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VI–14 Isovector $\delta g_l^{\rm mes}$ Produced by the Hamada-Johnstone Potential*

H. HYUGA and A. ARIMA

Department of Physics, State University of New York at Stony Brook, New York, USA

The Sachs moment $M_\pi^{(1)}$ coming from the central part of the Hamada Johnstone potential can be written as

$$M_\pi^{(1)} = M_{\rm one\pi}^{(1)} + M_{\rm Ho}^{(1)}$$

$$M_{\rm one\pi}^{(1)} = \left(\frac{f^2}{3}\right)\left(\frac{m}{\mu}\right)[\tau(1)\times\tau(2)]^{(1)}\,[x_1\times x_2]^{(1)} \times(\sigma(1)\sigma(2))\,Y(x)$$

$$M_{\rm Ho}^{(1)} = \left(\frac{f^2}{3}\right)\left(\frac{m}{\mu}\right)[\tau(1)\times\tau(2)]^{(1)}\,[x_1\times x_2]^{(1)}\,Y^2(x) \{4.56 - 2.31(\sigma(1)\sigma(2)) + (-8.65 + 8.77(\sigma(1)\sigma(2))\,Y(x)\}$$

where $M_{\rm one\pi}^{(1)}$ is the contribution of one pion exchange and $M_{\rm Ho}^{(1)}$ is the contribution from higher order processes. The value of coupling constant f^2 is 0.08, and m and μ stand for nucleon and pion masses, respectively.

The expectation values of $M_{\rm Ho}^{(1)}$ depend strongly on the short range behaviour of relative wave functions of two interacting nucleons. We use the short range correlation functions calculated by Hadjmichael *et al.*[1] Almost the same results are obtained by using a simple cut-off at 0.7 fm.

The results for light nuclei are shown in Table I. In this case the mesonic contribution from $M_\pi^{(1)}$ is of iso-vector type.

In the lead region, small differences appear between $\delta g_l^{\rm mes}$ for protons and those for neutrons because of neutron excess.

The following observations are worthwhile mentioning. (i) $\delta g_l^{\rm mes}$ has a strong state dependence. (ii) $\delta g_l^{\rm mes}$ for protons are larger than $|\delta g_{\bar{l}}^{\rm mes}|$ for neutrons. (iii) The mesonic corrections reported in this contribution are sometimes very large and cancel the first order-correction due to the core polarization in single particle states with $j = l + \frac{1}{2}$.[2] This fact indicates that some unknown corrections for example second order corrections[3] due to the core polarization should be taken into account.

Table I. $\delta g_l^{\rm mes}$ in light nuclei.

		One π	Higher order	Sum
^{15}N	$p_{\bar{1}/2}$	0.114	0.064	0.178
^{17}O	$d_{5/2}$	−0.063	−0.037	−0.100
^{39}K	$d_{\bar{3}/2}$	0.108	0.059	0.165
^{41}Ca	$f_{7/2}$	−0.069	−0.040	−0.109

Table II. $\delta g_l^{\rm mes}$ for protons in lead region.

	One π	Higher order	Sum
0g	0.117	0.066	0.183
0h	0.102	0.055	0.157
0i	0.092	0.045	0.136
1f	0.112	0.055	0.167
1g	0.158	0.045	0.203
2p	0.129	0.055	0.184

Table III. $\delta g_l^{\rm mes}$ for neutrons in lead region.

	One π	Higher order	Sum
0g	−0.098	−0.046	−0.144
0h	−0.073	−0.036	−0.109
0i	−0.051	−0.028	−0.089
1f	−0.065	−0.038	−0.103
1g	−0.049	−0.030	−0.079
2p	−0.058	−0.038	−0.096

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References

1) E. Hadjimichael: private communication and Nuclear Theory Group Progress Report SUNY, Stony Brook (1972).
2) A. Arima and L. J. Huang-Lin, presented at this conference VI–8.
3) A. Arima, M. Ichimura and K. Shimizu, presented at this conference VI–6.