$$\begin{cases}
\sigma_{pp} &= A + B\cdot\ln\ s + C\cdot\ln^2 s + Y_1^{pp}s^{-\eta_1} - Y_2^{pp}s^{-\eta_2},\\
\sigma_{\bar{p}p} &= A + B\cdot\ln\ s + C\cdot\ln^2 s + Y_1^{pp}s^{-\eta_1} + Y_2^{pp}s^{-\eta_2},\\
\sigma_{\pi^+p} &= \lambda_{\pi p}(A + B\cdot\ln\ s + C\cdot\ln^2 s) + Y_1^{\pi p}s^{-\eta_1} - Y_2^{\pi p}s^{-\eta_2},\\
\sigma_{\pi^-p} &= \lambda_{\pi p}(A + B\cdot\ln\ s + C\cdot\ln^2 s) + Y_1^{\pi p}s^{-\eta_1} + Y_2^{\pi p}s^{-\eta_2},\\
\sigma_{K^+p} &= \lambda_{Kp}(A + B\cdot\ln\ s + C\cdot\ln^2 s) + Y_1^{Kp}s^{-\eta_1} - Y_2^{Kp}s^{-\eta_2},\\
\sigma_{K^-p} &= \lambda_{Kp}(A + B\cdot\ln\ s + C\cdot\ln^2 s) + Y_1^{Kp}s^{-\eta_1} + Y_2^{Kp}s^{-\eta_2},\\
\sigma_{\gamma p} &= \lambda_{\gamma p}(A + B\cdot\ln\ s + C\cdot\ln^2 s) + Y_1^{\gamma p}s^{-\eta_1},\\
\sigma_{\gamma\gamma} &= \lambda_{\gamma\gamma}(A + B\cdot\ln\ s + C\cdot\ln^2 s) + Y_1^{\gamma\gamma}s^{-\eta_1},\\
\sigma_{\Sigma^-p} &= \lambda_{\Sigma p}(A + B\cdot\ln\ s + C\cdot\ln^2 s) + Y_1^{\Sigma p}s^{-\eta_1} - Y_2^{\Sigma p}s^{-\eta_2}. \blacksquare
\end{cases}$$

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

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 20 parameters used:

$$\eta_1, \eta_2, \lambda_{\pi p}, \lambda_{Kp}, \lambda_{\Sigma p}, \lambda_{\gamma p}, \lambda_{\gamma\gamma} \quad - \quad \text{dimensionless}$$

$$A, B, C, Y_{1,2}^{pp}, Y_{1,2}^{\pi p}, Y_{1,2}^{Kp}, Y_{1,2}^{\Sigma p}, Y_1^{\gamma p}, Y_1^{\gamma\gamma} \quad - \quad [\text{mb}]$$

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

E_{cm}^{min} [GeV]	3	4	5	6	7	8	9	10
N_{dof}: ρ excluded	706	561	487	414	349	311	265	210
N_{dof}: ρ included	884	722	628	549	478	433	377	309
χ^2/dof: ρ excluded	1.30	0.96	0.82	0.80	0.85	0.85	0.85	0.82
χ^2/dof: ρ included	1.61	1.10	0.97	0.97	0.998	0.95	0.93	0.93

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	=	**0.97**
CL[%]	=	69.72
Name of value	Numerical value	Error value
η_1	0.20020869	0.010536634
η_2	0.54334494	0.0064091006
$\lambda_{\pi p}$	0.68816667	0.0062681718
λ_{Kp}	0.65072174	0.010242795
$\lambda_{\Sigma p}$	1.0644665	0.058302433
$\lambda_{\gamma p}$	0.0035982407	0.000059308528
$\lambda_{\gamma\gamma}$	9.434353E-06	5.4339892E-07
B	7.5860589	0.83911335
A	-38.50015	8.5802622
C	-0.02800196	0.025777808
Y_{pp1}	113.76647	8.0642168
Y_{pp2}	33.168757	0.9704665
$Y_{\pi p1}$	66.769441	6.1105925
$Y_{\pi p2}$	5.7639493	0.16248065
Y_{Kp1}	55.18892	6.1761696
Y_{Kp2}	13.365214	0.38183928
$Y_{\gamma p1}$	0.32421008	0.033242904
$Y_{\gamma\gamma 1}$	0.00089545109	0.000086567891
$Y_{\Sigma p1}$	92.433612	11.013198
$Y_{\Sigma p2}$	8.1833441	21.692103

