

Nucleon-nucleon scattering in the large N_c limit

V. Krejčířik^{1#}

¹*Theoretical Research Division, RIKEN Nishina Center,
2-1 Hirosawa, Wako, Saitama 351-0198, Japan*

[#]*a corresponding author: E-mail vojtech.krejcirik@riken.jp*

In this work, implications of the extreme large N_c limit for nucleon-nucleon scattering are examined. Several arguments are shown strongly suggesting that the logarithm of a typical S-matrix element (or equivalently a typical scattering phase shift) is proportional to N_c . Interestingly, the relation holds both for the real and imaginary part. From there, an exact formula for the nucleon-nucleon cross section is derived: $\sigma_{\text{tot}} = 2\pi/m_\pi \log^2(N_c)$, with corrections of order $1/\log(N_c)$. Additionally, an interesting result determining the inelastic cross section to be exactly 1/8 of the total cross section emerges.

References

- [1] T.D. Cohen, V. Krejčířik, Phys. Rev. C **88**, 054003 (2013).
- [2] T.D. Cohen, V. Krejčířik, Phys. Rev. C **89**, 024003 (2014).