$$
\begin{cases}
\sigma_{pp} &= Z_{pp} + B_{pp}\ln s + Y_1^{pp}s^{-\eta_1} - Y_2^{pp}s^{-\eta_2},\\
\sigma_{\bar{p}p} &= Z_{pp} + B_{pp}\ln s + Y_1^{pp}s^{-\eta_1} + Y_2^{pp}s^{-\eta_2},\\
\sigma_{\pi^+p} &= Z_{\pi p} + B_{\pi p}\ln s + Y_1^{\pi p}s^{-\eta_1} - Y_2^{\pi p}s^{-\eta_2},\\
\sigma_{\pi^-p} &= Z_{\pi p} + B_{\pi p}\ln s + Y_1^{\pi p}s^{-\eta_1} + Y_2^{\pi p}s^{-\eta_2},\\
\sigma_{K^+p} &= Z_{Kp} + B_{Kp}\ln s + Y_1^{Kp}s^{-\eta_1} - Y_2^{Kp}s^{-\eta_2},\\
\sigma_{K^-p} &= Z_{Kp} + B_{Kp}\ln s + Y_1^{Kp}s^{-\eta_1} + Y_2^{Kp}s^{-\eta_2},\\
\sigma_{\gamma p} &= \delta\left(Z_{pp} + B_{pp}\ln s\right) + Y_1^{\gamma p}s^{-\eta_1},\\
\sigma_{\gamma\gamma} &= \delta^2\left(Z_{pp} + B_{pp}\ln s\right) + Y_1^{\gamma\gamma}s^{-\eta_1},\\
\sigma_{\Sigma^-p} &= Z_{\Sigma p} + B_{\Sigma p}\ln s + Y_1^{\Sigma p}s^{-\eta_1} - Y_2^{\Sigma p}s^{-\eta_2}.
\end{cases}
$$

$$
\begin{cases}
\rho_{pp}\sigma_{pp} &= \dfrac{\pi B_{pp}}{2} - \dfrac{Y_1^{pp}s^{-\eta_1}}{\tan\left[\dfrac{1-\eta_1}{2}\pi\right]} - \dfrac{Y_2^{pp}s^{-\eta_2}}{\cot\left[\dfrac{1-\eta_2}{2}\pi\right]},\\
\rho_{\bar{p}p}\sigma_{\bar{p}p} &= \dfrac{\pi B_{pp}}{2} - \dfrac{Y_1^{pp}s^{-\eta_1}}{\tan\left[\dfrac{1-\eta_1}{2}\pi\right]} + \dfrac{Y_2^{pp}s^{-\eta_2}}{\cot\left[\dfrac{1-\eta_2}{2}\pi\right]},\\
\rho_{\pi^+p}\sigma_{\pi^+p} &= \dfrac{\pi B_{\pi p}}{2} - \dfrac{Y_1^{\pi p}s^{-\eta_1}}{\tan\left[\dfrac{1-\eta_1}{2}\pi\right]} - \dfrac{Y_2^{\pi p}s^{-\eta_2}}{\cot\left[\dfrac{1-\eta_2}{2}\pi\right]},\\
\rho_{\pi^-p}\sigma_{\pi^-p} &= \dfrac{\pi B_{\pi p}}{2} - \dfrac{Y_1^{\pi p}s^{-\eta_1}}{\tan\left[\dfrac{1-\eta_1}{2}\pi\right]} + \dfrac{Y_2^{\pi p}s^{-\eta_2}}{\cot\left[\dfrac{1-\eta_2}{2}\pi\right]},\\
\rho_{K^+p}\sigma_{K^+p} &= \dfrac{\pi B_{Kp}}{2} - \dfrac{Y_1^{Kp}s^{-\eta_1}}{\tan\left[\dfrac{1-\eta_1}{2}\pi\right]} - \dfrac{Y_2^{Kp}s^{-\eta_2}}{\cot\left[\dfrac{1-\eta_2}{2}\pi\right]},\\
\rho_{K^-p}\sigma_{K^-p} &= \dfrac{\pi B_{Kp}}{2} - \dfrac{Y_1^{Kp}s^{-\eta_1}}{\tan\left[\dfrac{1-\eta_1}{2}\pi\right]} + \dfrac{Y_2^{Kp}s^{-\eta_2}}{\cot\left[\dfrac{1-\eta_2}{2}\pi\right]},
\end{cases}
$$

