

$$\left\{ \begin{array}{l}
\sigma_{pp} = Z_{pp} + X \cdot s^\varepsilon + Y_1^{pp} s^{-\eta_1} - Y_2^{pp} s^{-\eta_2}, \\
\sigma_{\bar{p}p} = Z_{pp} + X \cdot s^\varepsilon + Y_1^{pp} s^{-\eta_1} + Y_2^{pp} s^{-\eta_2}, \\
\sigma_{\pi+p} = Z_{\pi p} + X \cdot s^\varepsilon + Y_1^{\pi p} s^{-\eta_1} - Y_2^{\pi p} s^{-\eta_2}, \\
\sigma_{\pi-p} = Z_{\pi p} + X \cdot s^\varepsilon + Y_1^{\pi p} s^{-\eta_1} + Y_2^{\pi p} s^{-\eta_2}, \\
\sigma_{K+p} = Z_{Kp} + X \cdot s^\varepsilon + Y_1^{Kp} s^{-\eta_1} - Y_2^{Kp} s^{-\eta_2}, \\
\sigma_{K-p} = Z_{Kp} + X \cdot s^\varepsilon + Y_1^{Kp} s^{-\eta_1} + Y_2^{Kp} s^{-\eta_2}, \\
\sigma_{\gamma p} = \delta \cdot (Z_{pp} + X \cdot s^\varepsilon) + Y_1^{\gamma p} s^{-\eta_1}, \\
\sigma_{\gamma\gamma} = \delta^2 \cdot (Z_{pp} + X \cdot s^\varepsilon) + Y_1^{\gamma\gamma} s^{-\eta_1}, \\
\sigma_{\Sigma-p} = Z_{\Sigma p} + X \cdot s^\varepsilon + Y_1^{\Sigma p} s^{-\eta_1} - Y_2^{\Sigma p} s^{-\eta_2}. \blacksquare \\
\rho_{pp}\sigma_{pp} = -\frac{X \cdot s^\varepsilon}{\tan\left[\frac{1+\varepsilon}{2}\pi\right]} - \frac{Y_1^{pp} s^{-\eta_1}}{\tan\left[\frac{1-\eta_1}{2}\pi\right]} - \frac{Y_2^{pp} s^{-\eta_2}}{\cot\left[\frac{1-\eta_2}{2}\pi\right]}, \\
\rho_{\bar{p}p}\sigma_{\bar{p}p} = -\frac{X \cdot s^\varepsilon}{\tan\left[\frac{1+\varepsilon}{2}\pi\right]} - \frac{Y_1^{pp} s^{-\eta_1}}{\tan\left[\frac{1-\eta_1}{2}\pi\right]} + \frac{Y_2^{pp} s^{-\eta_2}}{\cot\left[\frac{1-\eta_2}{2}\pi\right]}, \\
\rho_{\pi+p}\sigma_{\pi+p} = -\frac{X \cdot s^\varepsilon}{\tan\left[\frac{1+\varepsilon}{2}\pi\right]} - \frac{Y_1^{\pi p} s^{-\eta_1}}{\tan\left[\frac{1-\eta_1}{2}\pi\right]} - \frac{Y_2^{\pi p} s^{-\eta_2}}{\cot\left[\frac{1-\eta_2}{2}\pi\right]}, \\
\rho_{\pi-p}\sigma_{\pi-p} = -\frac{X \cdot s^\varepsilon}{\tan\left[\frac{1+\varepsilon}{2}\pi\right]} - \frac{Y_1^{\pi p} s^{-\eta_1}}{\tan\left[\frac{1-\eta_1}{2}\pi\right]} + \frac{Y_2^{\pi p} s^{-\eta_2}}{\cot\left[\frac{1-\eta_2}{2}\pi\right]}, \\
\rho_{K+p}\sigma_{K+p} = -\frac{X \cdot s^\varepsilon}{\tan\left[\frac{1+\varepsilon}{2}\pi\right]} - \frac{Y_1^{Kp} s^{-\eta_1}}{\tan\left[\frac{1-\eta_1}{2}\pi\right]} - \frac{Y_2^{Kp} s^{-\eta_2}}{\cot\left[\frac{1-\eta_2}{2}\pi\right]}, \\
\rho_{K-p}\sigma_{K-p} = -\frac{X \cdot s^\varepsilon}{\tan\left[\frac{1+\varepsilon}{2}\pi\right]} - \frac{Y_1^{Kp} s^{-\eta_1}}{\tan\left[\frac{1-\eta_1}{2}\pi\right]} + \frac{Y_2^{Kp} s^{-\eta_2}}{\cot\left[\frac{1-\eta_2}{2}\pi\right]},
\end{array} \right.$$

