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The NJL-jet model for quark fragmentation functions TAKUYA ITO, WOLFGANG BENTZ, Department of Physics, Tokai Univ., Hiratsuka, Japan, IAN CLOET, Department of Physics, University of Washington, Seattle, USA, ANTHONY THOMAS, Jefferson Lab, Newport News, USA, KOICHI YAZAKI, Riken, Wako-shi, Japan — Quark distribution and fragmentation functions are the basic nonperturbative ingredients for a QCD-based analysis of hard scattering processes. We present some results of our recent calculations of quark fragmentation functions to pions in the NJL model. The important point is that our fragmentation functions naturally satisfy the momentum and isospin sum rules without any new parameters into the theory. Our calculation is based on a product ansatz to describe cascade-like fragmentation processes, similar to the product ansatz used in the quark jet-model of Field and Feynman. We arrive at the following expression for the total fragmentation function:

$$D_q^\pi(z) = \sum_{m=1}^{N} \sum_{k=m}^{N} P(k) \int_0^1 d\eta_1 \int_0^1 d\eta_2 \cdots \int_0^1 d\eta_k \\ \times \sum_{Q_k} F_q^{Q_1}(\eta_1) F_{Q_1}^{Q_2}(\eta_2) \cdots F_{Q_{k-1}}^{Q_k}(\eta_k) \delta(z - z_m) \delta(\tau_\pi, (\tau_{Q_{m-1}} - \tau_{Q_m})/2) \ .$$

We present numerical results and compare with the empirical results. We argue that this NJL-jet model provides a very useful framework to calculate the fragmentation functions in an effective chiral quark theory.

Takuya Ito
Department of Physics,Tokai Univ., Hiratsuka, Japan

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