Inverstigate B_5 model with the $\gamma P \to K^+ K^- P$ process

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1 Amplitudes

$$3F_2(a,b,c;d,e;z) = \sum_{k=0}^{\infty} \frac{\Gamma(a+k)\Gamma(b+k)\Gamma(c+k)\Gamma(d)\Gamma(e)}{\Gamma(a)\Gamma(b)\Gamma(e)\Gamma(d+k)\Gamma(e+k)} \frac{z^k}{k!}.$$

$$B_5 = B_4(12, A1)B_4(23, B3)_3F_2(-AB + 12 + 23, A1, B3; 12 + A1, 23 + B3), \quad (1)$$

where $A1 = -\alpha_{A1}$, and so on.

When s_{12} and s_{23} is large, the amplitude shows a double Regge limit,

$$B_5 = B_4(AB, A1)B_4(23, B3 - A1) + B_4(AB, B3)B_4(12, A1 - B3), \quad (2)$$

The single Regge limit is given when s_{12} or s_{23} goes large, for example when s_{23} is fixed, the amplitude is

$$B_5 \;=\; B_4(AB, A1)B_4(23, B3)F(A1, 23; 23 + B3; \frac{13}{AB}) \quad (3)$$

$$\mathcal{A}_1 = c \cdot \epsilon_{\mu\nu\rho\sigma}\varepsilon^{\mu} p^{\nu}_{\bar{K}} p^{\rho}_{K} p^{\sigma}_{\bar{p}} \times B_5(1 - \alpha_{K^*}, 1 - \alpha_{\phi}, \frac{3}{2} - \alpha_{\Lambda}, 1 - \alpha_{\omega}, \frac{3}{2} - \alpha_{\Delta}), \quad (4)$$

$$\mathcal{A}_2 = d \cdot \epsilon_{\mu\nu\rho\sigma}\varepsilon^{\mu} p^{\nu}_{K^+} p^{\rho}_{K^-} p^{\sigma}_{\bar{p}} \times B_5(1 - \alpha_{K^*}, 1 - \alpha_{\phi}, \frac{3}{2} - \alpha_{P}, 1 - \alpha_{\omega}, \frac{3}{2} - \alpha_{N^*}),$$

$$\mathcal{A}_3 = e \cdot \epsilon_{\mu\nu\rho\sigma}\varepsilon^{\mu} p^{\nu}_{K^+} p^{\rho}_{K^-} p^{\sigma}_{\bar{p}} \times B_5(1 - \alpha_{K^*}, 1 - \alpha_{P}, \frac{3}{2} - \alpha_{\Lambda}, \frac{3}{2} - \alpha_{\Lambda}, \frac{3}{2} - \alpha_{N^*}).$$