Variable s is in the units $[GeV^2]$. The additional scale $s_1 = 1 [GeV^2]$ in terms with $(s/s_1)^{-\eta_{1,2}}$ is omitted for brevity.

Adjustable parameters naming. In total 19 parameters used:

$$\begin{aligned} \varepsilon, \eta_1, \eta_2, \delta & - \text{dimensionless} \\ X, Z_{pp}, Z_{\pi p}, Z_{Kp}, Z_{\Sigma p}, Y_{1,2}^{pp}, Y_{1,2}^{\pi p}, Y_{1,2}^{Kp}, Y_{1,2}^{\Sigma p}, Y_1^{\gamma p}, Y_1^{\gamma\gamma} & - [\text{mb}] \end{aligned}$$

Scan-fits summary. 2000 database. Without cosmic data points.

$E_{\text{cm}}^{\text{min}}$ [GeV]	3	4	5	6	7	8	9	10
N_{dof} : ρ excluded	709	564	490	417	352	314	268	213
N_{dof} : ρ included	887	725	631	552	481	436	380	312
χ^2/dof : ρ excluded	1.36	1.04	0.89	0.86	0.87	0.86	0.83	0.76
χ^2/dof : ρ included	1.88	1.22	1.06	1.03	1.01	0.96	0.95	0.93

Details of the fit to the data in the whole domain of applicability

			χ^2/dof	=	0.956
			CL[%]	=	74.0
			Name of value	Numerical value	Error value
Breakdown of the CS data sample			ε	0.10134777	0.010953642
pp :	8.21361	78	η_1	0.34309186	0.023378107
$\bar{p}p$:	8.0405	43	η_2	0.54487001	0.0094151854
π^+p :	8.15962	28	X	15.685953	3.8215057
π^-p :	8.15962	61	δ	0.0031636678	0.000034904439
K^+p :	8.17372	26	Z_{pp}	4.1824033	6.215036
K^-p :	8.17372	37	$Z_{\pi p}$	-9.792634	6.0391943
Σ^-p :	11.922	8	Z_{Kp}	-12.42139	5.9383795
γp :	8.06586	28	$Z_{\Sigma p}$	3.4216468	6.9676518
$\gamma\gamma$:	8.	22	Y_{pp1}	57.450783	1.4863786
Breakdown of the ρ data sample			Y_{pp2}	33.468752	1.575049
pp :	8.55262	62	$Y_{\pi p1}$	40.828391	1.8882746
$\bar{p}p$:	11.5382	11	$Y_{\pi p2}$	6.8033827	0.35194253
π^+p :	8.98072	8	Y_{Kp1}	32.291959	2.2107119
π^-p :	8.36404	28	Y_{Kp2}	13.473102	0.62452453
K^+p :	8.99347	8	$Y_{\Sigma p1}$	13.035251	65.28109
K^-p :	11.5102	5	$Y_{\Sigma p2}$	-19.371356	128.4749
			$Y_{\gamma p1}$	0.10636581	0.0088878403
			$Y_{\gamma\gamma1}$	0.0000421402	0.000072671573

Model quality indicators:

	A^M	C_1^M	C_2^M	U^M	R_1^M	R_2^M	S_1^M	S_2^M
RRPE _u (19)	1.819	73.98	73.74	15.46	22.65	0.830	0.526	0.282

Repository:

computer - NPT1

directory - d:\MathemD\Kolja\Evela\Gauron\((RR)PEu(19)

Appendix RRPE_u(19) (N^o31) χ^2/NoP by data samples

		CS data							
Reaction	pp	$\bar{p}p$	π^+p	π^-p	K^+p	K^-p	Σ^-p	γp	$\gamma\gamma$
χ^2/NoP	1.04	1.19	0.34	0.98	0.4	0.74	0.41	0.66	0.65

