$$
\begin{cases}
\sigma_{pp} &= Z_{pp} + B\ln^2\left(\dfrac{s}{s_0}\right) + Y_1^{pp}s^{-\eta_1} - Y_2^{pp}s^{-\eta_2},\\
\sigma_{\bar{p}p} &= Z_{pp} + B\ln^2\left(\dfrac{s}{s_0}\right) + Y_1^{pp}s^{-\eta_1} + Y_2^{pp}s^{-\eta_2},\\
\sigma_{\pi^+p} &= Z_{\pi p} + B\ln^2\left(\dfrac{s}{s_0}\right) + Y_1^{\pi p}s^{-\eta_1} - Y_2^{\pi p}s^{-\eta_2},\\
\sigma_{\pi^-p} &= Z_{\pi p} + B\ln^2\left(\dfrac{s}{s_0}\right) + Y_1^{\pi p}s^{-\eta_1} + Y_2^{\pi p}s^{-\eta_2},\\
\sigma_{K^+p} &= Z_{Kp} + B\ln^2\left(\dfrac{s}{s_0}\right) + Y_1^{Kp}s^{-\eta_1} - Y_2^{Kp}s^{-\eta_2},\\
\sigma_{K^-p} &= Z_{Kp} + B\ln^2\left(\dfrac{s}{s_0}\right) + Y_1^{Kp}s^{-\eta_1} + Y_2^{Kp}s^{-\eta_2},\\
\sigma_{\gamma p} &= \delta\left[Z_{pp} + B\ln^2\left(\dfrac{s}{s_0}\right)\right] + Y_1^{\gamma p}s^{-\eta_1},\\
\sigma_{\gamma\gamma} &= \delta^2\left[Z_{pp} + B\ln^2\left(\dfrac{s}{s_0}\right)\right] + Y_1^{\gamma\gamma}s^{-\eta_1},\\
\sigma_{\Sigma^-p} &= Z_{\Sigma p} + B\ln^2\left(\dfrac{s}{s_0}\right) + Y_1^{\Sigma p}s^{-\eta_1} - Y_2^{\Sigma p}s^{-\eta_2}.
\end{cases}
\blacksquare
$$

$$
\begin{cases}
\rho_{pp}\sigma_{pp} &= \pi B\ln\left(\dfrac{s}{s_0}\right) - \dfrac{Y_1^{pp}s^{-\eta_1}}{\tan\left[\dfrac{1-\eta_1}{2}\pi\right]} - \dfrac{Y_2^{pp}s^{-\eta_2}}{\cot\left[\dfrac{1-\eta_2}{2}\pi\right]},\\
\rho_{\bar{p}p}\sigma_{\bar{p}p} &= \pi B\ln\left(\dfrac{s}{s_0}\right) - \dfrac{Y_1^{pp}s^{-\eta_1}}{\tan\left[\dfrac{1-\eta_1}{2}\pi\right]} + \dfrac{Y_2^{pp}s^{-\eta_2}}{\cot\left[\dfrac{1-\eta_2}{2}\pi\right]},\\
\rho_{\pi^+p}\sigma_{\pi^+p} &= \pi B\ln\left(\dfrac{s}{s_0}\right) - \dfrac{Y_1^{\pi p}s^{-\eta_1}}{\tan\left[\dfrac{1-\eta_1}{2}\pi\right]} - \dfrac{Y_2^{\pi p}s^{-\eta_2}}{\cot\left[\dfrac{1-\eta_2}{2}\pi\right]},\\
\rho_{\pi^-p}\sigma_{\pi^-p} &= \pi B\ln\left(\dfrac{s}{s_0}\right) - \dfrac{Y_1^{\pi p}s^{-\eta_1}}{\tan\left[\dfrac{1-\eta_1}{2}\pi\right]} + \dfrac{Y_2^{\pi p}s^{-\eta_2}}{\cot\left[\dfrac{1-\eta_2}{2}\pi\right]},\\
\rho_{K^+p}\sigma_{K^+p} &= \pi B\ln\left(\dfrac{s}{s_0}\right) - \dfrac{Y_1^{Kp}s^{-\eta_1}}{\tan\left[\dfrac{1-\eta_1}{2}\pi\right]} - \dfrac{Y_2^{Kp}s^{-\eta_2}}{\cot\left[\dfrac{1-\eta_2}{2}\pi\right]},\\
\rho_{K^-p}\sigma_{K^-p} &= \pi B\ln\left(\dfrac{s}{s_0}\right) - \dfrac{Y_1^{Kp}s^{-\eta_1}}{\tan\left[\dfrac{1-\eta_1}{2}\pi\right]} + \dfrac{Y_2^{Kp}s^{-\eta_2}}{\cot\left[\dfrac{1-\eta_2}{2}\pi\right]},
\end{cases}
$$

