

$$\left\{ \begin{array}{l}
\sigma_{pp} = 9B \ln \left(\frac{s}{s_0} \right) + Y_1^{pp} s^{-\eta_1} - Y_2^{pp} s^{-\eta_2}, \\
\sigma_{\bar{p}p} = 9B \ln \left(\frac{s}{s_0} \right) + Y_1^{pp} s^{-\eta_1} + Y_2^{pp} s^{-\eta_2}, \\
\sigma_{\pi^+p} = 6\lambda_m B \ln \left(\frac{s}{s_0} \right) + Y_1^{\pi p} s^{-\eta_1} - Y_2^{\pi p} s^{-\eta_2}, \\
\sigma_{\pi^-p} = 6\lambda_m B \ln \left(\frac{s}{s_0} \right) + Y_1^{\pi p} s^{-\eta_1} + Y_2^{\pi p} s^{-\eta_2}, \\
\sigma_{K^+p} = 3\lambda_m(1 + \lambda_s) B \ln \left(\frac{s}{s_0} \right) + Y_1^{Kp} s^{-\eta_1} - Y_2^{Kp} s^{-\eta_2}, \\
\sigma_{K^-p} = 3\lambda_m(1 + \lambda_s) B \ln \left(\frac{s}{s_0} \right) + Y_1^{Kp} s^{-\eta_1} + Y_2^{Kp} s^{-\eta_2}, \\
\sigma_{\gamma p} = 6\lambda_m \delta B \ln \left(\frac{s}{s_0} \right) + Y_1^{\gamma p} s^{-\eta_1}, \\
\sigma_{\gamma\gamma} = 4\lambda_m^2 \delta^2 B \ln \left(\frac{s}{s_0} \right) + Y_1^{\gamma\gamma} s^{-\eta_1}, \\
\sigma_{\Sigma^-p} = (6 + 3\lambda_s) B \ln \left(\frac{s}{s_0} \right) + Y_1^{\Sigma p} s^{-\eta_1} - Y_2^{\Sigma p} s^{-\eta_2}. \quad \blacksquare \\
\rho_{pp}\sigma_{pp} = \frac{9\pi B}{2} - \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{9\pi B}{2} - \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} = 3\pi\lambda_m B - \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} = 3\pi\lambda_m B - \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{3\pi\lambda_m(1 + \lambda_s)B}{2} - \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{3\pi\lambda_m(1 + \lambda_s)B}{2} - \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 17 parameters used:

$$\begin{aligned} \eta_1, \eta_2, \delta, \lambda_m, \lambda_s &- \text{dimensionless} \\ s_0 &- [\text{GeV}^2] \\ B, Y_{1,2}^{pp}, Y_{1,2}^{\pi p}, Y_{1,2}^{Kp}, Y_{1,2}^{\Sigma p}, Y_1^{\gamma p}, Y_1^{\gamma\gamma} &- [\text{mb}] \end{aligned}$$

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	1.33	0.99	0.85	0.83	0.87	0.87	0.87	0.85
χ^2/dof : ρ included	1.63	1.13	1.00 ⁻	0.99	1.02	0.97	0.94	0.94

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	χ^2/dof	=	0.9953
			CL[%]	=	52.97
Breakdown of the CS data sample			Name of value	Numerical value	Error value
pp :	5.00963	112	η_1	0.21146055	0.0079921224
$\bar{p}p$:	5.1569	59	η_2	0.54360032	0.0063104218
π^+p :	5.21275	50	λ_s	0.87913252	0.011197796
π^-p :	5.02954	106	λ_m	1.0219773	0.0065298638
K^+p :	5.12707	40	δ	0.0050796578	0.00004797683
K^-p :	5.10875	63	B	0.73635067	0.024365587
Σ^-p :	6.12189	9	s_0	79.027935	30.21895
γp :	5.01008	38	Y_{pp1}	104.66237	2.8112491
$\gamma\gamma$:	5.	30	Y_{pp2}	33.205188	0.9540322
Breakdown of the ρ data sample			$Y_{\pi p1}$	59.943205	2.288822
pp :	5.30542	74	$Y_{\pi p2}$	5.7635435	0.16132008
$\bar{p}p$:	11.5382	11	Y_{Kp1}	48.335191	2.4175999
π^+p :	8.98072	8	Y_{Kp2}	13.368781	0.37799108
π^-p :	7.56285	30	$Y_{\gamma p1}$	0.28762413	0.012227827
K^+p :	5.21771	10	$Y_{\gamma\gamma1}$	0.00075070742	0.0000529061
K^-p :	5.23565	8	$Y_{\Sigma p1}$	88.623421	3.753649
			$Y_{\Sigma p2}$	23.997204	10.778894