		ρ data				
Reaction	pp	$\bar{p}p$	π^+p	π^-p	K^+p	K^-p
χ^2/NoP	1.28	0.48	1.62	0.88	1.02	1.85

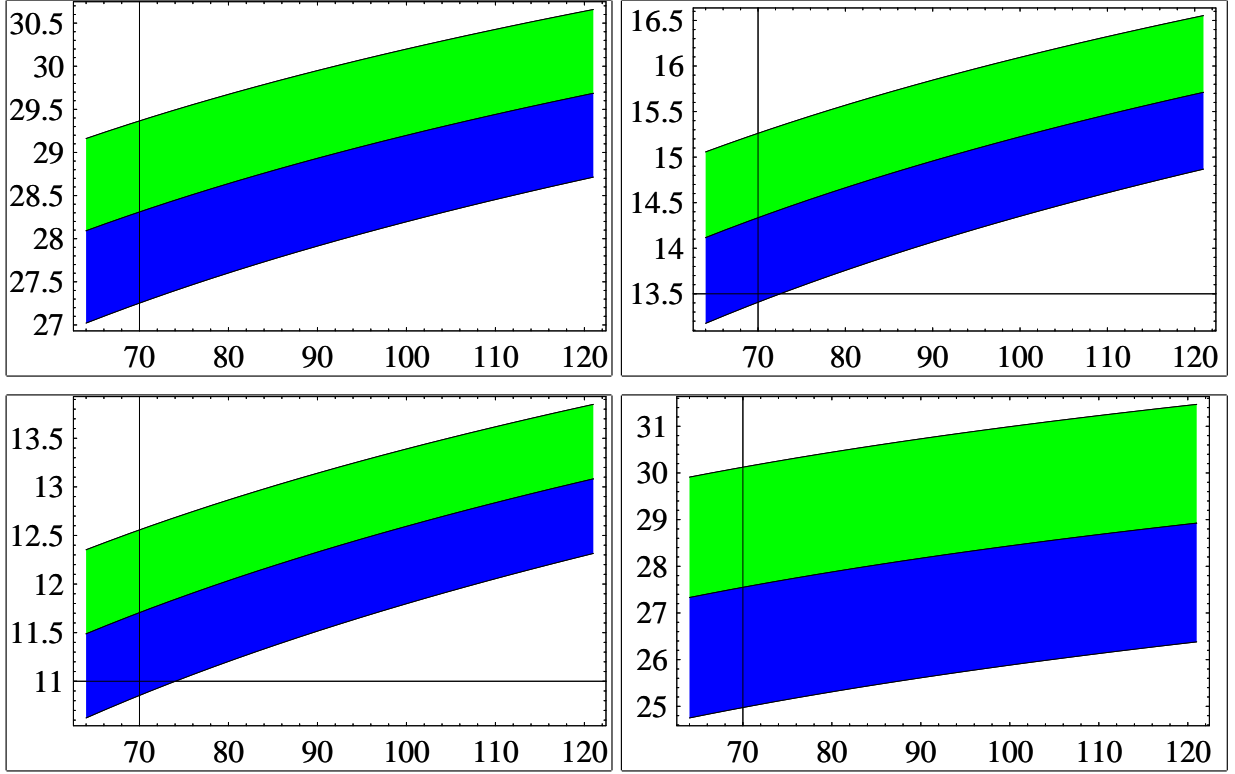


Figure 28: Pomeron contribution for pp , π^+p , K^+p and Σ^-p [mb] (Axis $X - s$ [GeV²])

