

The lowest resonance of QCD

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I intend to discuss the current state of knowledge in low energy $\pi\pi$ scattering, emphasizing the strength of the constraints imposed by chiral symmetry, crossing, analyticity and unitarity. The theoretical predictions will be compared with the experimental results obtained by E865, DIRAC and NA48, as well as with recent lattice results. In the second part of the talk, I plan to present the work done in collaboration with Irinel Caprini and Gilberto Colangelo [1], which concerns the lowest resonance of QCD. The singularity closest to the origin turns out to sit near the threshold and carries the quantum numbers of the vacuum - such a state occurs in many phenomenological analyses and is referred to as the sigma, but the results obtained for the position of the pole scatter wildly. Our method allows us to remove the ambiguities inherent in these analyses and to reliably determine the pole position. The example neatly illustrates the fact that the low energy dynamics of the Goldstone bosons is governed by the symmetries of QCD.

[1] I. Caprini, G. Colangelo and H. Leutwyler, Phys. Rev. Lett. **96** (2006) 132001.

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