Revealing the properties of tensor resonances using COMPASS measurements for $\eta\pi/\rho\pi$ channels

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I. THE MODEL

The transition amplitude is denoted by T_{ij}

$$\langle f|T|i\rangle = M_{if}\,(2\pi)^4\delta^4(p_1+p_2-p_1'-p_2') \tag{1}$$

where i, f are the initial and the final state. Those are considered to be either $\eta\pi$ or $\rho\pi$. For the convenience the channels are labeled by 1 ($\eta\pi$) and 2 ($\rho\pi$). First, we dissect out the threshold factors,

$$M_{if} = F_2((p_iR)^2))\hat{M}_{if}F_2((p_fR)^2)), \quad F_2(z) = \frac{z^2}{9+3z+z^2}, \tag{2}$$

where $p_1 = \lambda^{1/2}(s, m_\eta^2, m_\pi^2)/(2\sqrt{s})$, $p_2 = \lambda^{1/2}(s, m_\rho^2, m_\pi^2)/(2\sqrt{s})$. The $\lambda(x,y,z) = x^2+y^2+z^2-2xy-2yz-2zx$ is the Källèn function. The reduced amplitude $\hat{M}$ is parametrized in the matrix form

$$\hat{M} = [1 - i\rho K]^{-1}K \tag{3}$$

where ρ, and K are matrices given by

$$K_{ij} = \frac{1}{m_1^2-s}\begin{pmatrix} g_1^2 & g_1g_2 \\ g_2h_1 & g_2^2\end{pmatrix} + \frac{1}{m_2^2-s}\begin{pmatrix} h_1^2 & h_1h_2 \\ h_2h_1 & h_2^2\end{pmatrix}. \quad \rho_{ij} = \begin{pmatrix}\rho_1 & 0 \\ 0 & \rho_2\end{pmatrix}. \tag{4}$$

The $\rho_i(s)$ denotes the reduced phase space factor

$$\rho_i = \frac{1}{8\pi}\frac{2p_i}{\sqrt{s}}F_2^2((p_iR)^2)), \tag{5}$$

The masses of the particles are $m_\pi = 0.139\,57\,\mathrm{GeV}$, $m_\eta = 0.547\,\mathrm{GeV}$, $m_\rho = 0.7755\,\mathrm{GeV}$ [**?**].

The values of parameters are given in the Table I.

TABLE I: Values of the parameters in the model.

Parameters	m_1	g_1	g_2	m_2	h_1	h_2
Values	1.84 GeV	1.41 GeV	−3.67 GeV	2.99 GeV	2.33 GeV	5.28 GeV