

1 Central exclusive production of  $\pi^+\pi^-$ ,  $K^+K^-$   
2 and  $p\bar{p}$  pairs with forward protons measured in  
3 Roman Pot detectors in proton-proton collisions  
4 at  $\sqrt{s} = 200$  GeV with the STAR detector

5 Leszek Adamczyk for the STAR Collaboration

6 **Abstract**

7 We present results on the Central Exclusive Production of charged particle  
8 pairs  $h^+h^-$  ( $h = \pi, K, p$ ) obtained in the STAR experiment at RHIC  
9 in proton-proton collisions at center-of-mass energy of  $\sqrt{s} = 200$  GeV. All  
10 final-state particles of the process  $pp \rightarrow p' + h^+h^- + p'$  were reconstructed,  
11 including forward-scattered protons detected in the Roman Pot system.  
12 As a result, the Double Pomeron Exchange (DPE) events were selected  
13 and the non-exclusive backgrounds were efficiently rejected.

14 Differential fiducial cross sections were measured as functions of observables  
15 related to the central hadronic final state and to the forward-scattered  
16 protons. The measured cross sections were compared to phenomenological  
17 predictions based on the DPE model. Structures observed in the mass spectra  
18 of  $\pi^+\pi^-$  and  $K^+K^-$  pairs were found consistent with the DPE model, while  
19 angular distributions of pions suggested a dominant spin-0 contribution to  
20  $\pi^+\pi^-$  production.

21 For  $\pi^+\pi^-$  production, the fiducial cross section was extrapolated to the  
22 Lorentz-invariant region and was successfully modeled assuming the continuum  
23 production and at least three resonances, the  $f_0(980)$ ,  $f_2(1270)$ ,  
24 and  $f_0(1500)$ , with a possible small contribution from the  $f_0(1370)$ . Fits  
25 to the extrapolated differential cross section as a function of squared four-  
26 momentum transfers in proton vertices enabled extraction of the exponential  
27 slope parameters in several bins of the invariant mass of  $\pi^+\pi^-$  pairs.  
28 These parameters are sensitive to the size of the interaction region.