$$
\begin{cases}
\sigma_{pp} &= Z_{pp} + B\ln^2\left(\dfrac{s}{s_0}\right) + \left(Y_1^{pp} - Y_2^{pp}\right) s^{-\eta}, \\
\sigma_{\bar{p}p} &= Z_{pp} + B\ln^2\left(\dfrac{s}{s_0}\right) + \left(Y_1^{pp} + Y_2^{pp}\right) s^{-\eta}, \\
\sigma_{\pi^+p} &= R_{\pi p}Z_{pp} + B\ln^2\left(\dfrac{s}{s_0}\right) + \left(Y_1^{\pi p} - Y_2^{\pi p}\right) s^{-\eta}, \\
\sigma_{\pi^-p} &= R_{\pi p}Z_{pp} + B\ln^2\left(\dfrac{s}{s_0}\right) + \left(Y_1^{\pi p} + Y_2^{\pi p}\right) s^{-\eta}, \\
\sigma_{K^+p} &= R_{Kp}Z_{pp} + B\ln^2\left(\dfrac{s}{s_0}\right) + \left(Y_1^{Kp} - Y_2^{Kp}\right) s^{-\eta}, \\
\sigma_{K^-p} &= R_{Kp}Z_{pp} + B\ln^2\left(\dfrac{s}{s_0}\right) + \left(Y_1^{Kp} + Y_2^{Kp}\right) s^{-\eta}, \\
\sigma_{\gamma p} &= \delta Z_{pp} + \delta B\ln^2\left(\dfrac{s}{s_0}\right) + Y_1^{\gamma p} s^{-\eta}, \\
\sigma_{\gamma\gamma} &= \delta^2 Z_{pp} + \delta^2 B\ln^2\left(\dfrac{s}{s_0}\right) + Y_1^{\gamma\gamma} s^{-\eta}, \\
\sigma_{\Sigma^-p} &= R_{\Sigma p}Z_{pp} + B\ln^2\left(\dfrac{s}{s_0}\right) + Y_1^{\Sigma p} s^{-\eta} \qquad \blacksquare
\end{cases}
$$

$$
\begin{cases}
\rho_{pp}\sigma_{pp} &= \pi B\ln\left(\dfrac{s}{s_0}\right) - \dfrac{Y_1^{pp}s^{-\eta}}{\mathrm{tg}\left[\dfrac{1-\eta}{2}\pi\right]} - \dfrac{Y_2^{pp}s^{-\eta}}{\mathrm{ctg}\left[\dfrac{1-\eta}{2}\pi\right]}, \\
\rho_{\bar{p}p}\sigma_{\bar{p}p} &= \pi B\ln\left(\dfrac{s}{s_0}\right) - \dfrac{Y_1^{pp}s^{-\eta}}{\mathrm{tg}\left[\dfrac{1-\eta}{2}\pi\right]} + \dfrac{Y_2^{pp}s^{-\eta}}{\mathrm{ctg}\left[\dfrac{1-\eta}{2}\pi\right]}, \\
\rho_{\pi^+p}\sigma_{\pi^+p} &= \pi B\ln\left(\dfrac{s}{s_0}\right) - \dfrac{Y_1^{\pi p}s^{-\eta}}{\mathrm{tg}\left[\dfrac{1-\eta}{2}\pi\right]} - \dfrac{Y_2^{\pi p}s^{-\eta}}{\mathrm{ctg}\left[\dfrac{1-\eta}{2}\pi\right]}, \\
\rho_{\pi^-p}\sigma_{\pi^-p} &= \pi B\ln\left(\dfrac{s}{s_0}\right) - \dfrac{Y_1^{\pi p}s^{-\eta}}{\mathrm{tg}\left[\dfrac{1-\eta}{2}\pi\right]} + \dfrac{Y_2^{\pi p}s^{-\eta}}{\mathrm{ctg}\left[\frac{1-\eta}{2}\pi\right]}, \\
\rho_{K^+p}\sigma_{K^+p} &= \pi B\ln\left(\dfrac{s}{s_0}\right) - \dfrac{Y_1^{Kp}s^{-\eta}}{\mathrm{tg}\left[\dfrac{1-\eta}{2}\pi\right]} - \dfrac{Y_2^{Kp}s^{-\eta}}{\mathrm{ctg}\left[\dfrac{1-\eta}{2}\pi\right]}, \\
\rho_{K^-p}\sigma_{K^-p} &= \pi B\ln\left(\dfrac{s}{s_0}\right) - \dfrac{Y_1^{Kp}s^{-\eta}}{\mathrm{tg}\left[\dfrac{1-\eta}{2}\pi\right]} + \dfrac{Y_2^{Kp}s^{-\eta}}{\mathrm{ctg}\left[\dfrac{1-\eta}{2}\pi\right]},
\end{cases}
$$

