ANALYSIS OF THE PION FORMFACTOR IN THE TIME-LIKE REGION

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We perform a model independent analysis of the pion electromagnetic formfactor using the available space-like and time-like data. Our aim is to obtain information on the structure in the time-like region above the $\pi\omega$ threshold. The phase below is assumed to be known from $\pi\pi$ scattering. In the process of analytic continuation we use as stabilizing lever different types of bounds on the derivative of the formfactor.

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PIONIC CONTRIBUTION TO THE MUON MAGNETIC MOMENT

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A procedure is developed to derive optimal lower bounds for the pionic contribution to the muon magnetic moment from analyticity of the pion form factor $F(t)$, its normalization $F(0) = 1$ and from experimental information from both the processes $e^- p \to e^- \pi^+ n$ and $e^+ e^- \to \pi^+ \pi^-$. It represents essentially the solution of a certain kind of optimization problem in Hilbert space. Numerical results are presented and compared to the recent data for the muon magnetic moment; we find $a_\mu(\pi^+\pi^-) \geqslant 42 \times 10^{-9}$.

Can One Detect Zeroes of the Pion Form Factor?

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We discuss the question of zeroes of the pion form factor by a method which allows us to "quantify" the unavoidable assumptions concerning the high energy behaviour. The conclusion is that all the present data are consistent with the absence of zeroes inside the cut t-plane. If zeroes do exist, then they are excluded from certain regions around the data, whose boundaries are given in the text. (E.g. zeroes on the negative real t-axis are confined to the left of $t_0 = -6.5\,(\mathrm{GeV/c})^2$.)

On zeroes of the pion electromagnetic form factor

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We develop a general procedure for the location of possible zeroes of the pion form factor, which relies on interpolation theory for analytic functions. The zeroes are confined (in the unit disk) to regions bounded by (real) roots of algebraic equations and by algebraic curves. These regions depend both on the interpolation data and the class of functions, which is suitable for the physical problem.