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
RR(PL2)(20)	1.595	69.72	82.05	17.05	30.86	0.616	0.013	1.295

Repository:

computer - **NPT1**

directory - `d:\MathemD\Kolja\Evela\Gauron\(RR)(PL2)(20)`

	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	0.98	0.95	0.82	0.74	0.64	0.41	0.72	0.53

	ρ data					
Reaction	pp	$\bar{p}p$	π^+p	π^-p	K^+p	K^-p
χ^2/NoP	1.56	0.47	1.83	1.47	1.33	1.2

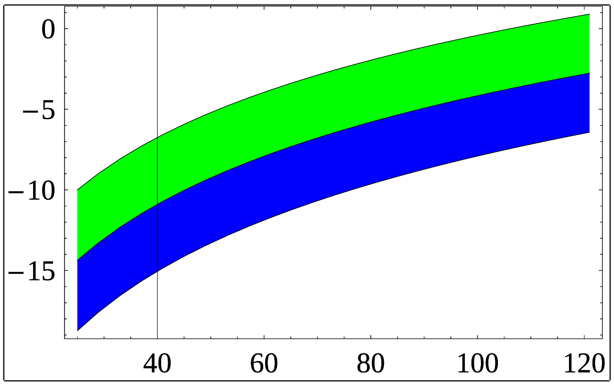


Figure 32: Pomeron contribution for pp [mb] (Axis X – s [GeV^2])