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 19 parameters used:

η_1, η_2, δ – dimensionless
$B, Z_{pp}, Z_{\pi p}, Z_{Kp}, Z_{\Sigma p}$ – [mb]
s_0 – [GeV^2]
$Y^{pp}_{1,2}, Y^{\pi p}_{1,2}, Y^{Kp}_{1,2}, Y^{\Sigma p}_{1,2}, Y^{\gamma p}_1, Y^{\gamma\gamma}_1$ – [mb]

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

$E^{\min}_{\rm cm}$ [GeV]	3	4	5	6	7	8	9	10
N_{dof}: ρ excluded	707	562	488	415	350	312	266	211
N_{dof}: ρ included	885	723	629	550	479	434	378	310
χ^2/dof: ρ excluded	1.27	0.98	0.82	0.80	0.84	0.84	0.83	0.76
χ^2/dof: ρ included	1.75	1.15	0.98	0.98	0.97	0.93	0.93	0.92

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[%]	=	63.46
Name of value	Numerical value	Error value
s_0	34.409806	5.442838
η_1	0.46822531	0.015111598
η_2	0.53956628	0.0064264992
Z_{pp}	35.865711	0.39194465
$Z_{\pi p}$	21.255573	0.32258531
Z_{Kp}	18.250196	0.29450647
$Z_{\Sigma p}$	35.595465	1.4285867
δ	0.0030641085	0.000016709173
B	0.31573	0.0094672397
Y_{pp1}	42.069653	1.2708388
Y_{pp2}	32.155544	0.94228883
$Y_{\pi p1}$	17.712148	1.1184374
$Y_{\pi p2}$	5.7136141	0.16061349
Y_{Kp1}	5.6248192	1.3995889
Y_{Kp2}	13.119015	0.37618197
$Y_{\Sigma p1}$	-260.39972	131.02776
$Y_{\Sigma p2}$	-325.24522	154.3704
$Y_{\gamma p1}$	0.029185027	0.0058494249
$Y_{\gamma\gamma 1}$	-0.00014738702	0.000071036228

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
RRPL2$_u$(19)	2.206	63.46	84.13	24.14	32.40	0.895	0.226	0.190

Repository:

computer - **NPT1**

`directory - d:\MathemD\Kolja\Evela\Gauron\(RR)PL2u(19)`

Appendix RRPL2$_u$(19) (№35) 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	1.2	0.78	0.89	0.71	0.61	0.38	0.62	0.7

	ρ data					
Reaction	pp	$\bar{p}p$	π^+p	π^-p	K^+p	K^-p
χ^2/NoP	1.75	0.55	1.46	1.16	0.99	0.96

