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

Problem set 5, date 14.6.00 9:30h Seminarraum KPI/III

1 **WKB phase shift for a repulsive hard-sphere potential:** Compute the WKB approximation to the phase shift of a hard-sphere potential (eq. (50)). Compute the derivative of the phase shift with respect to energy at fixed angular momentum ℓ and with respect to angular momentum at fixed energy. Discuss the interpretation of the derivatives.

2 **Breit-Wigner formula:** Estimate the maximum value of the cross section for $e^+e^- \to \pi^+\pi^-$. This reaction is dominated by a ρ meson intermediate state. The ρ meson has a mass of 770 MeV and it decays with almost 100 % probability into the 2π channel, while the branching ratio into the e^+e^- channel is $4.5\ 10^{-5}$.