"LHC on the March",
IHEP, Protvino, Russia
16-18 November 2011

TOP MODELS OF DIFFRACTIVE SCATTERING TO FALSIFY AT THE LHC

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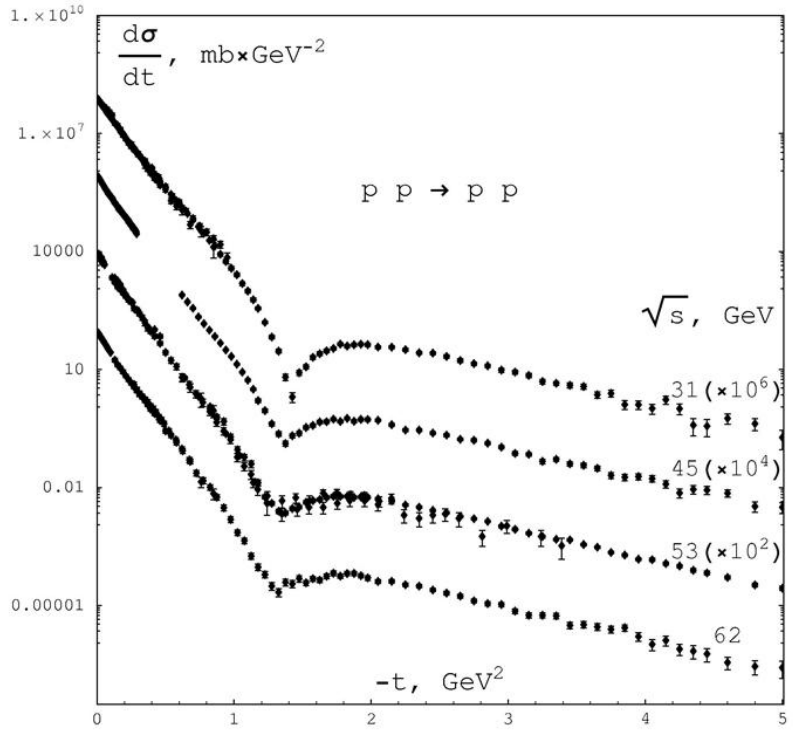
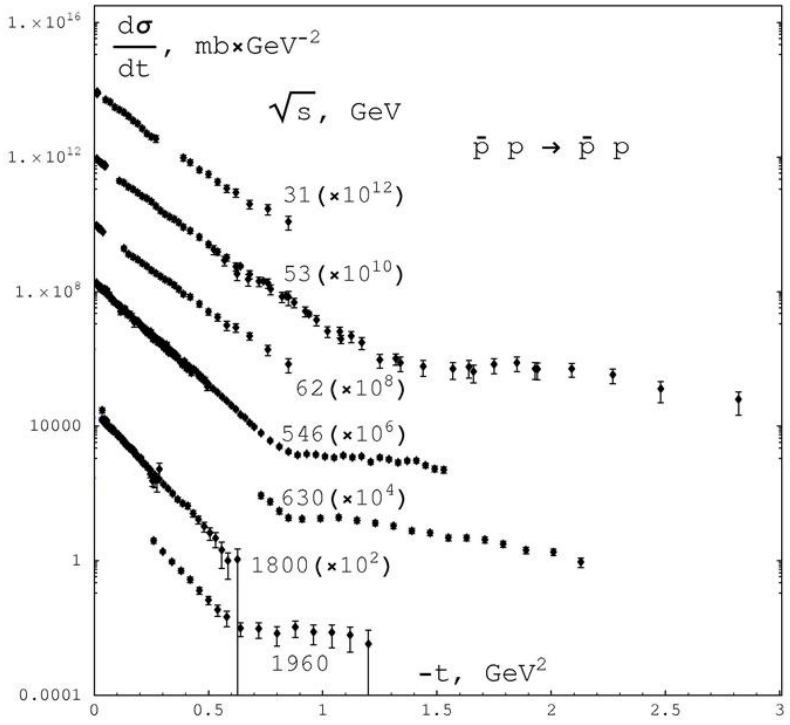
High Energy Diffraction Pattern

