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Applications of the tensor pomeron model to exclusive central diffractive meson production

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We discuss exclusive central diffractive production of scalar
($f_0(980)$, $f_0(1370)$, $f_0(1500)$),
pseudoscalar (η, $\eta'(958)$),
and vector (ρ^0) mesons in proton-proton collisions.
The amplitudes are formulated in terms of
effective vertices required to respect standard rules of Quantum Field Theory
and propagators for the exchanged pomeron and reggeons [1].
Different pomeron-pomeron-meson tensorial (vectorial)
coupling structures are possible in general.
In most cases two lowest orbital angular momentum - spin couplings
are necessary to describe experimental differential distributions [2].
We discuss differences between results of the
"tensorial pomeron" and "vectorial pomeron" models.
For $f_0(980)$ and η production reggeon-pomeron,
pomeron-reggeon, and reggeon-reggeon exchanges are included in addition,
which seems to be necessary at relatively low energies.
The theoretical results are compared with the WA102 experimental data,
in order to determine the model parameters.
Correlations in azimuthal angle between outgoing protons,
distributions in rapidities and transverse momenta of outgoing protons and mesons
in a special "glueball filter variable",
as well as some two-dimensional distributions are presented.
For ρ^0 production photon-pomeron, pomeron-photon exchanges are considered.
The coupling parameters of tensor pomeron and/or reggeon
are fixed from the H1 and ZEUS experimental data
of the $\gamma p \to \rho^0 p$ reaction.
We present first predictions of this mechanism
for $pp \to pp\pi^+\pi^-$ reaction being
studied at COMPASS, RHIC, Tevatron, and LHC [3].
Wy analyse influence of the experimental cuts on integrated cross section
and various differential distributions for pions.
We compare the ρ^0 contribution with double pomeron two-pion continuum [4].
We show that high-energy central production, in particular of pseudoscalar mesons,
could provide crucial information on the spin structure of the soft pomeron.
This is particularly clear for the coupling of the pomeron to particles carrying
non-zeroth spin as ρ^0 meson for example.

[1] C. Ewerz, M. Maniatis, and O. Nachtmann,
\textit{A Model for Soft High-Energy Scattering: Tensor Pomeron and Vector Odderon},
Ann. Phys. \textbf{342} (2014) 31,
arXiv:hep-ph/1309.3478.

[2] P. Lebiedowicz, O. Nachtmann, and A. Szczurek,
\textit{Exclusive central diffractive production of scalar and pseudoscalar mesons; tensorial vs. vectorial

pomeron}, in print in Ann. Phys.,
arXiv:hep-ph/1309.3913.

[3] P. Lebiedowicz, O. Nachtmann, and A. Szczurek, a paper in preparation.

[4] P. Lebiedowicz, Ph.D. thesis, \textit{Exclusive reactions with light mesons: From low to high energies}, IFJ PAN Cracow, 2014.

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