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 21 parameters used:

η_1, η_2, δ – dimensionless
$Z_{pp}, Z_{\pi p}, Z_{Kp}, Z_{\Sigma p}, B_{pp}, B_{\pi p}, B_{Kp}, B_{\Sigma p}$ – [mb]
$Y_{1,2}^{pp}, Y_{1,2}^{\pi p}, Y_{1,2}^{Kp}, Y_{1,2}^{\Sigma p}, Y_1^{\gamma p}, Y_1^{\gamma\gamma}$ – [mb]

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

$E_{\rm cm}^{\rm min}$ [GeV]	3	4	5	6	7	8	9	10
N_{dof}: ρ excluded	705	560	486	413	348	310	264	209
N_{dof}: ρ included	883	721	627	548	477	432	376	308
χ^2/dof: ρ excluded	1.33	0.98	0.85	0.83	0.87	0.87	0.84	0.74
χ^2/dof: ρ included	1.63	1.11	0.98	0.98	0.99	0.94	0.93	0.91

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

	$\sqrt{s}$ of the starting point in [**GeV**]	Number of data points
Breakdown of the CS data sample		
pp:	5.00963	112
$\bar{p}p$:	5.1569	59
π^+p:	5.21275	50
π^-p:	5.02954	106
K^+p:	5.12707	40
K^-p:	5.10875	63
Σ^-p:	6.12189	9
γp:	5.01008	38
$\gamma\gamma$:	5.	30
Breakdown of the ρ data sample		
pp:	5.30542	74
$\bar{p}p$:	11.5382	11
π^+p:	8.98072	8
π^-p:	7.56285	30
K^+p:	5.21771	10
K^-p:	5.23565	8

χ^2/dof	=	**0.98**
CL[%]	=	66.59
Name of value	Numerical value	Error value
η_1	0.20804983	0.0081843967
η_2	0.53637805	0.0063821539
δ	0.0034571382	0.000041246466
B_{pp}	6.5817218	0.23374123
$B_{\pi p}$	4.9677831	0.21128001
B_{Kp}	4.0083088	0.20222005
$B_{\Sigma p}$	3.6491645	9.717062
Y_{pp1}	103.61068	3.0863341
Y_{pp2}	32.036043	0.94003067
$Y_{\pi p1}$	65.779961	2.7899416
$Y_{\pi p2}$	5.6445108	0.15799338
Y_{Kp1}	45.237665	2.66838
Y_{Kp2}	12.937264	0.37044689
$Y_{\Sigma p1}$	0.012899879	232.50648
$Y_{\Sigma p2}$	-76.574871	191.63066
$Y_{\gamma p1}$	0.28513947	0.013159549
$Y_{\gamma\gamma 1}$	0.00074682565	0.000055617978
Z_{pp}	-28.963728	3.7085676
$Z_{\pi p}$	-24.447934	2.942881
Z_{Kp}	-16.541522	2.4614956
$Z_{\Sigma p}$	9.6315719	117.58049

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
RRPL(21)	1.607	66.59	82.16	26.29	29.45	0.752	0.210	1.135

Repository:

computer - **NPT1**

`directory - d:\MathemD\Kolja\Evela\Gauron\(RR)PL(21)`

Appendix RRPL(21) (№19) 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	0.87	1.01	0.78	0.89	0.72	0.62	0.38	0.75	0.95

	ρ data					
Reaction	pp	$\bar{p}p$	π^+p	π^-p	K^+p	K^-p
χ^2/NoP	1.57	0.47	1.59	1.27	1.11	1.24