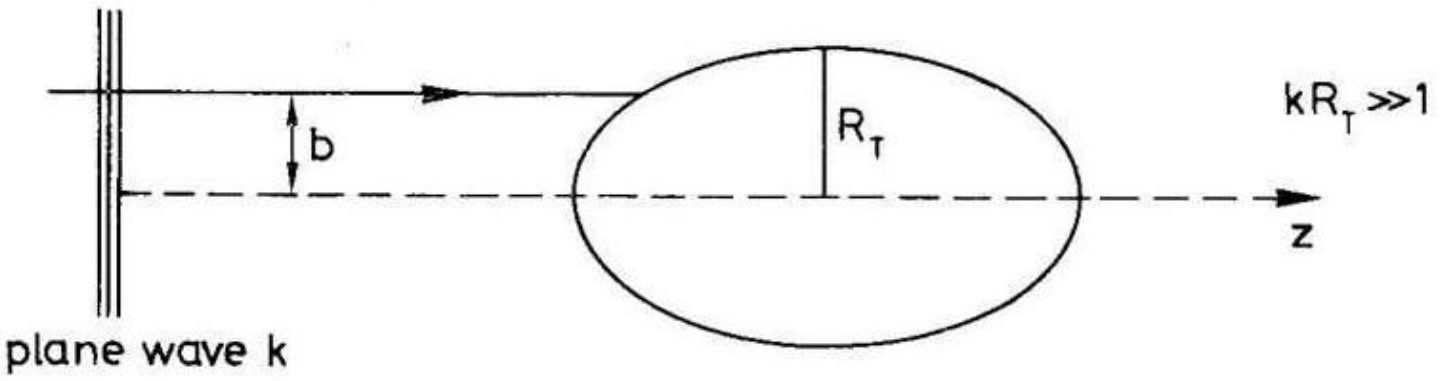




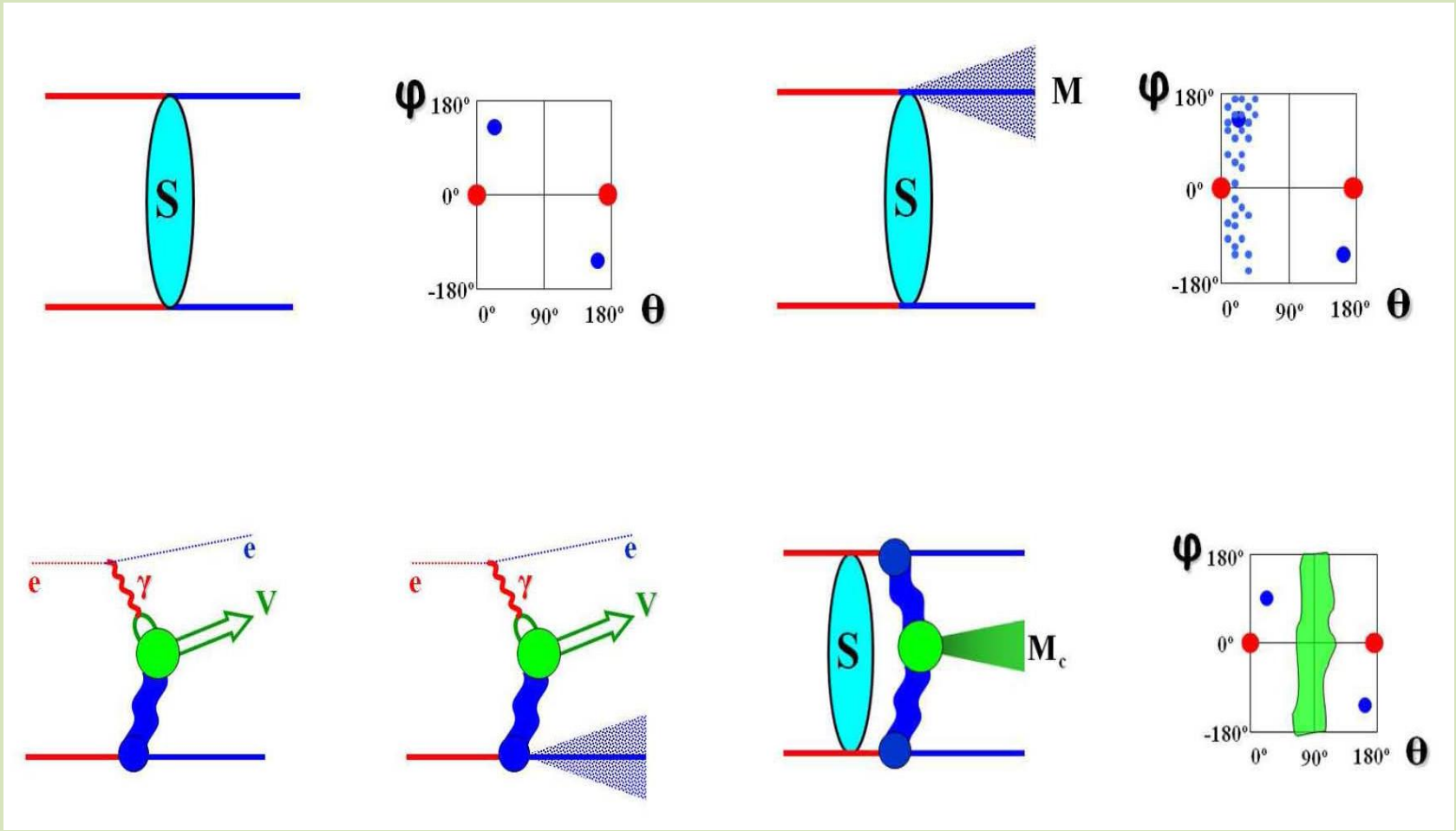
Higher Energies → Larger Distances

$$R_L \sim \Delta x_L \geq \frac{\sqrt{s}}{\sqrt{< t^2 > - < t >^2}}, \quad R_T \sim \Delta x_T \geq \frac{1}{\sqrt{- < t >}}$$

For Tevatron $\Delta x_L > 1000$ fm.



Typical Diffractive Processes



Scattering Amplitude , Born Term ("eikonal") and Regge Trajectories

$$T_{12\to 12}(s,t) = 4\pi s \int_0^\infty db^2 J_0(b\sqrt{-t}) \frac{e^{2i\delta_{12\to 12}(s,b)} - 1}{2i} ,$$

$$\delta_{12\to 12}(s,b) = \frac{1}{16\pi s} \int_0^\infty d(-t) J_0(b\sqrt{-t}) \delta_{12\to 12}(s,t) ,$$

$$\delta_{12\to 12}(s,t) = \sum_n \xi^+(\alpha_n^+(t)) \beta_n^+(t) s^{\alpha_n^+(t)} \mp \sum_n \xi^-(\alpha_n^-(t)) \beta_n^-(t) s^{\alpha_n^-(t)} .$$

