II. INTERPRETATION AND CRITIQUE OF PCAC RELATION

There remains the question of interpreting and justifying the PCAC hypothesis on a theoretical basis. We will discuss it from various angles.

1). First look at the Gell-Mann-Lévy ansatz $\partial_\mu a_\mu{}^i = C\phi^i$. As we have remarked already, this in itself should be considered a definition rather than an assumption. It is known that there is no unique way of defining a phenomenological field for a particle. An appropriate local operator like $\partial_\mu a_\mu{}^i$ will do if it has the right quantum numbers and is properly normalized.[10] We could, for example, also use $i\bar{q}\gamma_5\tau^i q$ with equal justification. Different definitions of a field agree by necessity on the mass shell of the particle, and may differ only as we go off the mass shell. Unless we know precisely what a pion field is (e.g., we know what a bare pion field is in the fundamental Lagrangian), there is no unique way of defining ϕ^i. Now it so happens that the pion is the lightest member of all hadrons, and especially the next states having the same quantum numbers are 3π configurations with mass $\geq 3m_\pi$. These belong to the off-mass-shell contributions. But since the mass ratio $(m_\pi/3m_\pi)^2 = 1/9$ is small. it may be reasonable to expect that near the pion mass shell $0 \lesssim q^2 \lesssim m_\pi{}^2$, the ambiguity, if there is any, of q^2 dependence will not be great. This ambiguity would show up in what we mean by $g_{\pi NN}(0)$ in Eq. (14) since it is an extrapolation from