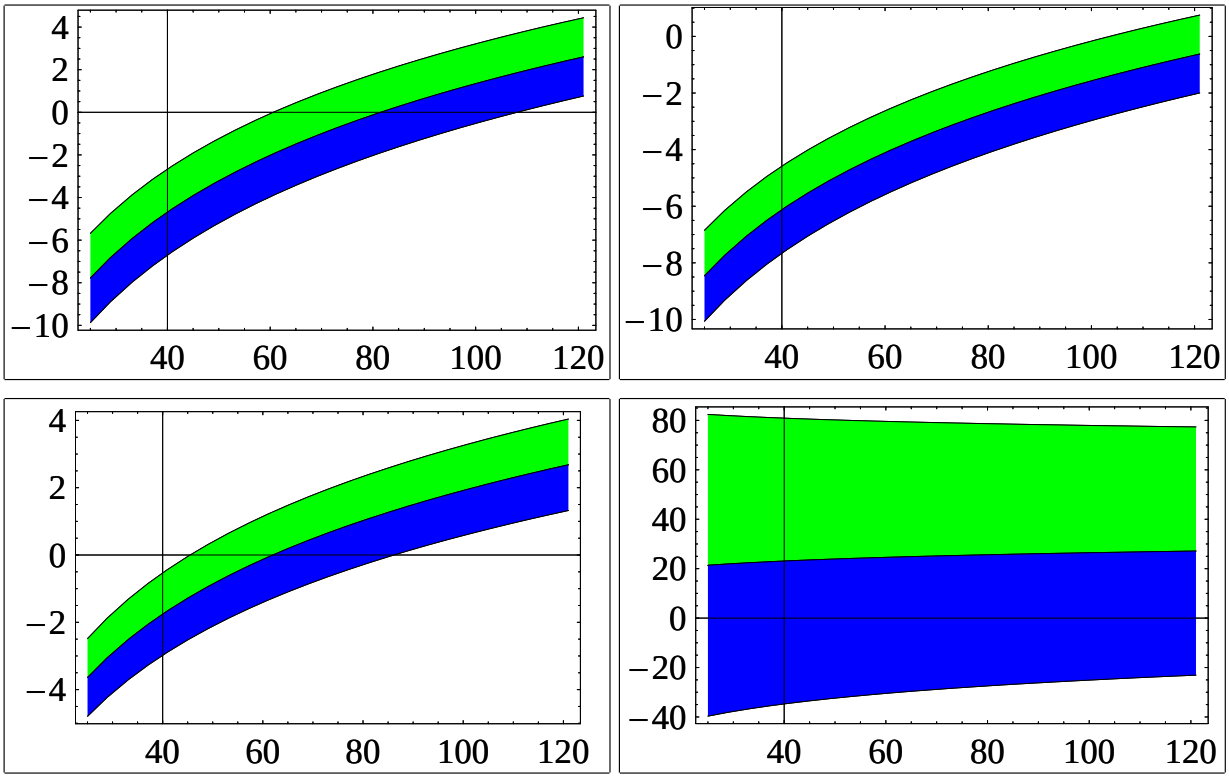


Figure 18: Pomeron contribution for pp, π^+p, K^+p and Σ^-p, [mb] (Axis X – s [GeV^2])