"Top Models" of Diffractive Scattering

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M.M. Islam, R.J. Luddy, and A.V. Prokudin, Int. J. Mod. Phys. A 21 (2006) 1
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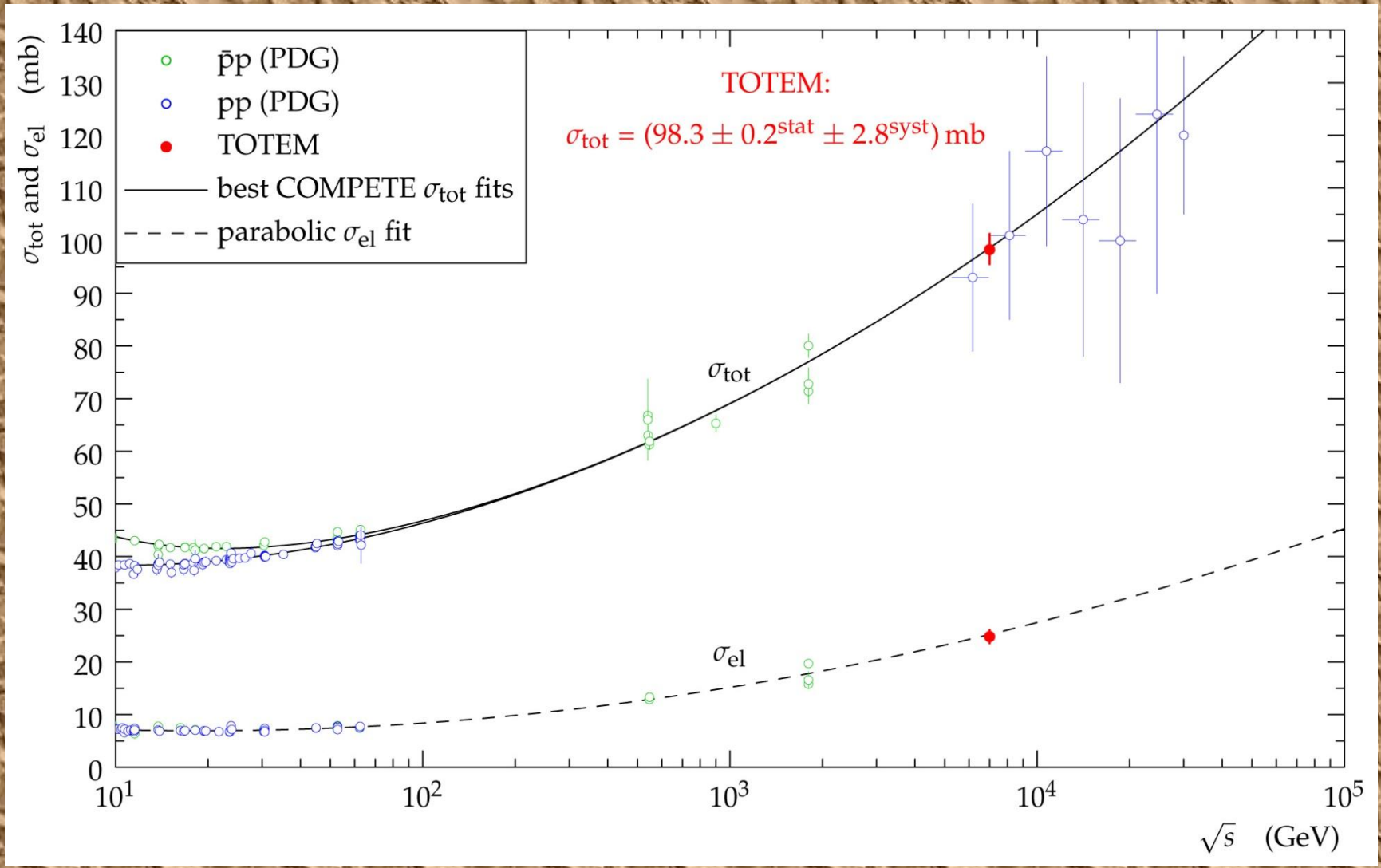
Total pp Cross-Sections