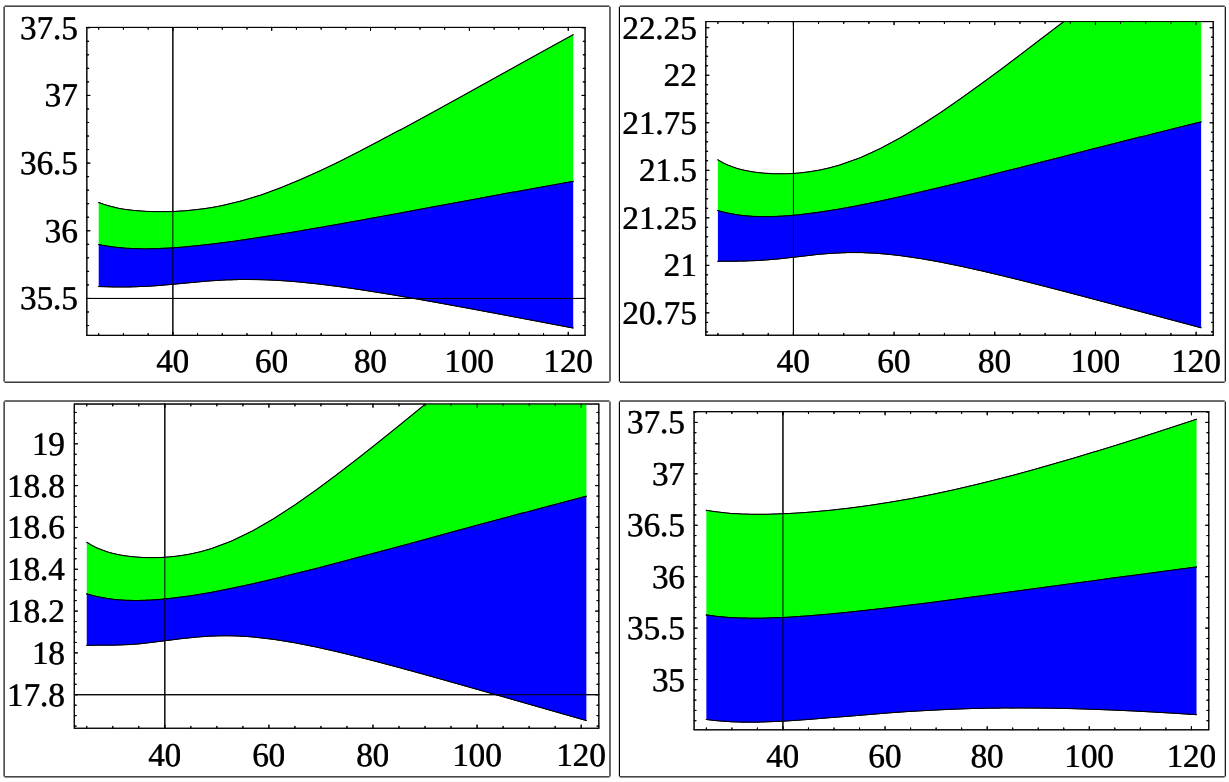


Figure 1: Pomeron contribution for pp, π^+p, K^+p and Σ^-p [mb] (Axis X – s [GeV^2])

