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Angular and chiral content of the ρ and ρ' mesons

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We identify the chiral and angular momentum content of the leading quark-antiquark Fock component for the $\rho(770)$ and $\rho(1450)$ mesons using a two-flavor lattice simulation with dynamical Overlap Dirac fermions. We extract this information from the overlap factors of two interpolating fields with different chiral structure and from the unitary transformation between chiral and angular momentum basis. For the chiral content of the mesons we find that the $\rho(770)$ slightly favors the $(1, 0) \oplus (0, 1)$ chiral representation and the $\rho(1450)$ slightly favors the $(1/2, 1/2)_b$ chiral representation. In the angular momentum basis the $\rho(770)$ is then a 3S_1 state, in accordance with the quark model. The $\rho(1450)$ is a 3D_1 state, showing that the quark model wrongly assumes the $\rho(1450)$ to be a radial excitation of the $\rho(770)$.

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