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
RRL ^{qc} (17)	1.823	52.97	78.17	17.56	36.0	0.743	0.198	1.080

Repository:

computer - NPT1

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

Appendix RRL_{qc}(17) (N^o6) 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	0.88	0.98	0.98	0.81	0.73	0.62	0.58	0.77	0.97

	ρ data					
Reaction	pp	$\bar{p}p$	π^+p	π^-p	K^+p	K^-p
χ^2/NoP	1.56	0.47	1.91	1.52	1.25	1.22

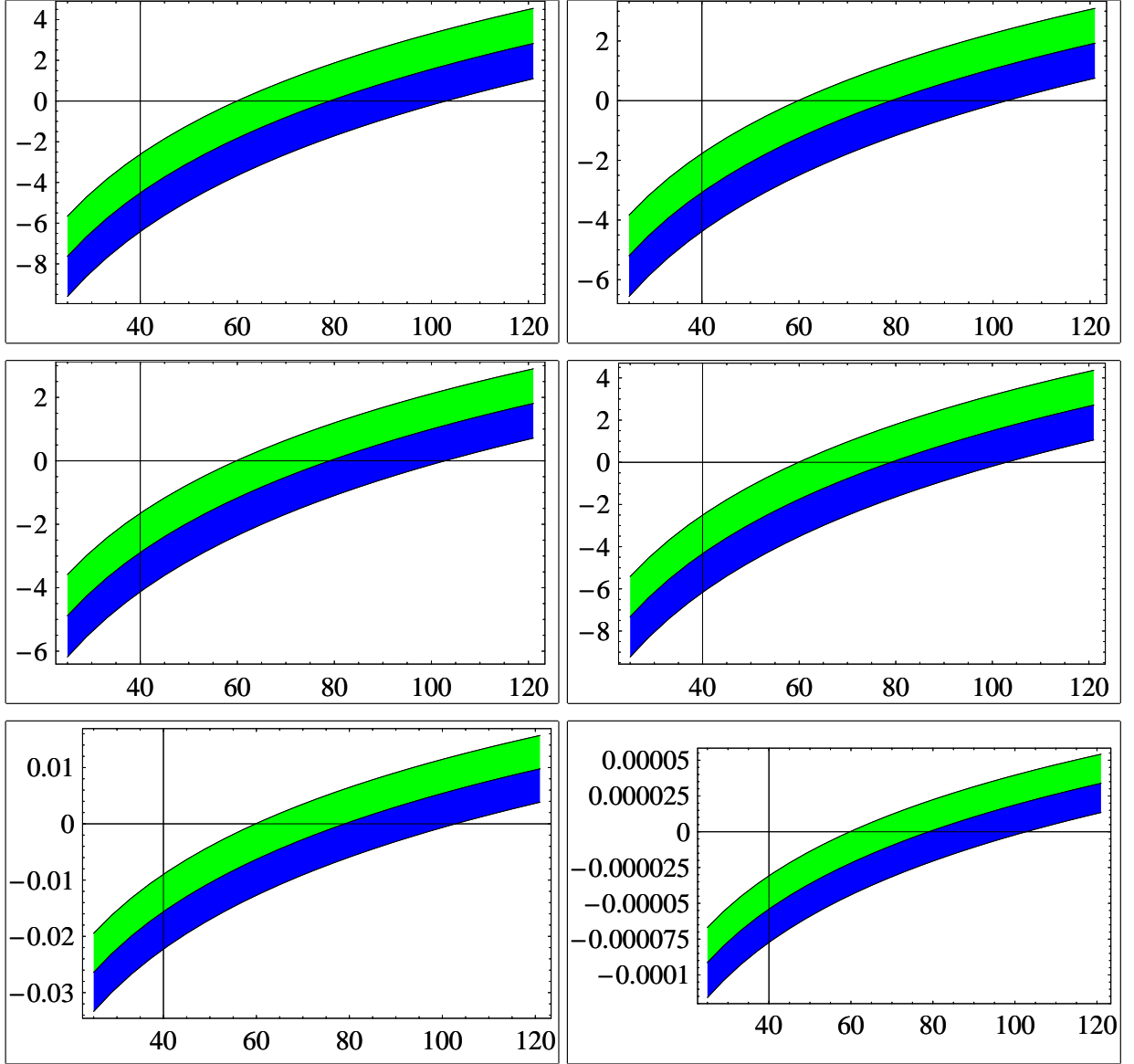


Figure 24: Pomeron contribution for pp , π^+p , K^+p , Σ^-p , γp and $\gamma\gamma$ [mb] (Axis $X - s$ [GeV²])

Appendix RRL^{qc}(17) (N=6) Correlation matrix

	η_1	η_2	λ_s	λ_m	δ	B	s_0	Y_{pp1}	Y_{pp2}	$Y_{\pi p1}$	$Y_{\pi p2}$	Y_{Kp1}	Y_{Kp2}	$Y_{\gamma p1}$	$Y_{\gamma p2}$	$Y_{\Sigma p1}$	$Y_{\Sigma p2}$
η_1	100	25.1	-82.5	-87	-12.5	-97.2	-99.2	-95.7	26.6	-97.1	23.9	-97.7	22.9	-97.3	-90.4	-82.5	-3.04
η_2	25.1	100	-25	1.49	-6.74	-19.6	-20.9	-14.4	97.4	-16.9	88.3	-17.8	94.5	-17.2	-17.6	-14	5.11
λ_s	-82.5	-25	100	60.5	16.9	79.1	81.2	77.5	-26.3	78.9	-24.2	79.3	-21.7	79.1	73.8	64.3	-1.8
λ_m	-87	1.49	60.5	100	3.01	89.7	89.9	91.7	1.92	91.3	0.775	91	2.35	91.1	83.3	79.6	6.94
δ	-12.5	-6.74	16.9	3.01	100	11.3	11.9	10.7	-7.08	11.1	-6.58	11.3	-6.31	10	2.87	8.79	-0.8