RRPE_u(19) (N^o31) Correlation matrix

Appendix

	ϵ	η_1	η_2	X	δ	Z_{pp}	$Z_{\pi p}$	Z_{Kp}	$Z_{\Sigma p}$	Y_{pp1}	Y_{pp2}	$Y_{\pi p1}$	$Y_{\pi p2}$	Y_{Kp1}	Y_{Kp2}	$Y_{\Sigma p1}$	$Y_{\Sigma p2}$	$Y_{\gamma p1}$	$Y_{\gamma p2}$
ϵ	100	87	13.5	-99.7	-56.6	98.7	98.8	98.9	86.5	-71.2	11.3	-95.4	16.4	-96.5	13.6	-13.2	7.92	-85.4	-51.9
η_1	87	100	17.5	-90.1	-62.7	93	92.8	92.5	80.7	-38.5	14.7	-78.4	22.5	-83.5	17.4	-13.2	8.17	-76.4	-52.4
η_2	13.5	17.5	100	-13.7	-3.71	13.7	14.2	14.1	12	13.8	98.1	-10.1	89.5	-10.2	95.9	-1.16	1	-7.81	-9.4
X	-99.7	-90.1	-13.7	100	58.7	-99.7	-99.7	-99.8	-87.3	69.7	-11.4	95.6	-16.9	97.1	-13.8	13.6	-8.18	86.3	53
δ	-56.6	-62.7	-3.71	58.7	100	-60.5	-60.2	-60.1	-52.5	33.5	-2.11	53.4	-7.51	56.1	-3.98	8.73	-5.38	15.7	-3.6
Z_{pp}	98.7	93	13.7	-99.7	-60.5	100	100	100	87.4	-66.6	11.3	-94.5	17.4	-96.6	13.8	-13.8	8.35	-86.2	-53.7
$Z_{\pi p}$	98.8	92.8	14.2	-99.7	-60.2	100	100	100	87.4	-66.7	11.8	-94.7	17.8	-96.7	14.3	-13.7	8.33	-86.2	-53.6
Z_{Kp}	98.9	92.5	14.1	-99.8	-60.1	100	100	100	87.5	-67.2	11.7	-94.8	17.6	-96.9	14.2	-13.7	8.32	-86.3	-53.6
$Z_{\Sigma p}$	86.5	80.7	12	-87.3	-52.5	87.4	87.4	87.5	100	-59.5	9.93	-83.3	15.1	-84.9	12.1	-59.4	54.2	-75.7	-46.8
Y_{pp1}	-71.2	-38.5	13.8	69.7	33.5	-66.6	-66.7	-67.2	-59.5	100	14.9	84.1	12.4	79.5	12.7	9.42	-5.51	68.6	31.6
Y_{pp2}	11.3	14.7	98.1	-11.4	-2.11	11.3	11.8	11.7	9.93	14.9	100	-8.15	87.6	-8.18	94	-0.824	0.783	-5.93	-8.0
$Y_{\pi p1}$	-95.4	-78.4	-10.1	95.6	53.4	-94.5	-94.7	-94.8	-83.3	84.1	-8.15	100	-13.5	98	-10.3	13.2	-7.92	86.1	49.4
$Y_{\pi p2}$	16.4	22.5	89.5	-16.9	-7.51	17.4	17.8	17.6	15.1	12.4	87.6	-13.5	100	-13.1	85.8	-1.81	1.38	-10.8	-11.5
Y_{Kp1}	-96.5	-83.5	-10.2	97.1	56.1	-96.6	-96.7	-96.9	-84.9	79.5	-8.18	98	-13.1	100	-11.2	13.5	-8.15	86.8	51
Y_{Kp2}	13.6	17.4	95.9	-13.8	-3.98	13.8	14.3	14.2	12.1	12.7	94	-10.3	85.8	-11.2	100	-1.21	1.02	-8.09	-9.4
$Y_{\Sigma p1}$	-13.2	-13.2	-1.16	13.6	8.73	-13.8	-13.7	-13.7	-59.4	9.42	-0.824	13.2	-1.81	13.5	-1.21	100	-99.6	12.1	7.5
$Y_{\Sigma p2}$	7.92	8.17	1	-8.18	-5.38	8.35	8.33	8.32	54.2	-5.51	0.783	-7.92	1.38	-8.15	1.02	-99.6	100	-7.34	-4.6
$Y_{\gamma p1}$	-85.4	-76.4	-7.81	86.3	15.7	-86.2	-86.2	-86.3	-75.7	68.6	-5.93	86.1	-10.8	86.8	-8.09	12.1	-7.34	100	68.4
$Y_{\gamma p2}$	-51.9	-52.4	-9.43	53	-3.56	-53.7	-53.6	-53.6	-46.8	31.6	-8.01	49.4	-11.5	51	-9.4	7.51	-4.6	68.4	100

