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The spin alignment of vector mesons with light front quarks

The global spin alignment of the vector meson has been observed in relativistic heavy ion collisions, but its theoretical origin is still on hot debates. Here we propose to apply the light front framework to explain this phenomenon since the light front form explicitly describes the hadron spin including both the quark spin and the orbital angular momentum. After applying the light front spinor, the spin alignment in the polarization of vector mesons with $\rho 00 > 1/3$ can be naturally manifested and in particular, the obtained spin alignment for ϕ meson is in good agreement with the experimental data. This implies that to explain the spin alignment, it is important to properly include the contribution from the gluon interactions that are presented in terms of the orbital angular momentum of the hadron bound state.

[1] B. Fu, F. Gao, Y.-X. Liu, and H. Song, Phys.Lett.B 855 (2024) 138821, arXiv:2308.07936

Category

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