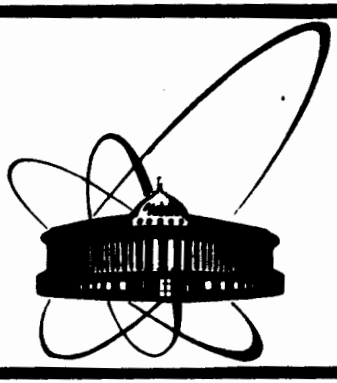

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THE h*N-TOTAL CROSS SECTIONS IN THE DOUBLE-GLUON EXCHANGE APPROXIMATION

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It is believed that the measurement of the h*N-total cross sections (h* to be hadronic resonance) can help to discriminate various theoretical models used for description of hadronic dynamics. At present time the most popular models of this kind are the additive quark model (AQM)[1] and double gluon exchange model (DGEM)[2] which is also known as Born approximation of QCD.

These two models yield quite different features of total hh-cross sections.

In the simplest version of AQM, where shadow effects are neglected, the total hh-cross sections are determined by numbers of the constituent quarks in hadrons and the value of the phenomenological quark-quark total cross section only and does not depend upon hadronic sizes and consequently upon excitation state of quark system.

On the contrary the DGEM predicts strong dependence of hh-total cross sections on transverse hadronic sizes. As a consequence, the excited hadronic states in this model interact more intensivly than the ground ones and on the other hand their interaction can also depend on hadronic helicities λ's. To estimate the order of magnitude of the effects under consideration we have performed simple calculations within DGEM using the harmonic oscillator wave functions as quark wave functions of hadrons. Considering nonstrange meson-nucleon interactions we assume, for the sake of simplicity, oscillator parameters of two-quark and three-quark system to be equal. This assumption is equivalent to the following relations between r.m.s. radii: $\langle r^2\rangle_\pi = \langle r^2\rangle_\rho = 3/4 \langle r^2\rangle_N$ and hN-total cross sections $\sigma^{tot}_{\pi N} = \sigma^{tot}_{\rho N} = \frac{2}{3}\sigma^{tot}_{NN}$. Some results of calculations are as follows:

h* = B(1235):
$$\lambda_B = 0 \qquad \sigma_{BN} = \sigma_{\pi N}$$
$$\lambda_B = \pm 1 \qquad \sigma_{BN} = \frac{3}{2}\sigma_{\pi N} \ ,$$

h* = δ (970):
$$\sigma_{\delta N} = \frac{4}{3}\sigma_{\rho N} = \frac{4}{3}\sigma_{\pi N} \ ,$$

h* = A_1 (1100):
$$\lambda_{A_1} = 0 \qquad \sigma_{A_1 N} = \frac{3}{2}\sigma_{\rho N}$$
$$\lambda_{A_1} = \pm 1 \qquad \sigma_{A_1 N} = \frac{5}{4}\sigma_{\rho N} \ ,$$

$$\lambda_{A_2} = 0 \qquad \sigma_{A_2N} = \frac{7}{8}\sigma_{\rho N}$$

$h^* = A_2(1310)$: $\lambda_{A_2} = \pm 1 \qquad \sigma_{A_2N} = \frac{5}{4}\sigma_{\rho N}$

$$\lambda_{A_2} = \pm 2 \qquad \sigma_{A_2N} = \frac{3}{2}\sigma_{\rho N} \quad .$$

As has been pointed out in ref.[8] the large values of h^*N--total cross sections can be correlated with the observed A-dependence of h^*-production cross sections from nuclei if the inelastic shadowing is taken into account.

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Омбоо З., Садыков Н.О., Тарасов А.В. E2-82-429

Полные сечения h*N-взаимодействия в приближении двухглюонного обмена

Обращается внимание на то, что в модели двухглюонного обмена возбужденные состояния адронов (h*) должны взаимодействовать более интенсивно, чем основные. Проводятся простые численные оценки обсуждаемых эффектов.

Работа выполнена в Лаборатории ядерных проблем ОИЯИ.

Препринт Объединенного института ядерных исследований. Дубна 1982

Omboo Z., Sadykov N.O., Tarasov A.V. E2-82-429

The h*N-Total Cross Sections in the Double-Gluon Exchange Approximation

It is shown that within double gluon exchange model excited hadronic states (h*) have more intensive interaction than bound ones. Simple numerical estimates of the effects under consideration are performed.

The investigation has been performed at the Laboratory of Nuclear Problems, JINR.

Preprint of the Joint Institute for Nuclear Research. Dubna 1982