Then the full amplitude describing the reaction is

$$\mathcal{A} = \mathcal{A}_1 + \mathcal{A}_2 + \mathcal{A}_2. \quad (5)$$

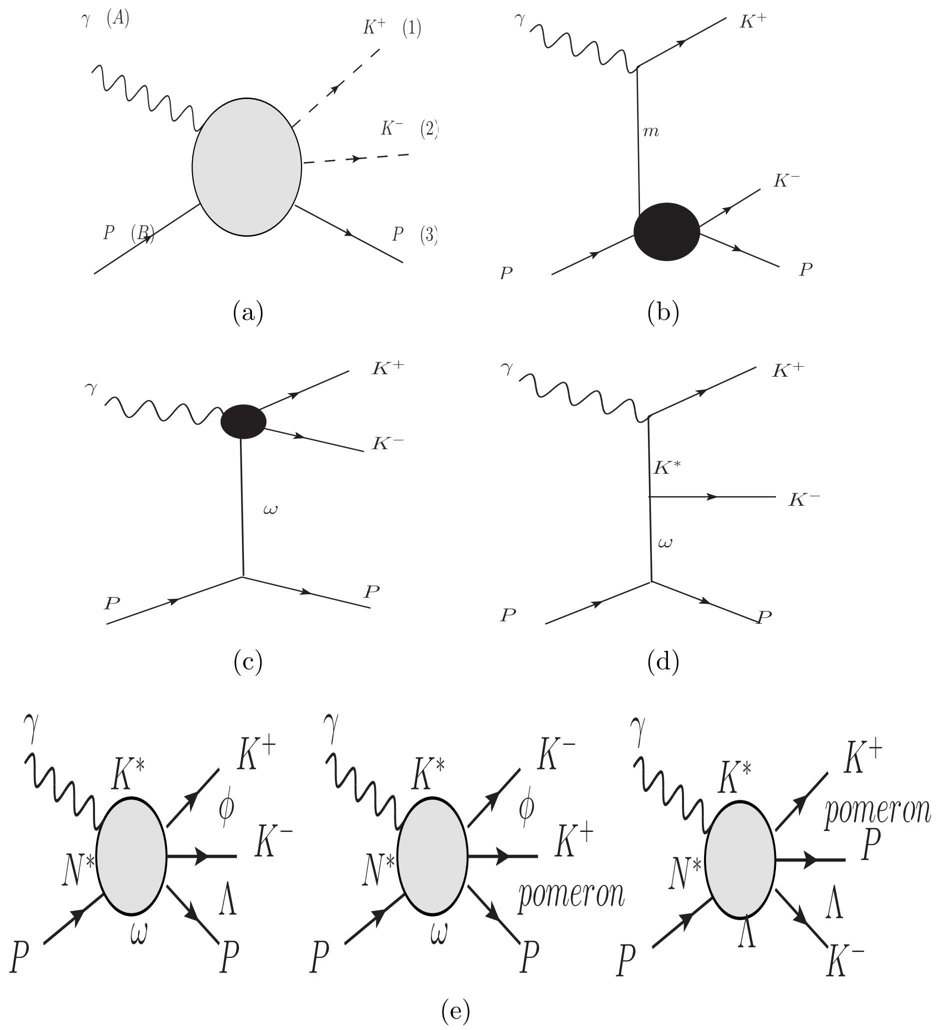

Figure 1: a, a general diagram of $\gamma P \rightarrow K^+K^-P$; b,c,d correspond different high energy limits; e includes the particular intermediate states in each diagram.