	η_1	η_2	δ	B_{pp}	$B_{\pi p}$	B_{Kp}	$B_{\Sigma p}$	Y_{pp1}	Y_{pp2}	$Y_{\pi p1}$	$Y_{\pi p2}$	Y_{Kp1}	Y_{Kp2}	$Y_{\Sigma p1}$	$Y_{\Sigma p2}$	$Y_{\gamma p1}$	$Y_{\gamma\gamma 1}$	Z_{pp}	$Z_{\pi p}$	Z_{Kp}	$Z_{\Sigma p}$
η_1	100	22.8	-59.5	**-96.2**	**-91.6**	-69.8	-4.07	**-94.5**	24	**-92.2**	22.6	-69.8	21.6	-4	4.06	**-96.4**	**-90.9**	**98.3**	**96.1**	82	4.05
η_2	22.8	100	-1.95	-13.7	-22.2	-14.9	0.3	-8.38	**97.5**	-22.5	88.3	-14.8	**94.5**	0.65	-0.3	-11.7	-13.1	15.9	22.9	17.8	-0.4
δ	-59.5	-1.95	100	60.6	54.3	41.6	2.57	61.1	-1.72	54.6	-3.28	41.7	-1.93	2.57	-2.57	60.5	51.2	-61	-57	-48.9	-2.57
B_{pp}	**-96.2**	-13.7	60.6	100	88	67.2	4.02	**99.6**	-13.8	88.6	-14.6	67.3	-13.1	3.99	-4.02	**99.8**	**92.8**	**-99.6**	**-92.4**	-79	-4.02
$B_{\pi p}$	**-91.6**	-22.2	54.3	88	100	63.9	3.71	86.4	-23.2	**99.9**	-19.5	64	-21.1	3.65	-3.71	88.2	83.2	**-90**	**-99.1**	-75.1	-3.7
B_{Kp}	-69.8	-14.9	41.6	67.2	63.9	100	2.85	66.1	-15.8	64.3	-14.9	**99.8**	-11.3	2.81	-2.85	67.4	63.5	-68.7	-67.1	**-98.2**	-2.84
$B_{\Sigma p}$	-4.07	0.3	2.57	4.02	3.71	2.85	100	4.02	0.261	3.73	0.197	2.85	0.323	**99.8**	**-98.9**	4.06	3.8	-4.08	-3.9	-3.35	-100
Y_{pp1}	**-94.5**	-8.38	61.1	**99.6**	86.4	66.1	4.02	100	-7.86	86.9	-9.86	66.1	-8.05	4	-4.01	**99.7**	**92.4**	**-98.9**	**-90.7**	-77.6	-4.02
Y_{pp1}	24	**97.5**	-1.72	-13.8	-23.2	-15.8	0.261	-7.86	100	-23.6	86.2	-15.7	**92.1**	0.6	-0.2	-11.7	-13.4	16.3	24	18.8	-0.332
$Y_{\pi p1}$	**-92.2**	-22.5	54.6	88.6	**99.9**	64.3	3.73	86.9	-23.6	100	-20.1	64.4	-21.4	3.67	-3.73	88.7	83.7	**-90.5**	**-99.3**	-75.6	-3.72
$Y_{\pi p2}$	22.6	88.3	-3.28	-14.6	-19.5	-14.9	0.197	-9.86	86.2	-20.1	100	-14.8	83.5	0.463	-0.2	-12.8	-13.9	16.5	21	17.8	-0.262
Y_{Kp1}	-69.8	-14.8	41.7	67.3	64	**99.8**	2.85	66.1	-15.7	64.4	-14.8	100	-11.5	2.82	-2.85	67.5	63.6	-68.7	-67.1	**-98.2**	-2.85
Y_{Kp2}	21.6	**94.5**	-1.93	-13.1	-21.1	-11.3	0.323	-8.05	**92.1**	-21.4	83.5	-11.5	100	0.608	-0.3	-11.2	-12.5	15.1	21.8	14.8	-0.392
$Y_{\Sigma p1}$	-4	0.65	2.57	3.99	3.65	2.81	**99.8**	4	0.6	3.67	0.463	2.82	0.608	100	**-99.5**	4.03	3.76	-4.04	-3.83	-3.3	**-99.9**
$Y_{\Sigma p2}$	4.06	-0.3	-2.57	-4.02	-3.71	-2.85	**-98.9**	-4.01	-0.2	-3.73	-0.2	-2.85	-0.3	**-99.5**	100	-4.05	-3.79	4.08	3.89	3.34	**99.2**
$Y_{\gamma p1}$	**-96.4**	-11.7	60.5	**99.8**	88.2	67.4	4.06	**99.7**	-11.7	88.7	-12.8	67.5	-11.2	4.03	-4.05	100	**93**	**-99.6**	**-92.6**	-79.2	-4.05
$Y_{\gamma\gamma 1}$	**-90.9**	-13.1	51.2	**92.8**	83.2	63.5	3.8	**92.4**	-13.4	83.7	-13.9	63.6	-12.5	3.76	-3.79	**93**	100	**-93**	-87.3	-74.6	-3.79
Z_{pp}	**98.3**	15.9	-61	**-99.6**	**-90**	-68.7	-4.08	**-98.9**	16.3	**-90.5**	16.5	-68.7	15.1	-4.04	4.08	**-99.6**	**-93**	100	**94.4**	80.7	4.08
$Z_{\pi p}$	**96.1**	22.9	-57	**-92.4**	**-99.1**	-67.1	-3.9	**-90.7**	24	**-99.3**	21	-67.1	21.8	-3.83	3.89	**-92.6**	-87.3	**94.4**	100	78.8	3.88
Z_{Kp}	82	17.8	-48.9	-79	-75.1	**-98.2**	-3.35	-77.6	18.8	-75.6	17.8	**-98.2**	14.8	-3.3	3.34	-79.2	-74.6	80.7	78.8	100	3.34
$Z_{\Sigma p}$	4.05	-0.4	-2.57	-4.02	-3.7	-2.84	-100	-4.02	-0.332	-3.72	-0.262	-2.85	-0.392	**-99.9**	**99.2**	-4.05	-3.79	4.08	3.88	3.34	100