"Top Models" for Total pp Cross-Sections

The Model	$\sigma_{tot}^{pp}(7\,TeV)$, mb
V.A. Khoze, A.D. Martin, M.G. Ryskin, Eur. Phys. J. C 18 (2000) 167	90
P. Desgrolard, M. Giffon, E. Martynov, Eur. Phys. J. C 18 (2000) 359	95
V.A. Petrov, A.V. Prokudin, Eur. Phys. J. C 23 (2002) 135	97
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R.F. Avila, S.D. Campos, M.J. Menon, J. Montanha, Eur. Phys. J. C 47 (2006) 171	93
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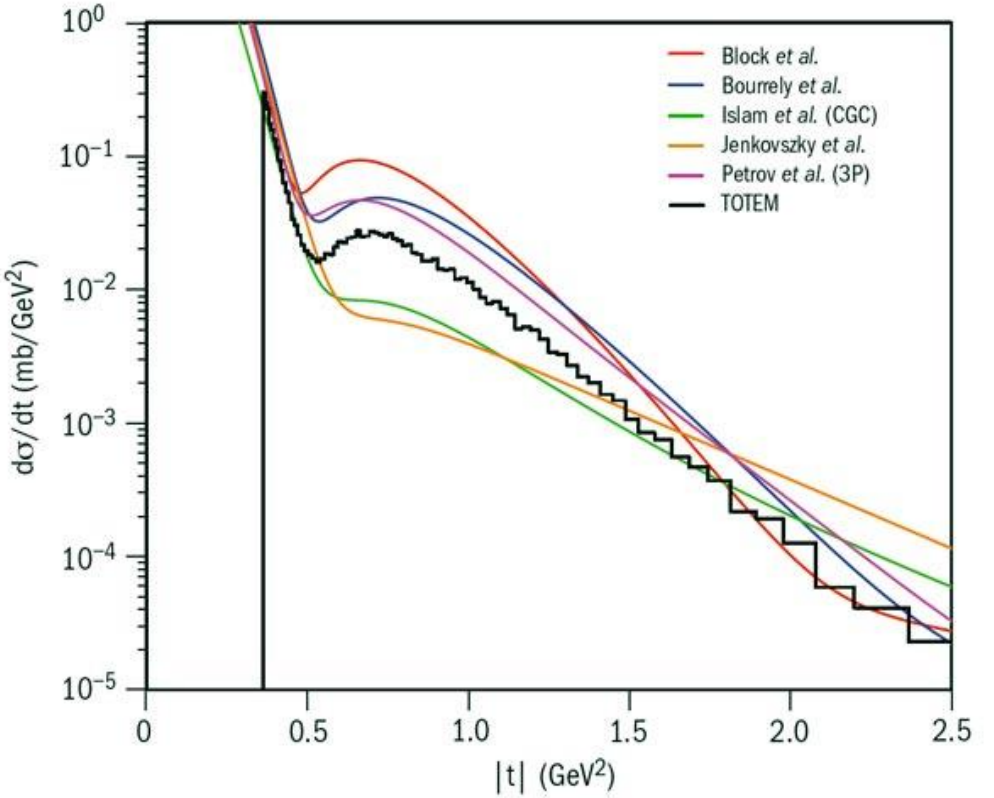
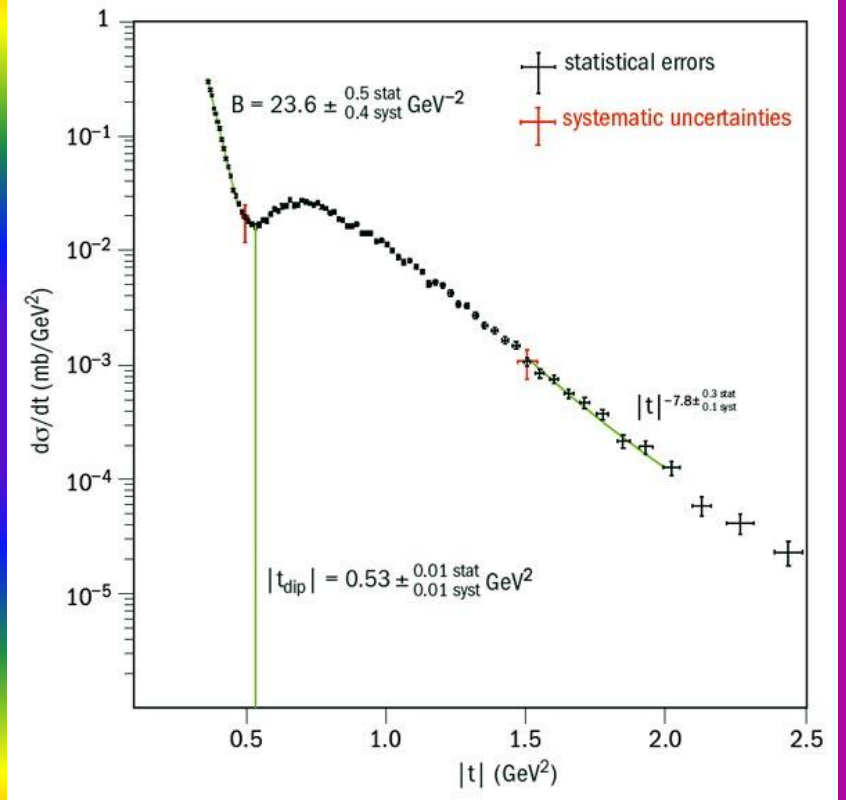
The TOTEM Collaboration, CERN-PH-EP-2011-158:

