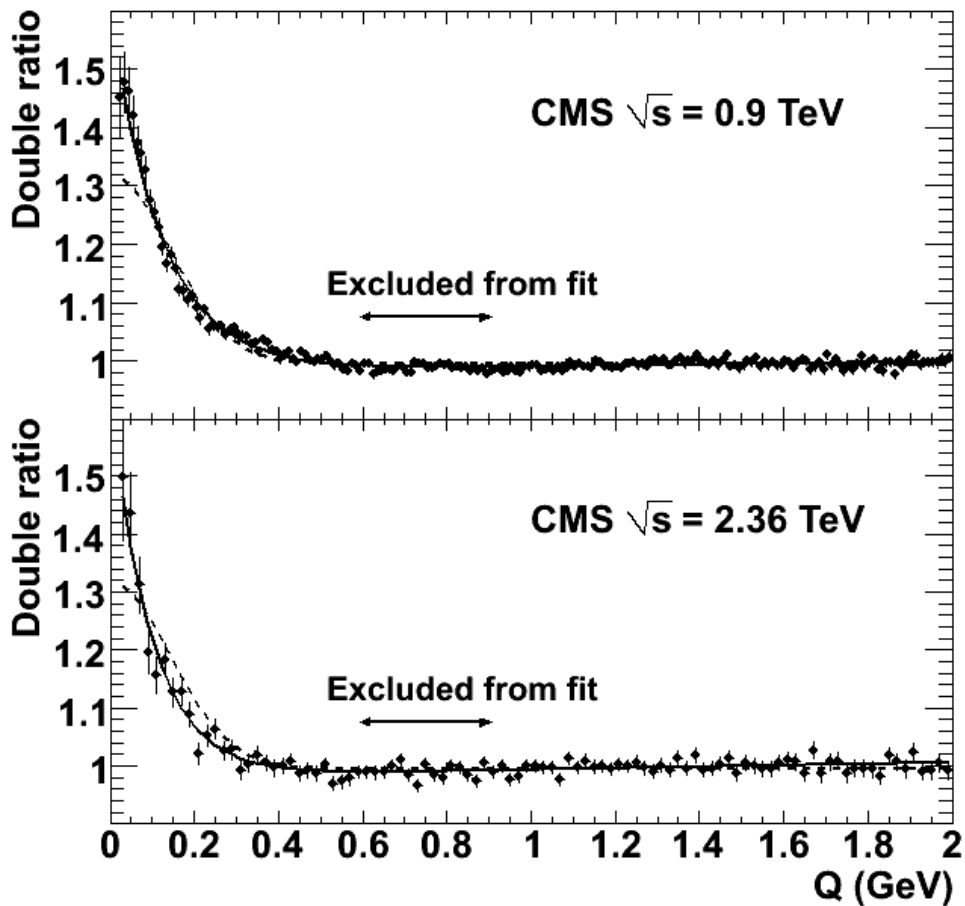
- Ratios $R(Q)$ obtained with the opposite-hemisphere, same-charge reference samples for data (dots) and MC with no BEC effect (crosses):



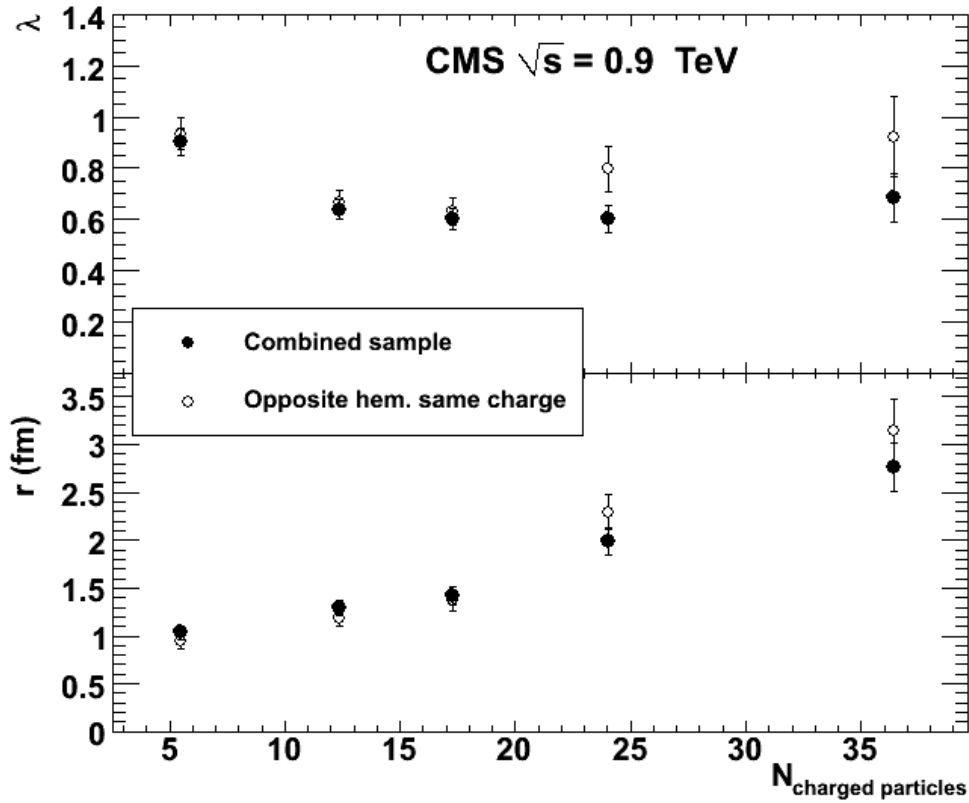
- Double ratios for the 0.9 TeV data, using the opposite-hemisphere, same-charge reference samples for combinations enriched, using a dE/dx measurement, in pion-pion pairs (dots) and in pion-non-pion pairs (open circles), respectively:



- Fits to the double ratios with exponential (solid lines) and Gaussian (dashed lines) functions, for 0.9 TeV (top) and 2.36 TeV (bottom) data. The range $0.6 < Q < 0.9$ GeV is excluded from the fits.:



- Values of the λ (top) and r (bottom) parameters as a function of the charged-particle multiplicity in the event for combined (dots) and opposite-hemisphere, same-charge (open circles) reference samples, at 0.9 TeV. The errors shown are statistical only. The points are placed on the horizontal scale at the average of the multiplicity distribution in the corresponding bin.:



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-- PaoloCecchia - 03-Aug-2010

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