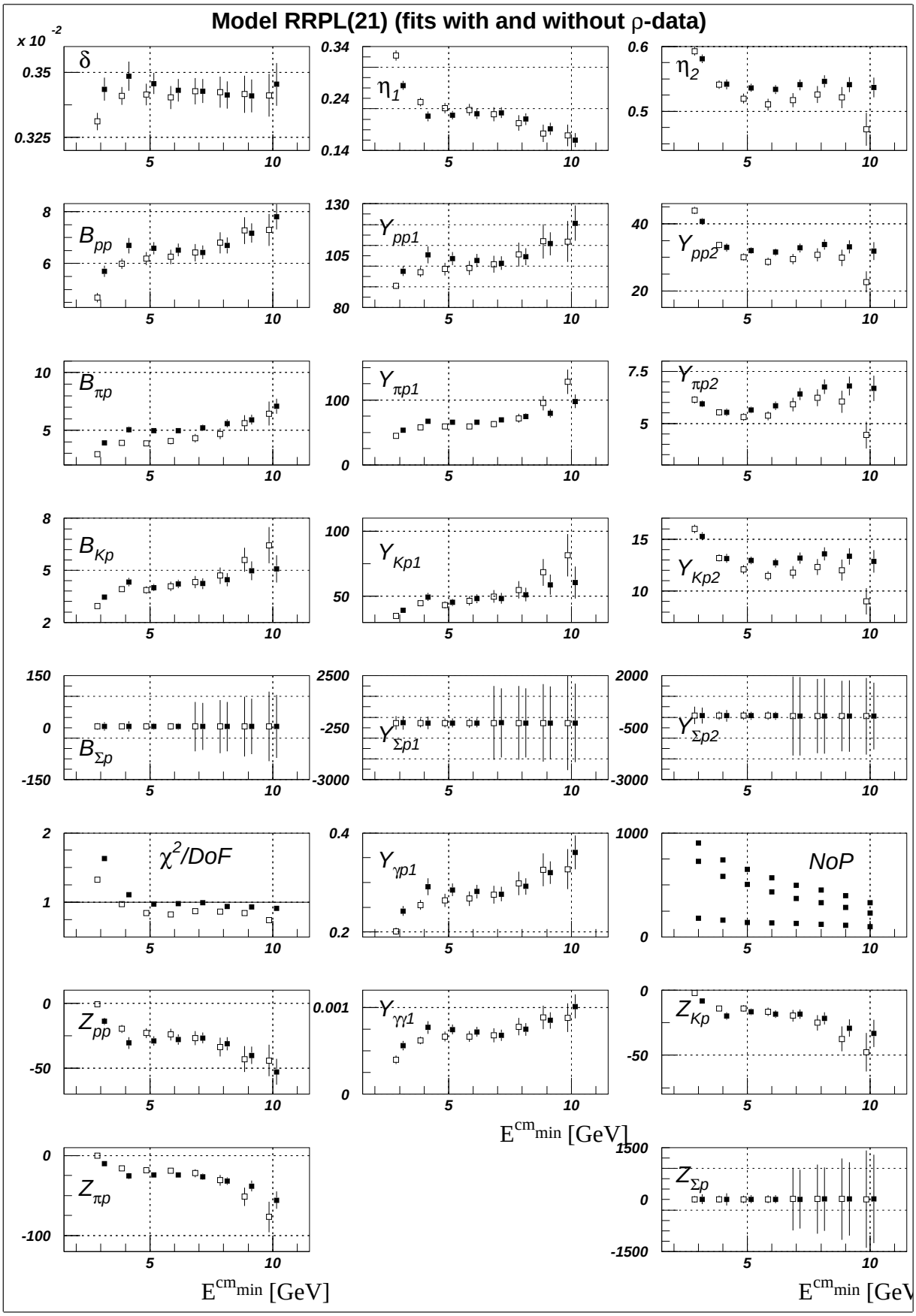
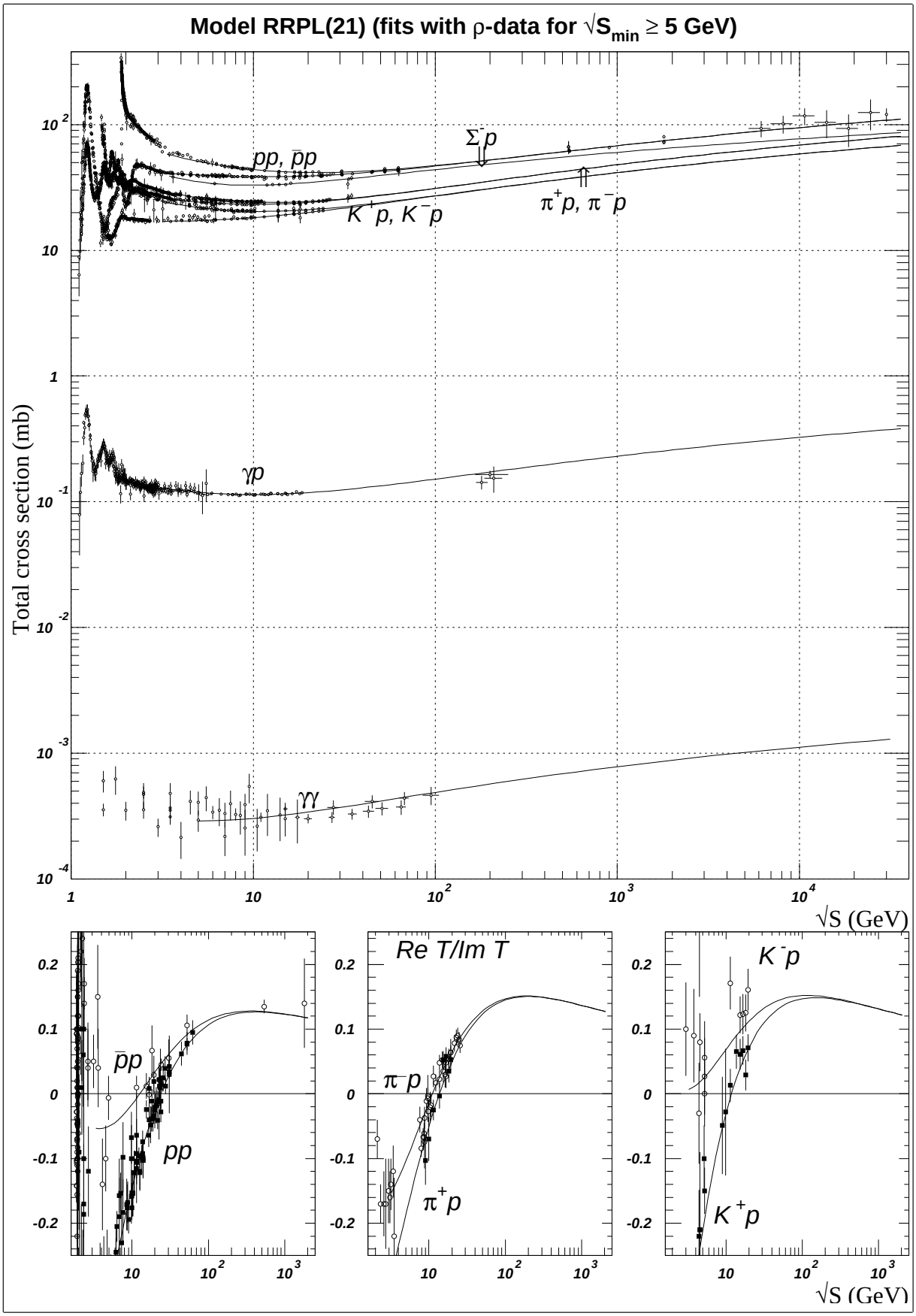


Figure 19: Bold (empty) symbol marks fits with (without) $\boldsymbol{\rho}$ data and are shifted to the right (left) in energy slightly for the cleareness


Model RRPL(21) (fits with ρ-data for √S_min ≥ 5 GeV)
Total cross section (mb)
√S (GeV)
pp, p̄p
Σ⁻p
K⁺p, K⁻p
π⁺p, π⁻p
γp
γγ
Re T/Im T
p̄p
pp
π⁻p
π⁺p
K⁻p
K⁺p
√S (GeV)