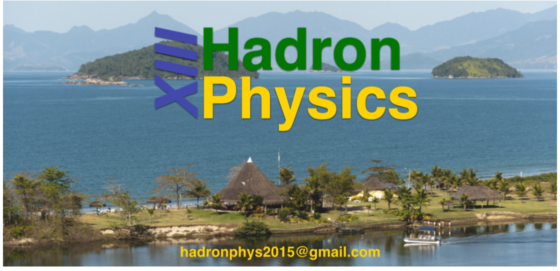

Contribution ID: **60** Type: **Oral presentation**

A covariant model for the negative parity resonances of the nucleon

Monday, 23 March 2015 18:30 (30 minutes)

One of the challenges of the modern physics
is the description of the internal structure
of the baryons and mesons.
The electromagnetic structure
of the nucleon N and the nucleon resonances N^* can be accessed
through the $\gamma^* N \to N^*$ reactions,
which deppend of the (photon) transfer momentum squared Q^2 [1–4].
The data associated with those transitions
are represented in terms of helicity amplitudes and have been collected in the recent years at Jefferson Lab,
with increasing Q^2.
The new data demands the development of theoretical models
based in the underlying structure
of quarks and mesons states [3,4].
Those models can be also very useful
to predict the results of the future
Jlab–12 GeV upgrade, particularly
for resonances in the second and third resonance region
(energy $W =$ 1400–1750 GeV) [4].
In that region there are several resonances N^*
from the supermultiplet $[70, 1^-]$ of $SU(6) \otimes O(3)$,
characterized by a negative parity [5].
According with the single quark transition model,
when the electromagnetic interaction
is the result of the photon coupling with just one quark,
the helicity amplitudes of the $[70, 1^-]$ members
depend only of three independent functions of Q^2:
A, B and C [5,6].
In this work we use the
covariant spectator quark model [4,6,7]
developed for the $\gamma^* N \to N^*(1520)$
and $\gamma^* N \to N^*(1535)$ transitions [8],
also members of $[70, 1^-]$,
to calculate those functions.
With the knowledge of the functions A, B, and C
we predict the helicity amplitudes for the
transitions $\gamma^* N \to N^*(1650)$, $\gamma^* N \to N^*(1700)$,
$\gamma^* N \to \Delta(1620)$,
and $\gamma^* N \to \Delta(1700)$ [6].
To facilitate the comparison with
future experimental data at high Q^2,
we provide also simple parametrizations
of the amplitudes $A_{1/2}$ and $A_{3/2}$
for the different transitions, compatible with the expected

falloff at high Q^2 [6].

[1] I.G. Aznauryan et al. [CLAS Collaboration],
Phys. Rev. C 80, 055203 (2009);
V.I. Mokeev et al. [CLAS Collaboration],
Phys. Rev. C 86, 035203 (2012).

[2] L. Tiator, D. Drechsel, S.S. Kamalov and M.Vanderhaeghen,
Eur. Phys. J. ST 198, 141 (2011).

[3] I.G. Aznauryan and V.D. Burkert,
Prog. Part. Nucl. Phys. 67, 1 (2012).

[4] I.G. Aznauryan et al.
Int. J. Mod. Phys. E 22, 1330015 (2013).

[5] V. D. Burkert, R. De Vita, M. Battaglieri, M. Ripani and V. Mokeev,
Phys. Rev. C 67, 035204 (2003).

[6] G. Ramalho,
Phys. Rev. D 90, 033010 (2014).

[7] F. Gross, G. Ramalho and M.T.~Peña,
Phys. Rev. C 77, 015202 (2008);
Phys. Rev. D 85, 093005 (2012).

[8] G. Ramalho and M.T. Peña,
Phys. Rev. D 89, 094016 (2014);
Phys. Rev. D 84, 033007 (2011);
G. Ramalho and K. Tsushima,
Phys. Rev. D 84, 051301 (2011).

Primary author: Dr RAMALHO, Gilberto (UFRN)

Presenter: Dr RAMALHO, Gilberto (UFRN)

Session Classification: Hadronic structure - reactions, production and decays

Track Classification: Hadronic structure - reactions, production and decays