	s_0	η_1	η_2	Z_{pp}	$Z_{\pi p}$	Z_{Kp}	$Z_{\Sigma p}$	δ	B	Y_{pp1}	Y_{pp2}	$Y_{\pi p1}$	$Y_{\pi p2}$	Y_{Kp1}	Y_{Kp2}	$Y_{\Sigma p1}$	$Y_{\Sigma p2}$	$Y_{\gamma p1}$	$Y_{\gamma\gamma 1}$
s_0	100	63.4	10.1	**93.2**	**96.9**	**98.3**	20.6	-33.7	**91.2**	-37.2	9.46	**-93.7**	3.89	**-97.9**	6.78	-36	-31.2	-67.9	-19.6
η_1	63.4	**100**	20.7	85	79.1	72.5	13.2	-52	34.7	42.8	18.8	-35.7	17.3	-61.3	17.4	-53.3	-46.9	-39.5	-14.6
η_2	10.1	20.7	**100**	8.87	13.8	11.1	-0.838	0.0749	8	31.9	**97.4**	-3.45	88.5	-7.81	**94.6**	6.48	4.63	-4.08	-4.49
Z_{pp}	**93.2**	85	8.87	**100**	**98.5**	**96.8**	19.9	-47.3	72.1	-10.4	7.29	-78	3.8	**-91.9**	5.44	-48.3	-42.1	-62.6	-18.8
$Z_{\pi p}$	**96.9**	79.1	13.8	**98.5**	**100**	**98.7**	20.3	-42.2	79.9	-17.6	12.6	-85.3	7.55	**-95.2**	10.1	-44.1	-38.4	-65.2	-19.6
Z_{Kp}	**98.3**	72.5	11.1	**96.8**	**98.7**	**100**	20.6	-39	83.7	-27	10	-88.8	4.98	**-98.6**	7.61	-41	-35.6	-66.7	-19.6
$Z_{\Sigma p}$	20.6	13.2	-0.838	19.9	20.3	20.6	**100**	-7.72	17.2	-9.06	-1.03	-19.7	-1.92	-20.7	-1.44	-85.4	-87.1	-14.4	-3.96
δ	-33.7	-52	0.0749	-47.3	-42.2	-39	-7.72	**100**	-16.3	-15.1	1.43	20.3	0.894	33.6	1.4	29.9	26.2	-35.8	-23
B	**91.2**	34.7	8	72.1	79.9	83.7	17.2	-16.3	**100**	-53.6	8.59	**-91.9**	2.41	-86.9	5.56	-19.4	-16.5	-61.3	-17.3
Y_{pp1}	-37.2	42.8	31.9	-10.4	-17.6	-27	-9.06	-15.1	-53.6	**100**	33	63	33	39.5	31	-16.3	-15	31.2	3.93
Y_{pp2}	9.46	18.8	**97.4**	7.29	12.6	10	-1.03	1.43	8.59	33	**100**	-3.22	86.3	-6.99	**92.2**	7.19	5.29	-3.57	-4.35
$Y_{\pi p1}$	**-93.7**	-35.7	-3.45	-78	-85.3	-88.8	-19.7	20.3	**-91.9**	63	-3.22	**100**	2.34	**93**	-0.73	22	18.8	65.7	17.5
$Y_{\pi p2}$	3.89	17.3	88.5	3.8	7.55	4.98	-1.92	0.894	2.41	33	86.3	2.34	**100**	-1.66	83.8	6.54	4.78	0.152	-3.07
Y_{Kp1}	**-97.9**	-61.3	-7.81	**-91.9**	**-95.2**	**-98.6**	-20.7	33.6	-86.9	39.5	-6.99	**93**	-1.66	**100**	-5.1	35.5	30.7	67.2	19.1
Y_{Kp2}	6.78	17.4	**94.6**	5.44	10.1	7.61	-1.44	1.4	5.56	31	**92.2**	-0.73	83.8	-5.1	**100**	7.49	5.56	-1.91	-3.69
$Y_{\Sigma p1}$	-36	-53.3	6.48	-48.3	-44.1	-41	-85.4	29.9	-19.4	-16.3	7.19	22	6.54	35.5	7.49	**100**	**99.5**	23.2	7.78
$Y_{\Sigma p2}$	-31.2	-46.9	4.63	-42.1	-38.4	-35.6	-87.1	26.2	-16.5	-15	5.29	18.8	4.78	30.7	5.56	**99.5**	**100**	20	6.77
$Y_{\gamma p1}$	-67.9	-39.5	-4.08	-62.6	-65.2	-66.7	-14.4	-35.8	-61.3	31.2	-3.57	65.7	0.152	67.2	-1.91	23.2	20	**100**	38.2
$Y_{\gamma\gamma 1}$	-19.6	-14.6	-4.49	-18.8	-19.6	-19.6	-3.96	-23	-17.3	3.93	-4.35	17.5	-3.07	19.1	-3.69	7.78	6.77	38.2	**100**

