

Filipponi, Pancheri, and Srivastava Reply: In our works [1–3] mesonic mass formulas for real, linear Regge trajectories (for all flavors) and their extension to the spacelike region have been discussed and found to be generally valid to about 10%. As shown below, the assumption of additivity of Regge intercepts in the previous Comment by Burakovsky and Goldman (BG) [4] must fail if one requires a better accuracy.

BG state that our Regge intercepts in the light sector contradict data, e.g., the ρ intercept $\alpha_\rho(0) = 0.47$ (ours) versus $\alpha_\rho(0) = 0.55$ (the “correct” value). The objections BG raise have an ancient heritage since they are commonly afflicting all linear, real Regge parametrizations. In fact, their own parametrization for the ρ trajectory gives almost identical values to ours for the intercept: $\alpha_\rho(0) = 0.478$ (BG value).

The above noted discrepancy for the Regge intercepts and their slopes has been very simply and satisfactorily resolved recently [5]. In the real and linear Regge trajectories approximation, in contrast to experimental data, the Regge slopes are automatically equal in spacelike and timelike regions. On the other hand, as finite widths and hence imaginary parts of Regge trajectories are included we show rigorously [5] that the slopes in the spacelike region become larger than their timelike counterparts. More can be said. We find that asymptotically as $s \rightarrow \infty$, the total width of resonances scale with the mass, $\Gamma_{\text{TOTAL}}(s)/\sqrt{s} \rightarrow \pi\epsilon$ leading to maximally complex trajectories for which $\text{Re}(s)$ and $\text{Im}(s)$ grow as $s^{1-\epsilon}$, with $\epsilon \approx 0.035$.

Figure 1 shows a comparison of our theoretical prediction with experimental data [6,7] for the ρ case. One can see clearly that the real, linear approximation (shown as the solid line) is much improved by the unitarily corrected one. Incidentally, after unitarity corrections, $\alpha_\rho(0) = 0.53$, bringing a long standing controversy to a close.

Regarding meson masses for heavy flavors, we eliminated the troublesome, unknown (and scale variant) quark masses in favor of the ground state $J = 1$ mesons. Thus, $M(B^*)$ and $M(B_s^*)$ become inputs [2,3]. This obviates the intercept additivity assumption while leading to a very good phenomenology for all mesonic resonances as shown in [2,3]. For example, our B_c mass agrees quite well with the present experimental value. Also, our slopes for the $c\bar{c}$ and $b\bar{b}$ trajectories agree with an independent estimate in [8].

Objections raised by BG are thus shown to be invalid both for the intercept as well as for the masses. Done properly, all our predictions in Refs. [1–3] are valid to within 10%. Reference [5] shows how to go beyond, through unitarized, complex, and nonlinear trajectories.

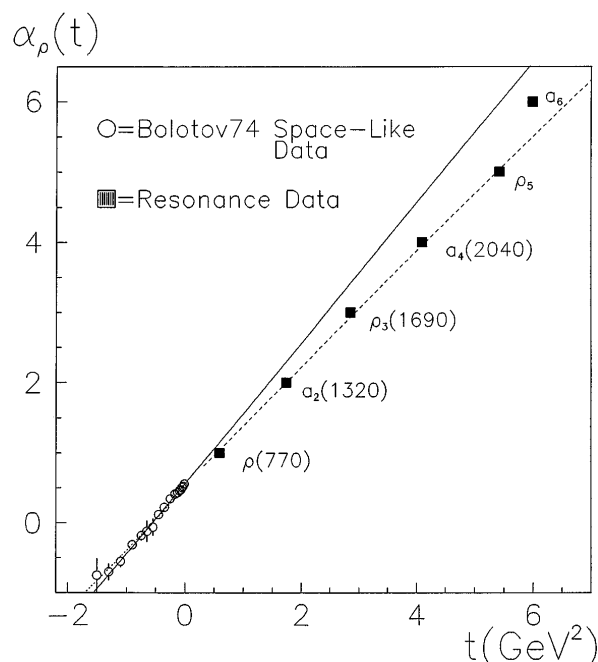


FIG. 1. $\text{Re } \alpha_\rho(t)$ vs t for spacelike and timelike regions.

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