$$\sigma_{tot}^{pp}(7\,TeV) = (98.3 \pm 0.2^{stat} \pm 2.8^{syst})\ \text{mb}$$

“Top Models” vs. Experiment





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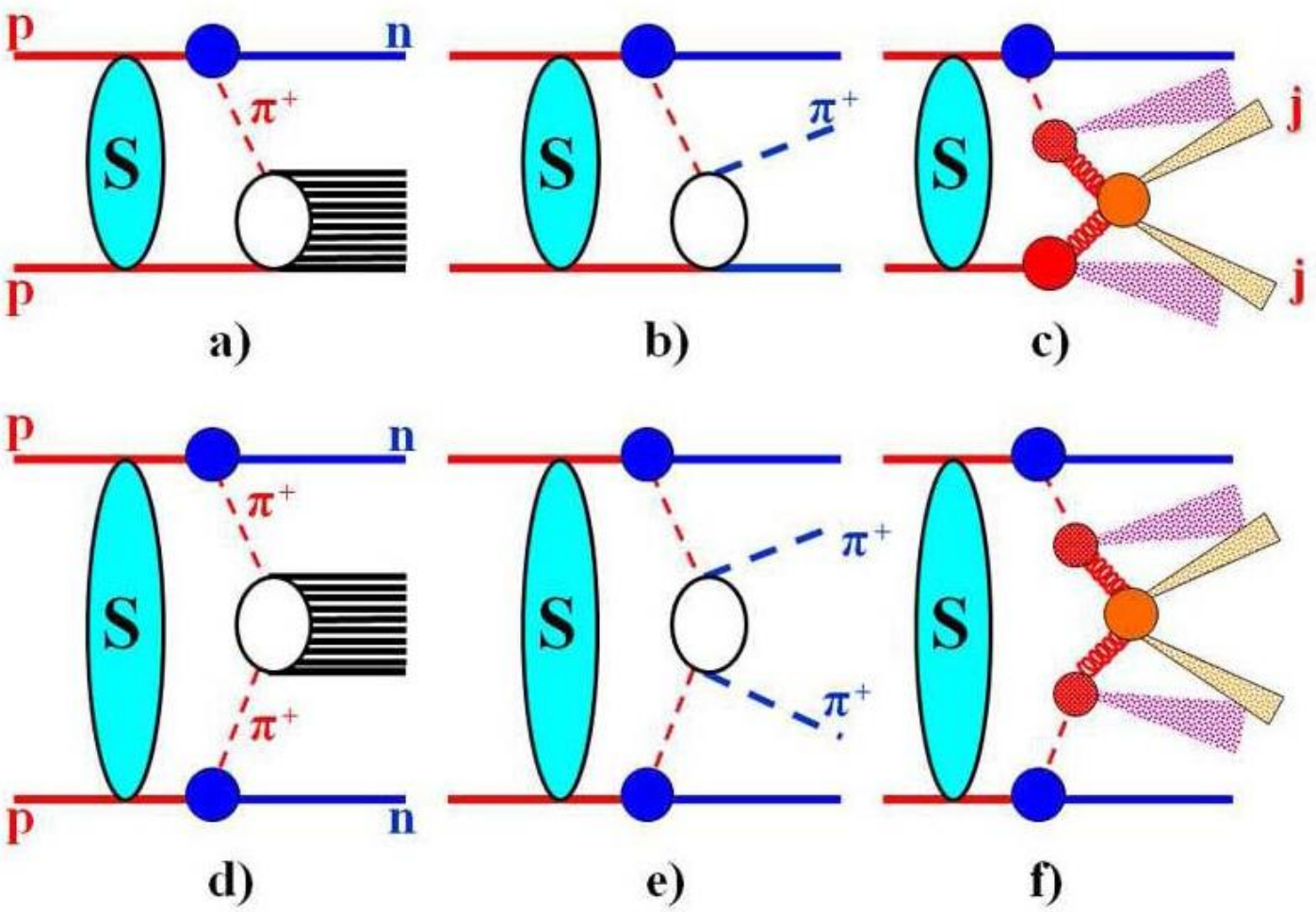
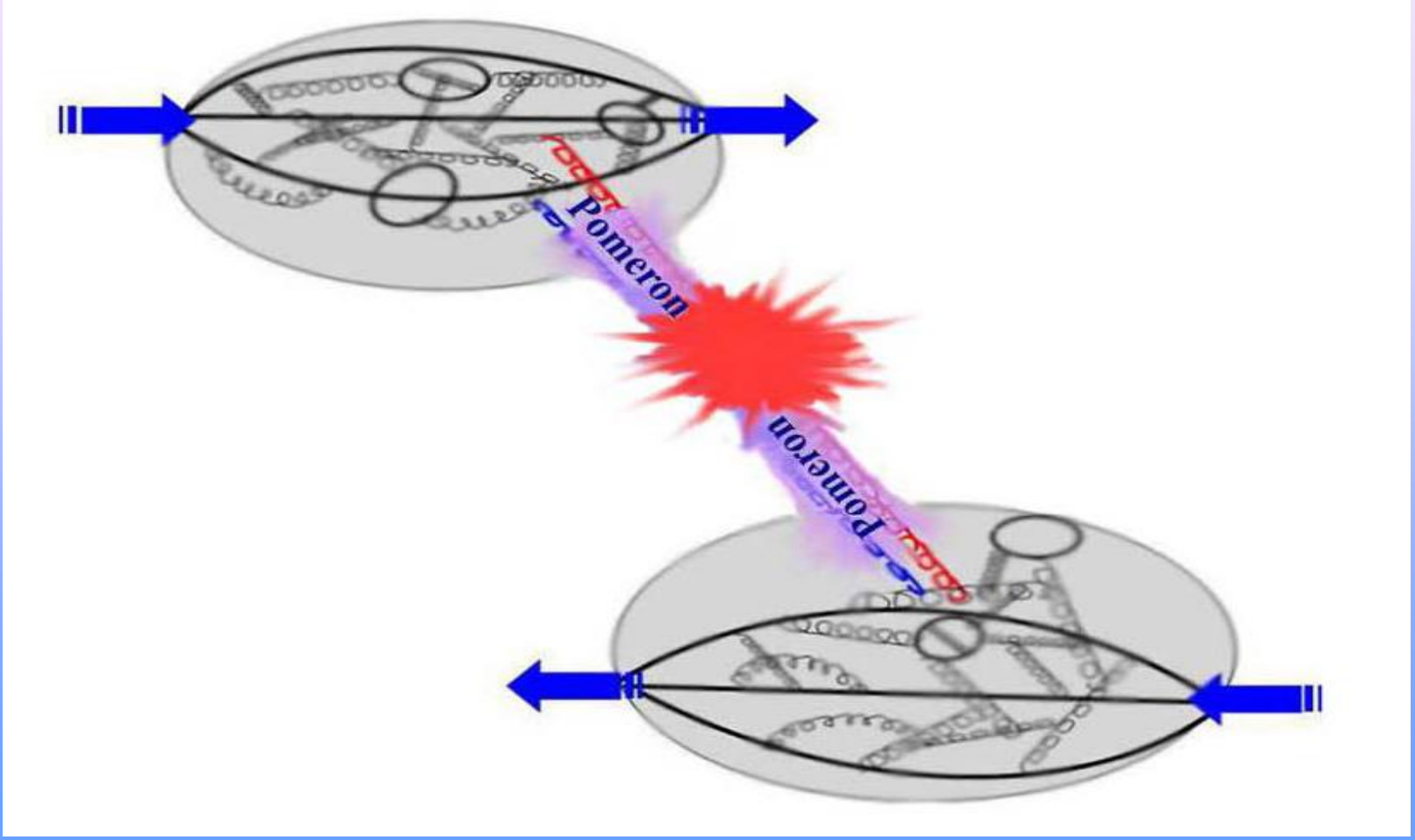
LHC as πp and ππ Collider ?



Central Diffractive Production:
Interplay of Long- and Short - Distance QCD Dynamics

[Task for High Precision Spectrometer]



TOP MODELS
BEFORE THE TOTEM DATA

"TOP MODELS" AFTER COMPARISON WITH THE TOTEM DATA