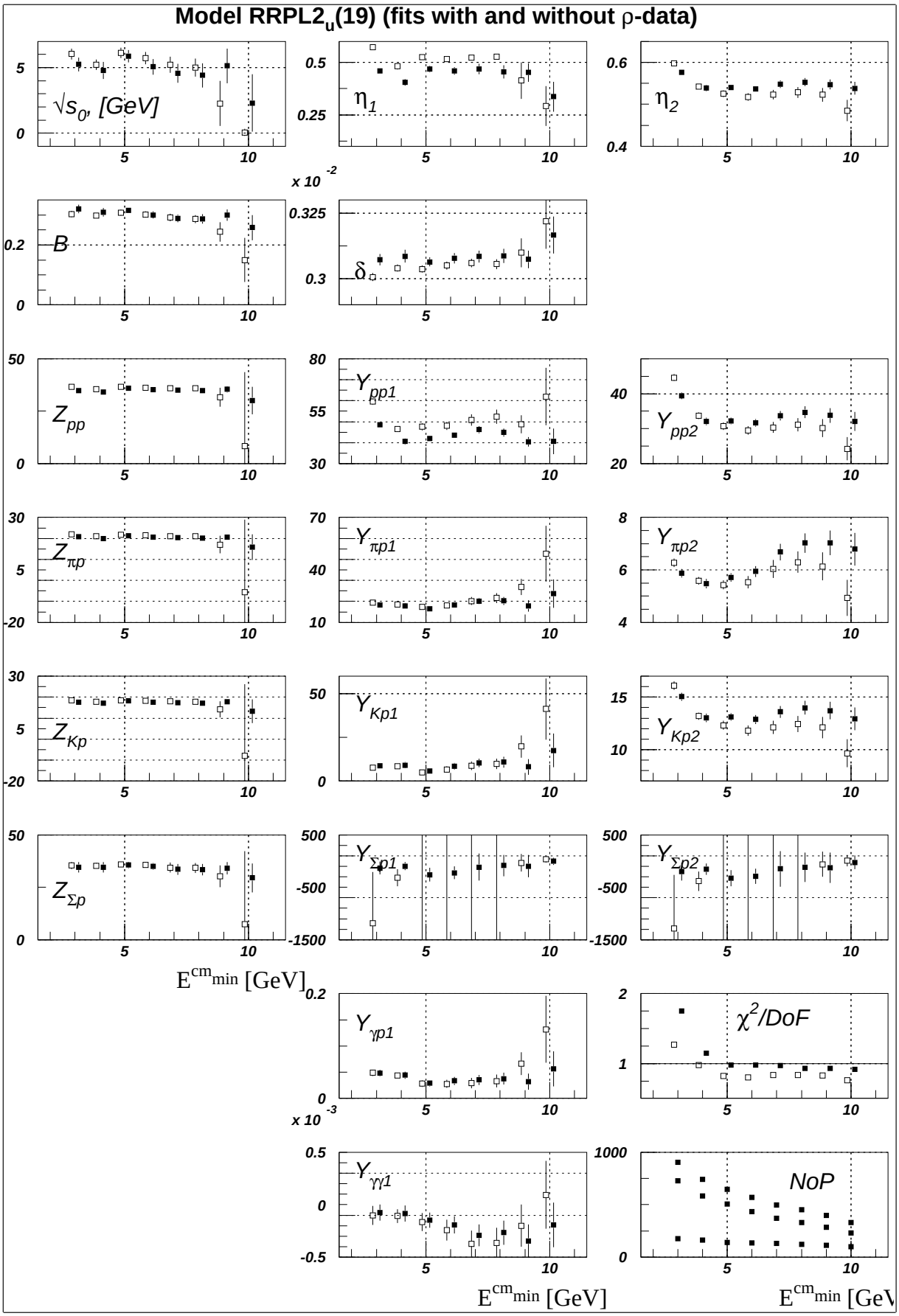
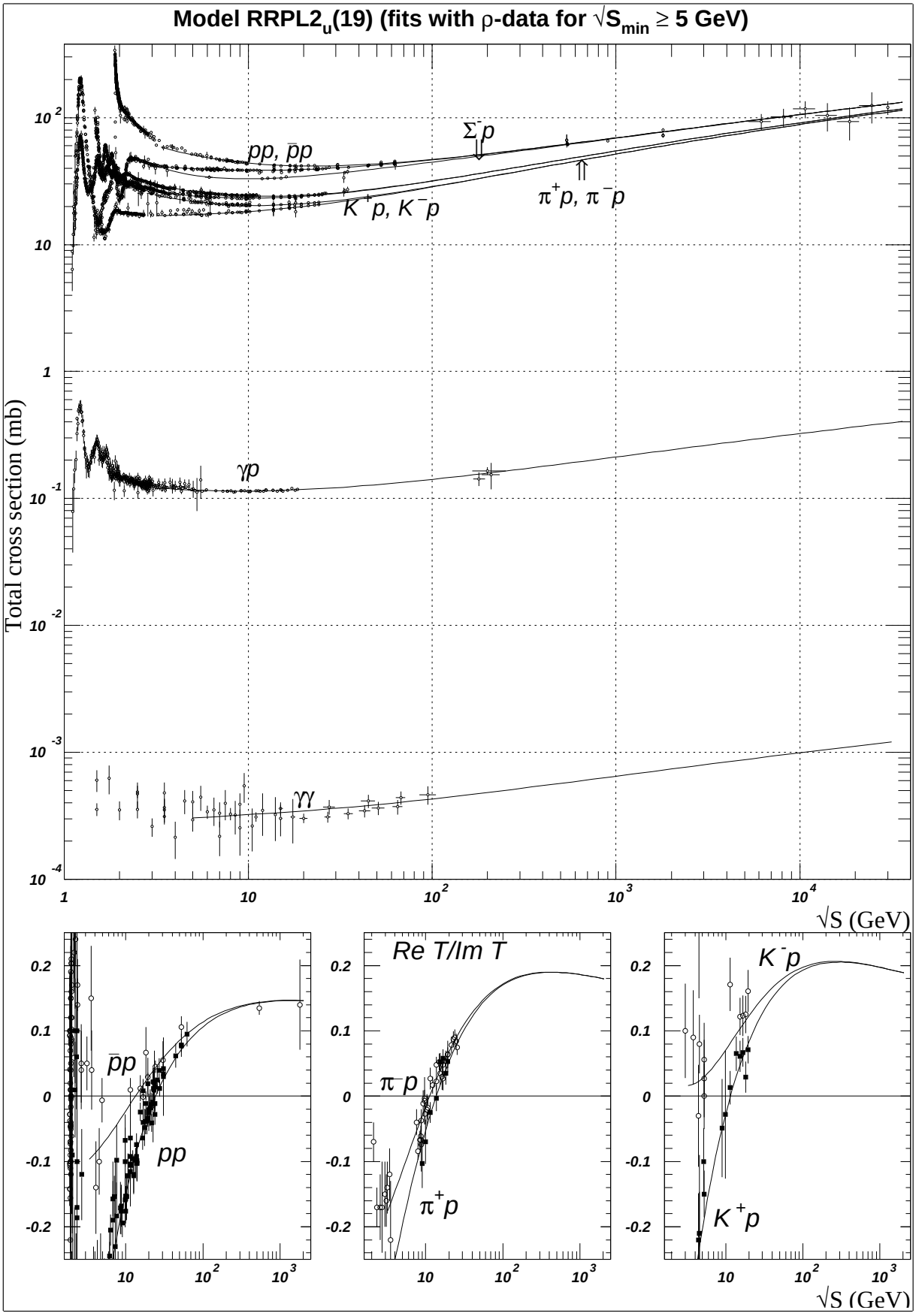


Figure 2: Bold (empty) symbol marks fits with (without) $\boldsymbol{\rho}$ data and are shifted to the right (left) in energy slightly for the cleareness


Model RRPL2u(19) (fits with ρ-data for √Smin ≥ 5 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)