B	-97.2	-19.6	79.1	89.7	11.3	100	99.3	99.6	-20.3	99.9	-18.4	99.8	-17.5	99.8	91.8	85.3	3.72
s_0	-99.2	-20.9	81.2	89.9	11.9	99.3	100	98.6	-21.9	99.4	-19.9	99.6	-18.9	99.4	91.9	84.7	3.62
Y_{pp1}	-95.7	-14.4	77.5	91.7	10.7	99.6	100	100	-14.4	99.8	-13.7	99.7	-12.6	99.7	91.5	85.5	4.33
Y_{pp2}	26.6	97.4	-26.3	1.92	-7.08	-20.3	99.3	-14.4	100	-17.4	86.2	-18.5	92.1	-17.8	-18.3	-14.1	5.31
$Y_{\pi p1}$	-97.1	-16.9	78.9	91.3	11.1	99.9	99.4	99.8	-17.4	100	-16.2	100	-15	99.9	91.9	85.5	4.08
$Y_{\pi p2}$	23.9	88.3	-24.2	0.775	-6.58	-18.4	99.9	-13.7	100	-16.2	100	-16.9	83.4	-16.4	-16.7	-13.2	4.58
Y_{Kp1}	-97.7	-17.8	79.3	91	11.3	99.8	99.6	99.7	-18.5	100	-16.9	100	-16	99.9	92	85.4	4
Y_{Kp2}	22.9	94.5	-21.7	2.35	-6.31	-17.5	99.4	-12.6	92.1	-15	83.4	-16	100	-15.3	-15.8	-12.5	4.73
$Y_{\gamma p1}$	-97.3	-17.2	79.1	91.1	10	99.8	99.4	99.7	-17.8	99.9	-16.4	99.9	-15.3	100	92	85.4	4.04
$Y_{\gamma p2}$	-90.4	-17.6	73.8	83.3	2.87	91.8	91.9	91.5	-18.3	91.9	-16.7	92	-15.8	92	100	78.4	3.52
$Y_{\Sigma p1}$	-82.5	-14	64.3	79.6	8.79	85.3	84.7	85.5	-14.1	85.5	-13.2	85.4	-12.5	85.4	78.4	100	54.6
$Y_{\Sigma p2}$	-3.04	5.11	-1.8	6.94	-0.8	3.72	3.62	4.33	5.31	4.08	4.58	4	4.73	4.04	3.52	54.6	100

