B. L. Friman & J. Knoll, Lectures SS 2000

Problem set 3, date 24.5.00 9:30h Seminarraum Theorie

left over from last time:

1 **Correlations through momentum conservation:** Analog to eq. (67,68) write down the two-particle distribution $W(\vec{p}_1, \vec{p}_2)$ to observe two particles with momenta $\vec{p}_1$ and $\vec{p}_2$ and discuss the result as a function of the number of particles N at constant c.m. energy per particle $\sqrt{s}/N = const.$

2 **Dalitz-plot for resonance decay:** How will the Dalitz-plot distribution look for the case, where a Φ-meson of mass of 1 GeV will decay into three pions, and one assumes that pions 2 and 3 result from an intermediate ρ-meson with properties given by a spectral function as in (56-59) of the lecture notes. For simplicity we treat the three pions as distinguishable particles such that only particles 2 and 3 stem from an intermediate ρ-meson.

and a new problem:

3 **ρ-meson- production in π N scattering:** A pion scatters off a resting nucleon. From which kinetic beam energy t_π and c.m. energy $\sqrt{s}$ can one produce two pions ($\pi N \longrightarrow \pi\pi N$)? Calculate the invariant mass spectrum $F(\sqrt{s_{\pi\pi}})$ for the production of the pion pair under the assumption that an intermediat ρ-meson is formed which decays into the two pions ($\pi N \rightarrow \rho N \rightarrow \pi\pi N$). The fist coupling is assumed to be constant, the sesequent decay through p-wave coupling (c.f. (56-59) in the lecture notes).