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 17 parameters used:

$\eta, R_{\pi p}, R_{Kp}, R_{\Sigma p}, \delta$ – dimensionless
s_0 – [GeV^2]
$Z_{pp}, B, Y^{pp}_{1,2}, Y^{\pi p}_{1,2}, Y^{Kp}_{1,2}, Y^{\gamma p}_{1}, Y^{\gamma\gamma}_{1}, Y^{\Sigma p}_{1}$ – [mb]

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

$E^{\min}_{cm}$ [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	1.28	1.00	0.83	0.81	0.83	0.83	0.83	0.76
χ^2/dof: ρ included	1.96	1.27	1.00	1.00$^-$	0.98	0.94	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:	6.17066	102
$\bar{p}p$:	6.27159	54
π^+p:	6.19932	37
π^-p:	6.08013	87
K^+p:	6.06551	32
K^-p:	6.08096	54
Σ^-p	6.12189	9
γp:	6.66455	32
$\gamma\gamma$:	6.0	27
Breakdown of the ρ data sample		
pp:	6.13104	73
$\bar{p}p$:	11.5382	11
π^+p:	8.98072	8
π^-p:	7.56285	30
K^+p:	8.99347	8
K^-p:	11.5102	5

χ^2/dof	=	**0.999**
CL[%]	=	50.35
Name of value	Numerical value	Error value
η	0.52949847	0.0067753699
$R_{\pi p}$	0.59475011	0.0020577984
R_{Kp}	0.50906536	0.0025167819
$R_{\Sigma p}$	0.89198395	0.011250223
δ	0.0030397053	0.000014541381
B	0.32009024	0.008928839
Z_{pp}	36.863204	0.19379232
s_0	43.88116	5.1579027
Y_{pp1}	45.42289	1.4254126
Y_{pp2}	30.53598	0.95735258
$Y_{\pi p1}$	17.389224	1.2296214
$Y_{\pi p2}$	5.7636809	0.19170271
Y_{Kp1}	3.3937205	1.4087137
Y_{Kp2}	12.481909	0.39709976
$Y_{\Sigma p1}$	-2.013287	6.6313268
$Y_{\gamma p1}$	0.018644536	0.0073780857
$Y_{\gamma\gamma 1}$	-0.0002711505	0.0001042378

Model quality indicators:

	A^M	C^M_1	C^M_2	U^M	R^M_1	R^M_2	S^M_1	S^M_2
(RR)^{d}PL2$_{u}$(17)	1.000	50.35	83.04	15.64	31.61	0.882	0.296	0.673

Repository:

computer - **NPT1**

`directory - d:\MathemD\Kolja\Evela\Gauron\(RR)dPL2u(17)`

Appendix $(RR)^{d}PL2_{u}(17)$ (№27) 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	0.92	1.17	0.59	0.88	0.4	0.65	0.76	0.61	0.65

	ρ data					
Reaction	pp	$\bar{p}p$	π^+p	π^-p	K^+p	K^-p
χ^2/NoP	1.89	0.54	1.66	1.14	0.7	1.43