Appendix RRL^{qc}(17) (N^o6) Parameters evolution

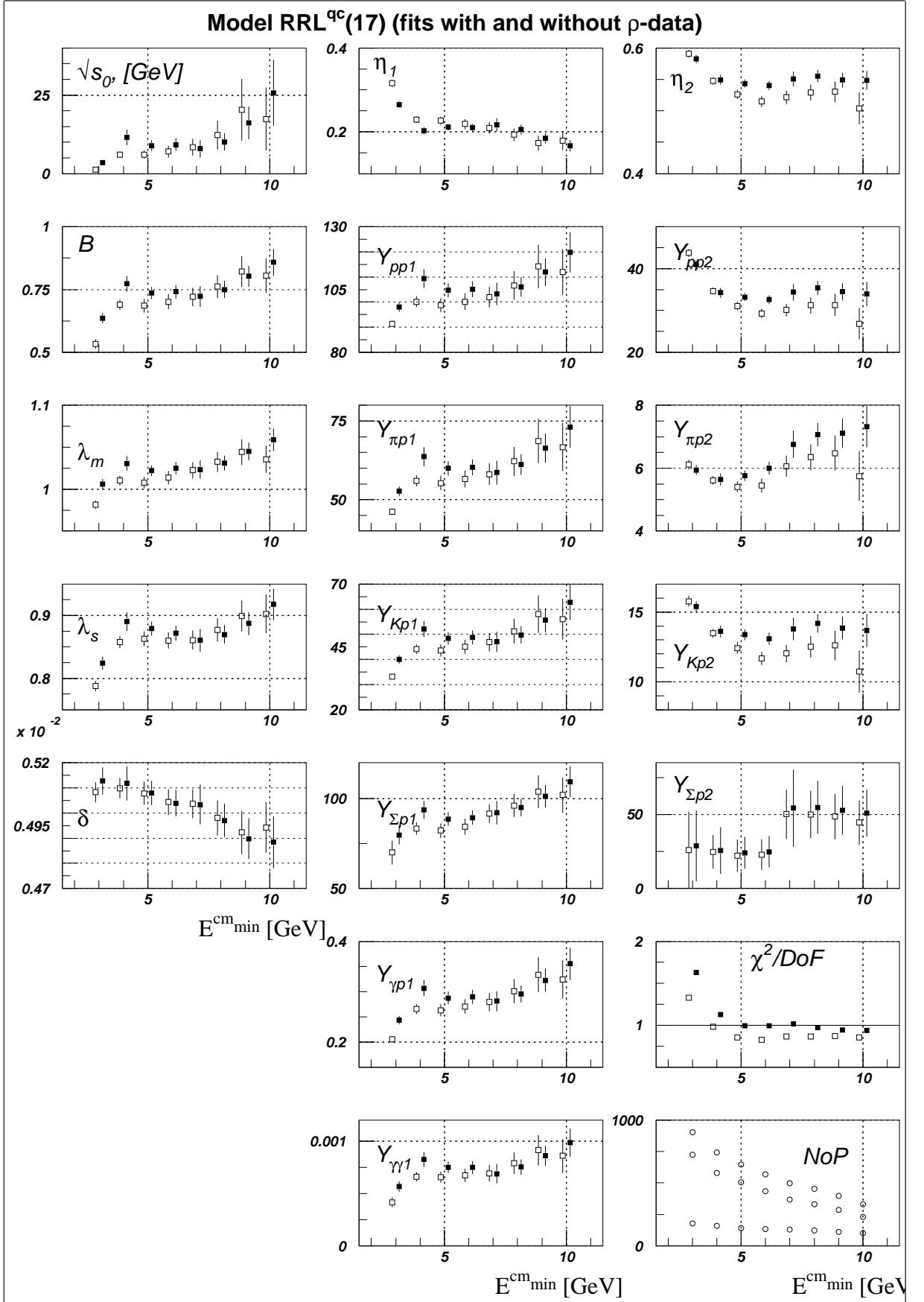


Figure 25: Bold (empty) symbol marks fits with (without) ρ data and are shifted to the right (left) in energy slightly for the cleareness