	η_1	η_2	$\lambda_{\pi p}$	λ_{Kp}	$\lambda_{\Sigma p}$	$\lambda_{\gamma p}$	$\lambda_{\gamma\gamma}$	B	A	C	Y_{pp1}	Y_{pp2}	$Y_{\pi p1}$	$Y_{\pi p2}$	Y_{Kp1}	Y_{Kp2}	$Y_{\Sigma p1}$	$Y_{\Sigma p2}$	$Y_{\gamma p1}$	$Y_{\gamma\gamma 1}$
η_1	**100**	31.2	**-93**	**-97.1**	-14	-75.2	-14.4	-86.9	**94.6**	70.1	**-92**	33.2	**-93.4**	26.8	**-94.3**	27.7	**-93.9**	**-91.2**	-88.6	-9.05
η_2	31.2	**100**	-12.1	-22.3	-3.87	-14.9	-3.02	-24.2	26.7	19.4	-24.1	**97.5**	-24.9	88.5	-25.5	**94.6**	-25.2	-24.5	-23.3	-1.84
$\lambda_{\pi p}$	**-93**	-12.1	**100**	**94.8**	13.1	74.6	14.1	83.3	**-90.2**	-67.2	88.9	-12.7	**90.1**	-8.91	**90.6**	-9.38	**90.3**	87.8	85.4	9.26
λ_{Kp}	**-97.1**	-22.3	**94.8**	**100**	13.7	75.4	14.4	84.7	**-92.4**	-67.8	**90.3**	-23.5	**91.6**	-18.7	**92.4**	-18.6	**92**	89.4	87	9.16
$\lambda_{\Sigma p}$	-14	-3.87	13.1	13.7	**100**	10.5	2.12	10.7	-12.3	-8.02	11.7	-4.16	12	-3.48	12.2	-3.45	12.1	11.7	-18.1	-85.2
$\lambda_{\gamma p}$	-75.2	-14.9	74.6	75.4	10.5	**100**	11.2	66.8	-72.4	-54	71.1	-15.7	72	-12.2	72.5	-12.5	73	70.3	68.3	7.27
$\lambda_{\gamma\gamma}$	-14.4	-3.02	14.1	14.4	2.12	11.2	**100**	12.3	-13.5	-9.76	13.1	-3.22	13.3	-2.57	13.5	-2.58	13.4	10.6	12.7	1.3
B	-86.9	-24.2	83.3	84.7	10.7	66.8	12.3	**100**	**-98.2**	**-95.9**	**99.1**	-25.6	**98.6**	-18.7	**98.2**	-20.7	**98.4**	**96.1**	**92.4**	9
A	**94.6**	26.7	**-90.2**	**-92.4**	-12.3	-72.4	-13.5	**-98.2**	**100**	88.9	**-99.7**	28.2	**-99.9**	21.5	-100	23	**-99.9**	**-97.4**	**-94**	-9.4
C	70.1	19.4	-67.2	-67.8	-8.02	-54	-9.76	**-95.9**	88.9	**100**	**-91.4**	20.7	-89.9	14.1	-88.9	16.3	-89.4	-87.5	-83.6	-7.63
Y_{pp1}	**-92**	-24.1	88.9	**90.3**	11.7	71.1	13.1	**99.1**	**-99.7**	**-91.4**	**100**	-25.4	**99.9**	-18.9	**99.8**	-20.6	**99.9**	**97.4**	**93.9**	9.41
Y_{pp2}	33.2	**97.5**	-12.7	-23.5	-4.16	-15.7	-3.22	-25.6	28.2	20.7	-25.4	**100**	-26.3	86.4	-26.9	**92.2**	-26.7	-25.9	-24.6	-1.85
$Y_{\pi p1}$	**-93.4**	-24.9	**90.1**	**91.6**	12	72	13.3	**98.6**	**-99.9**	-89.9	**99.9**	-26.3	**100**	-19.8	**100**	-21.4	**100**	**97.5**	**94.1**	9.45
$Y_{\pi p2}$	26.8	88.5	-8.91	-18.7	-3.48	-12.2	-2.57	-18.7	21.5	14.1	-18.9	86.4	-19.8	**100**	-20.4	83.7	-20.1	-19.5	-18.5	-1.38
Y_{Kp1}	**-94.3**	-25.5	**90.6**	**92.4**	12.2	72.5	13.5	**98.2**	-100	-88.9	**99.8**	-26.9	**100**	-20.4	**100**	-21.9	**100**	**97.5**	**94.1**	9.46
Y_{Kp2}	27.7	**94.6**	-9.38	-18.6	-3.45	-12.5	-2.58	-20.7	23	16.3	-20.6	**92.2**	-21.4	83.7	-21.9	**100**	-21.7	-21	-19.9	-1.51
$Y_{\Sigma p1}$	**-93.9**	-25.2	**90.3**	**92**	12.1	73	13.4	**98.4**	**-99.9**	-89.4	**99.9**	-26.7	**100**	-20.1	**100**	-21.7	**100**	**97.5**	**94.1**	9.46
$Y_{\Sigma p2}$	**-91.2**	-24.5	87.8	89.4	11.7	70.3	10.6	**96.1**	**-97.4**	-87.5	**97.4**	-25.9	**97.5**	-19.5	**97.5**	-21	**97.5**	**100**	**91.7**	9.21
$Y_{\gamma p1}$	-88.6	-23.3	85.4	87	-18.1	68.3	12.7	**92.4**	**-94**	-83.6	**93.9**	-24.6	**94.1**	-18.5	**94.1**	-19.9	**94.1**	**91.7**	**100**	42.6
$Y_{\gamma\gamma 1}$	-9.05	-1.84	9.26	9.16	-85.2	7.27	1.3	9	-9.4	-7.63	9.41	-1.85	9.45	-1.38	9.46	-1.51	9.46	9.21	42.6	100