	η	$R_{\pi p}$	R_{Kp}	$R_{\Sigma p}$	δ	B	Z_{pp}	s_0	Y_{pp1}	Y_{pp2}	$Y_{\pi p1}$	$Y_{\pi p2}$	Y_{Kp1}	Y_{Kp2}	$Y_{\Sigma p1}$	$Y_{\gamma p1}$	$Y_{\gamma\gamma 1}$
η	100	43.4	28.7	-4.41	-10.9	22.5	48.8	35.6	41.1	**97.5**	-18.6	86.3	-35.4	**94.3**	-8.46	-17.4	-9.19
$R_{\pi p}$	43.4	100	88.3	3.74	-1.51	85.6	85.8	**91.6**	-46.1	43.4	**-91**	31.5	-87.8	41	-19.5	-48.6	-13.2
R_{Kp}	28.7	88.3	100	4.22	-1.47	86.8	86.5	**92.9**	-60.7	29	**-90.4**	18.5	**-97.1**	28.7	-19.8	-50.1	-12.3
$R_{\Sigma p}$	-4.41	3.74	4.22	100	1.52	4.05	0.927	3.16	-4.55	-4.18	-3.88	-4.14	-2.81	-4.15	**-95.3**	-1.64	-0.298
δ	-10.9	-1.51	-1.47	1.52	100	-0.451	-9.58	-4.51	0.914	-10.4	3.62	-9.19	5.45	-10.3	1.39	-75.5	-35
B	22.5	85.6	86.8	4.05	-0.451	100	82.9	**93.9**	-62.1	23.5	-88.3	13.5	-86	21.2	-18.5	-48.4	-11.9
Z_{pp}	48.8	85.8	86.5	0.927	-9.58	82.9	100	**96.1**	-58.3	48.1	**-91.7**	35.8	**-94.5**	46.1	-21.3	-52.8	-12.8
s_0	35.6	**91.6**	**92.9**	3.16	-4.51	**93.9**	**96.1**	100	-64.8	35.7	**-96.1**	24.1	**-96**	33.6	-21.3	-53.8	-13.1
Y_{pp1}	41.1	-46.1	-60.7	-4.55	0.914	-62.1	-58.3	-64.8	100	41.9	76.2	41.9	63.9	38.7	14	37.9	4.51
Y_{pp2}	**97.5**	43.4	29	-4.18	-10.4	23.5	48.1	35.7	41.9	100	-19	84.1	-35.3	**91.9**	-8.39	-17.4	-9.1
$Y_{\pi p1}$	-18.6	**-91**	**-90.4**	-3.88	3.62	-88.3	**-91.7**	**-96.1**	76.2	-19	100	-10.9	**93.4**	-17.6	20.8	52.8	11.7
$Y_{\pi p2}$	86.3	31.5	18.5	-4.14	-9.19	13.5	35.8	24.1	41.9	84.1	-10.9	100	-24	81.3	-5.84	-11.3	-7.19
Y_{Kp1}	-35.4	-87.8	**-97.1**	-2.81	5.45	-86	**-94.5**	**-96**	63.9	-35.3	**93.4**	-24	100	-35.6	21	52.5	12.6
Y_{Kp2}	**94.3**	41	28.7	-4.15	-10.3	21.2	46.1	33.6	38.7	**91.9**	-17.6	81.3	-35.6	100	-8	-16.5	-8.66
$Y_{\Sigma p1}$	-8.46	-19.5	-19.8	**-95.3**	1.39	-18.5	-21.3	-21.3	14	-8.39	20.8	-5.84	21	-8	100	11.7	2.81
$Y_{\gamma p1}$	-17.4	-48.6	-50.1	-1.64	-75.5	-48.4	-52.8	-53.8	37.9	-17.4	52.8	-11.3	52.5	-16.5	11.7	100	36.1
$Y_{\gamma\gamma 1}$	-9.19	-13.2	-12.3	-0.298	-35	-11.9	-12.8	-13.1	4.51	-9.1	11.7	-7.19	12.6	-8.66	2.81	36.1	100

