On the determination of πN phase shifts from isospin constraints and fixed t analyticity

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This paper treats the problem of the unique and constructive determination of πN scattering amplitudes by means of fixed t dispersion relations and isospin invariance from data on the differential cross section and polarization of the elastic and charge exchange reactions. The conclusion is that the amplitudes can be uniquely constructed in a neighborhood $(-\alpha, a)$ of $t = 0$ if they are continuous functions of both real s and t for s on the cuts and $4\mu^2 > t > -\alpha_0$, $\alpha_0 > \alpha$ and there exists ν_0 such that, for $|\nu| \geqslant \nu_0$, both $|A^+(\nu,t)|/|A^+(\nu,t) + \nu B^+(\nu,t)| < $ const, $t \in (-\alpha_0, 4\mu^2)$ (as indicated by spin rotation measurements) and $|\mathrm{Re}(A^+ + \nu B^+)|/\mathrm{Im}(A^+ + \nu B^+) < $ const, $t \in (-\alpha_0, 0)$. This result is specific for πN scattering, as it depends on a small number of experimental facts concerning this process, which are enumerated in the text.