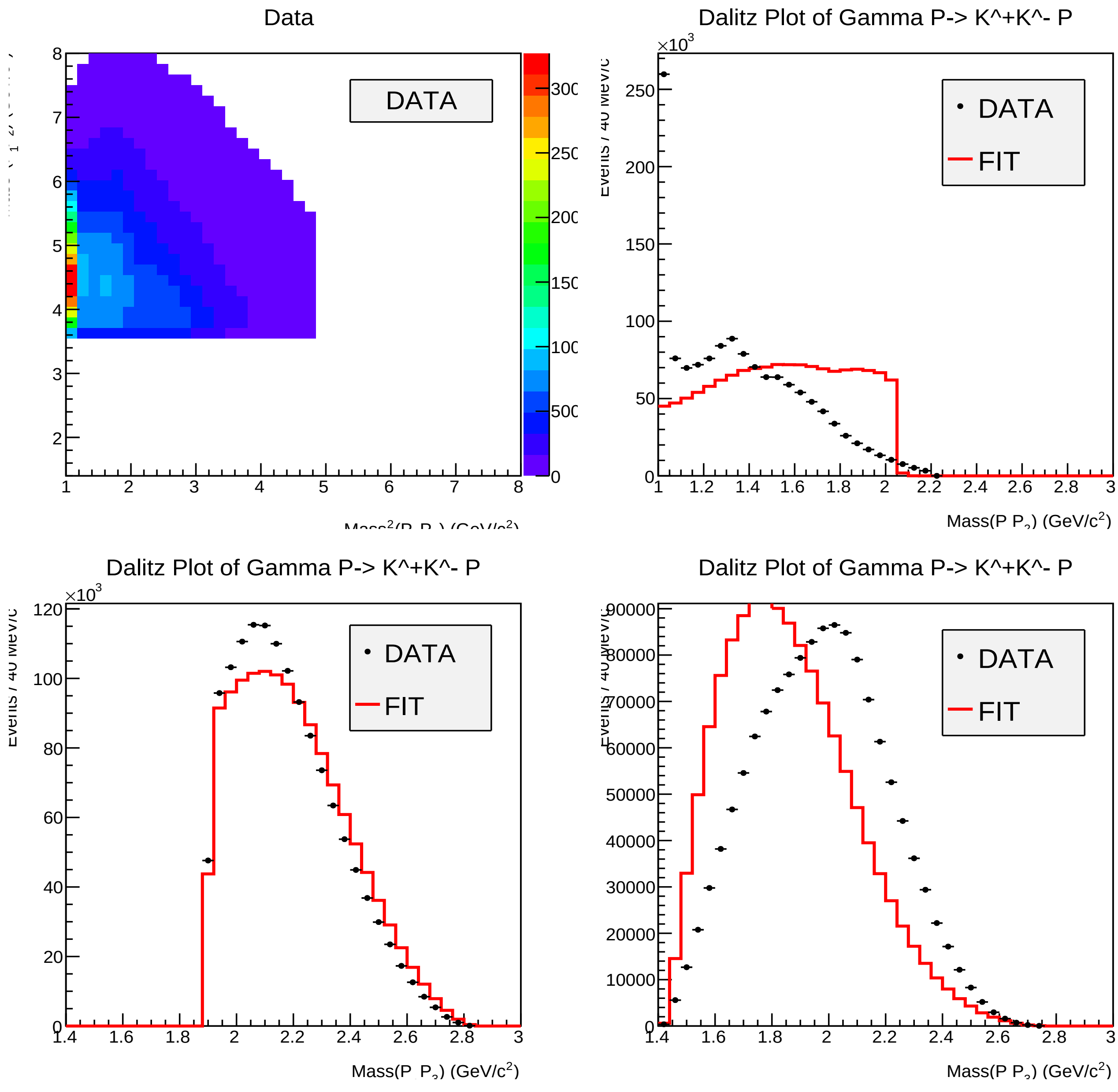

Figure 2: Double regge limit fitting result

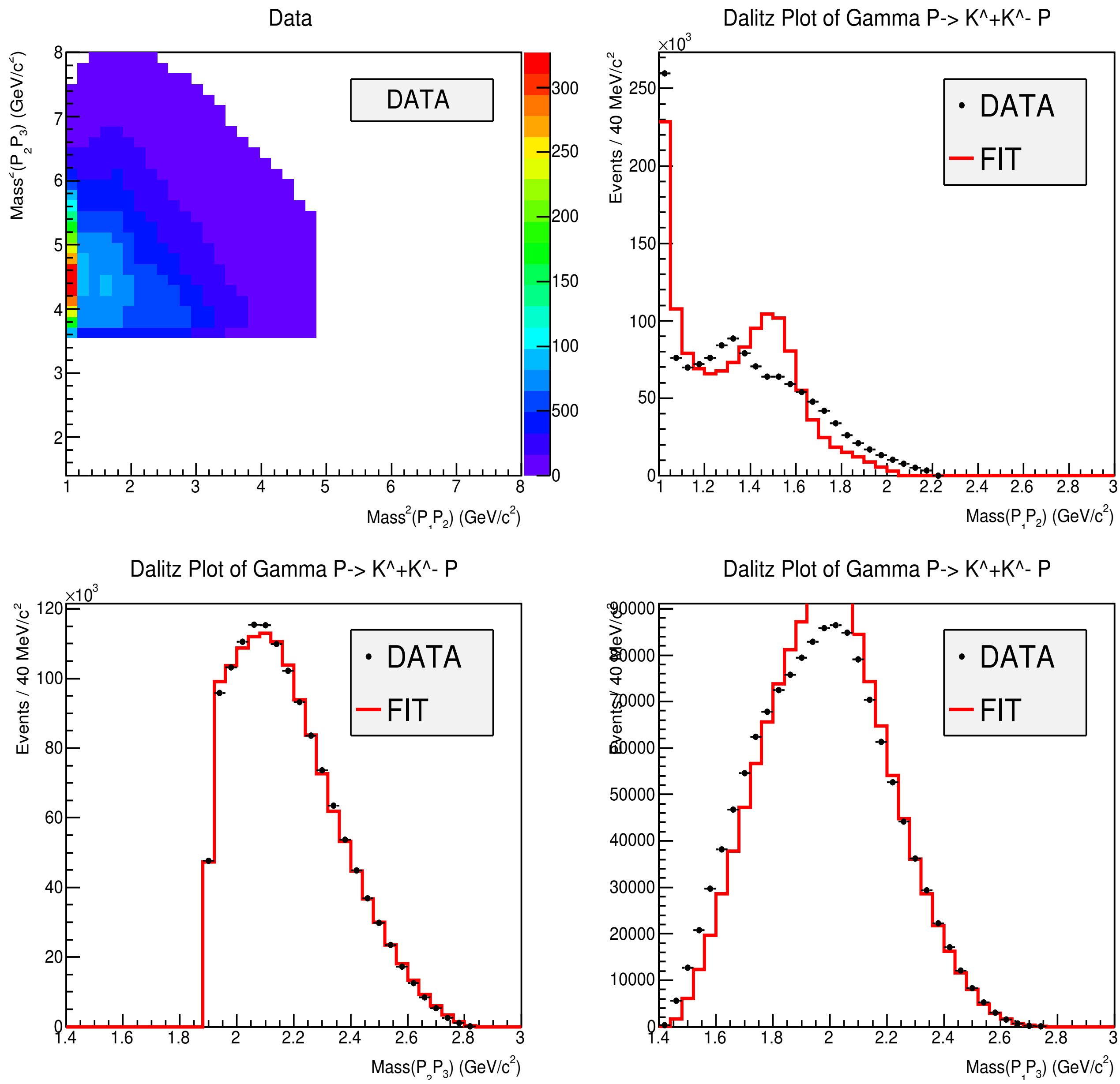

Figure 3: Single regge limit fitting result