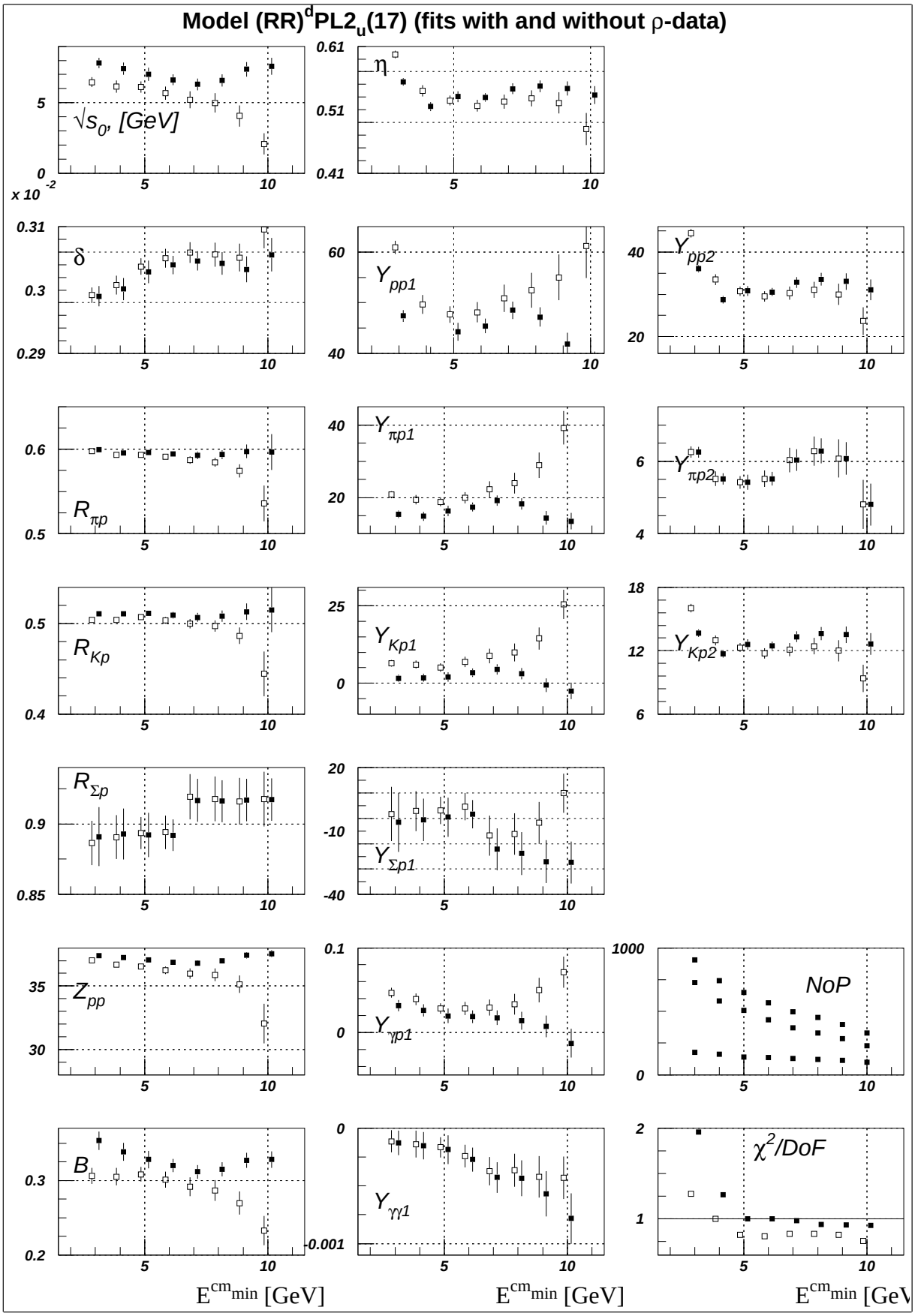
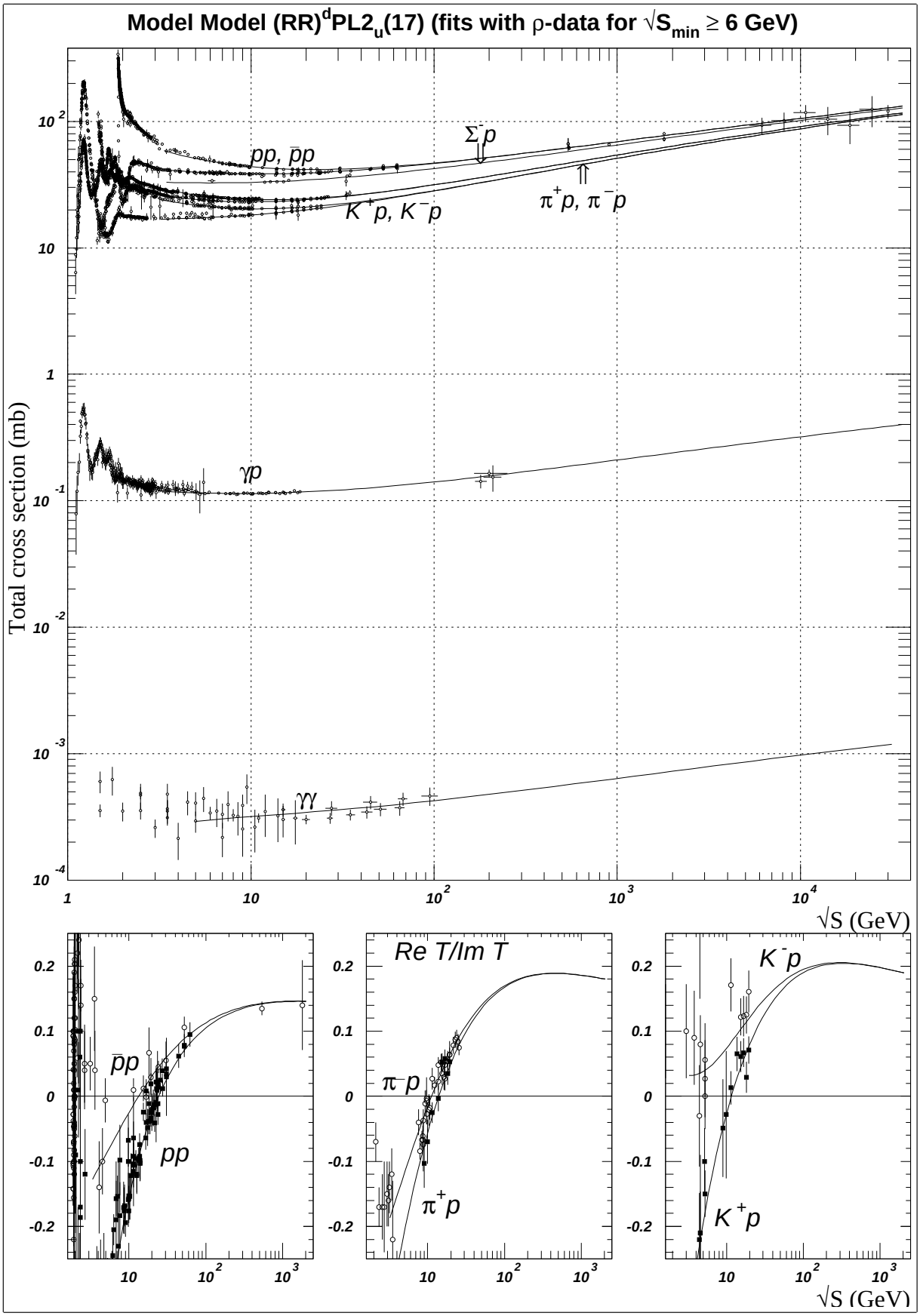


Figure 17: Bold (empty) symbol marks fits with (without) $\boldsymbol{\rho}$ data and are shifted to the right (left) in energy slightly for the clearness


Model Model (RR)dPL2u(17) (fits with ρ-data for √Smin ≥ 6 GeV)
Total cross section (mb)
pp, p̄p
Σ⁻p
K⁺p, K⁻p
π⁺p, π⁻p
γp
γγ
√S (GeV)
Re T/Im T
p̄p
pp
π⁻p
π⁺p
K⁻p
K⁺p
√S (GeV)