Appendix RRPE_u(19) (N^o31) Parameters evolution

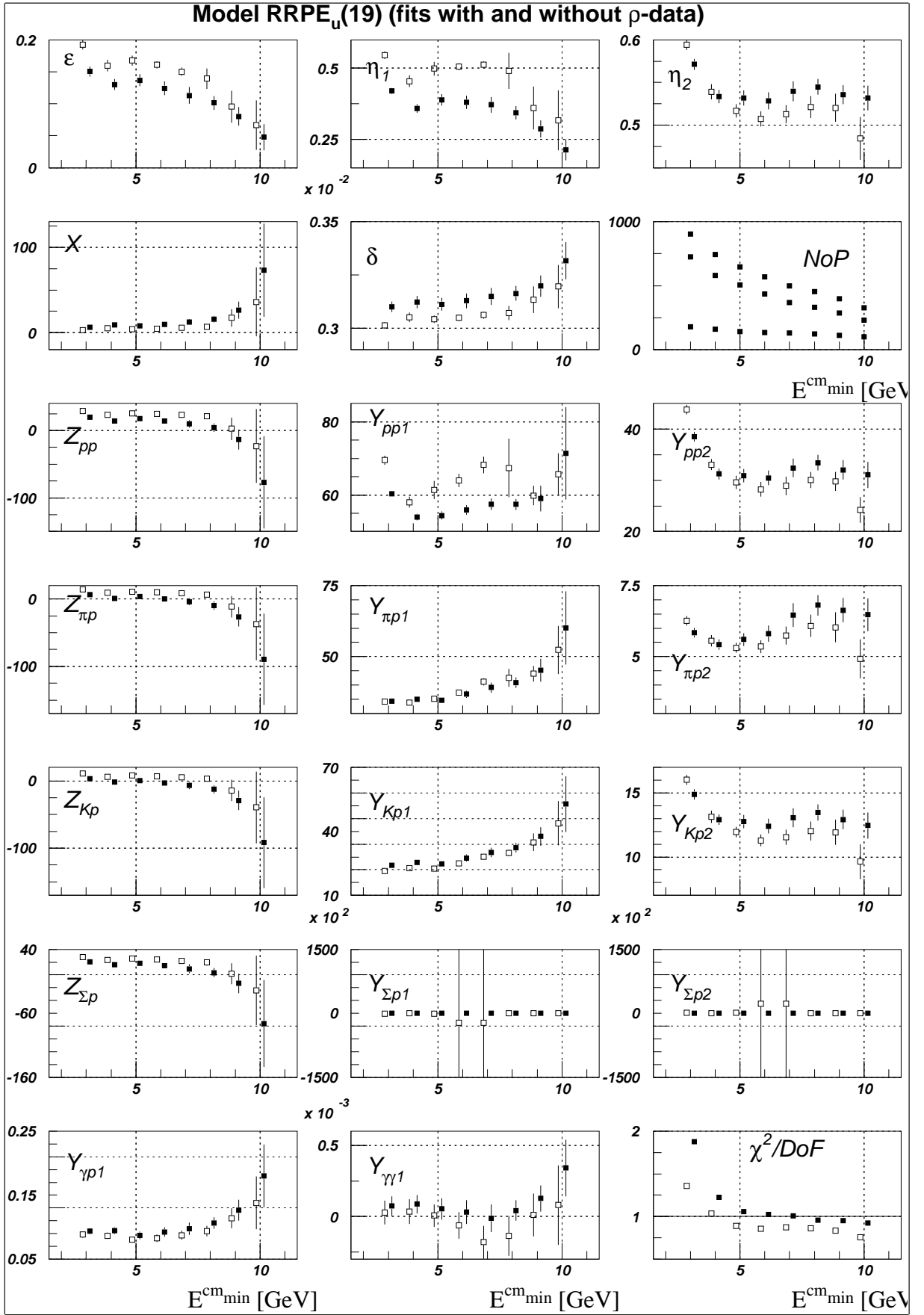


Figure 29: Bold (empty) symbol marks fits with (without) ρ data and are shifted to the right (left) in energy slightly for the cleareness