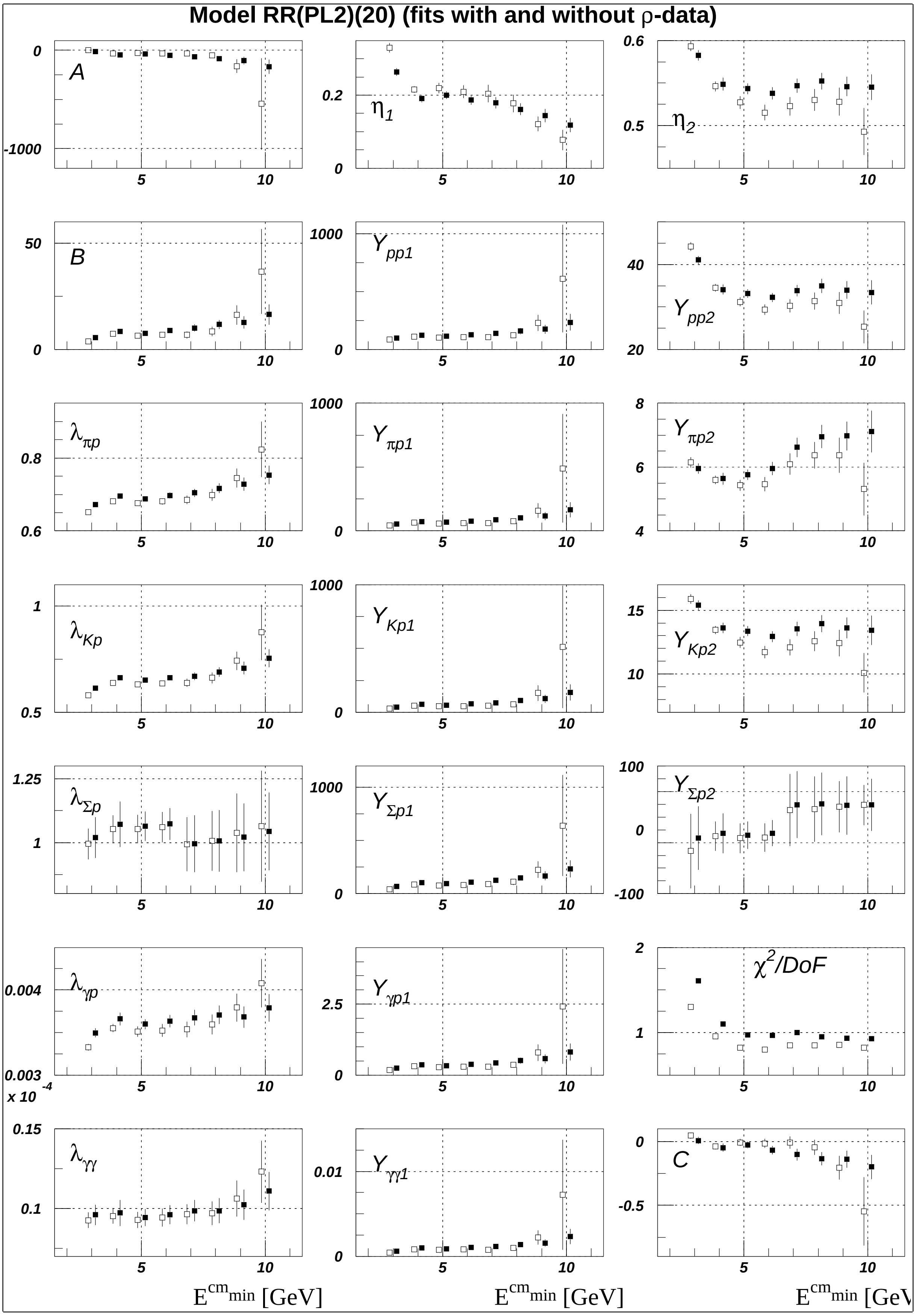
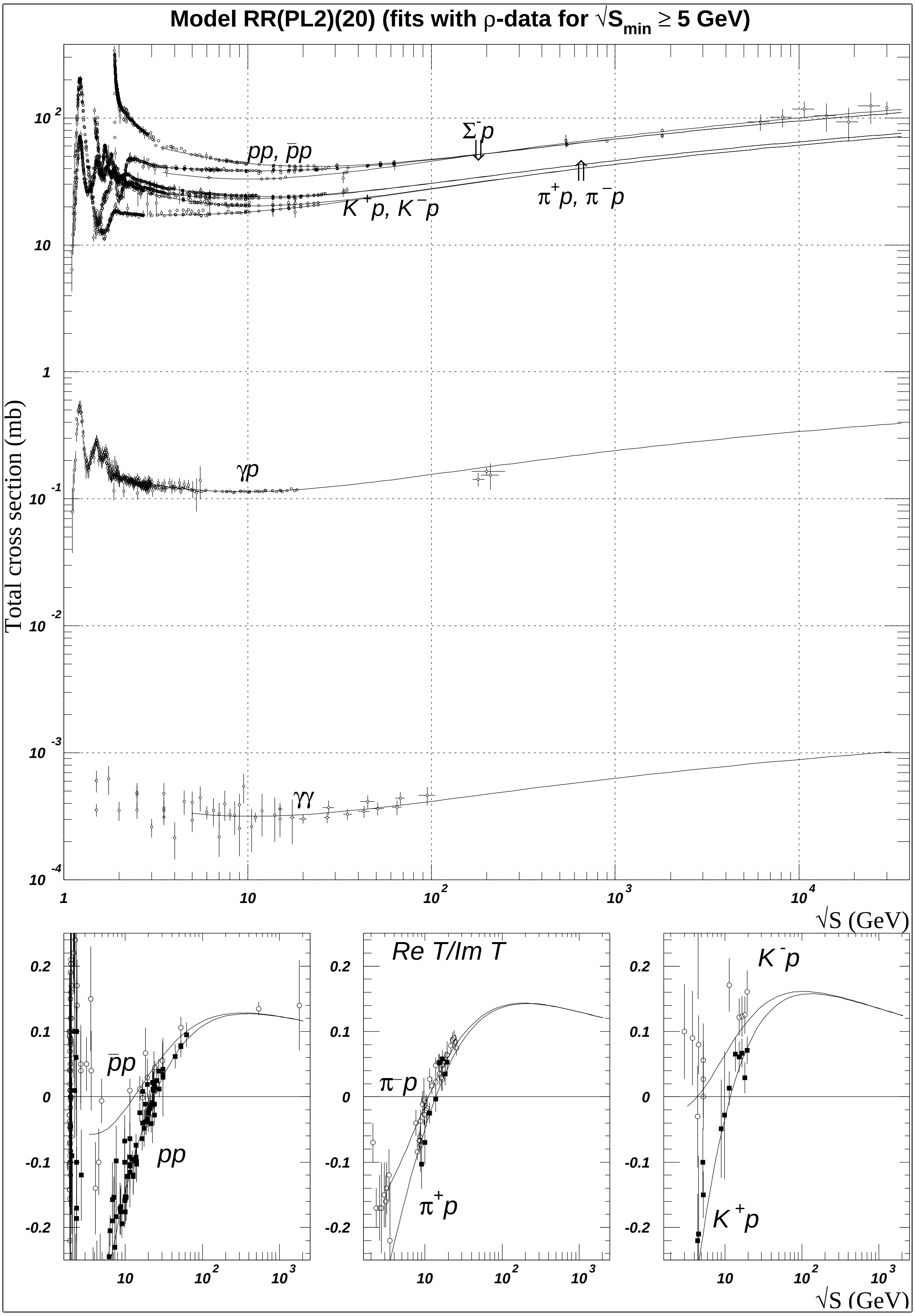


Figure 33: Bold (empty) symbol marks fits with (without) $\boldsymbol{\rho}$ data and are shifted to the right (left) in energy slightly for the clereness


Model RR(PL2)(20) (fits with ρ-data for √S_min ≥ 5 GeV)
Total cross section (mb)
pp, p̄p
Σ⁻p
π⁺p, π⁻p
K⁺p, K⁻p
γp
γγ
√S (GeV)
p̄p
pp
Re T/Im T
π⁻p
π⁺p
K⁻p
K⁺p
√S (GeV)