In medium modification of nucleon electromagnetic properties.

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Since nucleons are composite objects, their internal structure is expected to be changed by nuclear environment. Recently we have proposed a Skyrme like Lagrangian to consider such effects. In ordinary notations it has the form [1]

$$L_{sk}^*(U, \rho) = -\frac{F_\pi^2}{16}(1 - \chi_p(r)) Tr(\vec{\nabla} U)(\vec{\nabla} U^+) + L_{4a} + \frac{F_\pi^2 m_\pi^2}{16}\left(1 + \frac{\chi_s(r)}{m_\pi^2}\right) \qquad (1)$$

where $\chi_p(r)$ - pion dipole susceptibility of the medium [2], $\chi_s(r) = -4\pi b_0 \rho(r)$ - isoscalar S - wave pion - nucleon scattering length and $\rho(r)$ - nuclear density. The lagrangian (1) takes into account a distortion of pion field in the medium and for constant density it leads just to renormalization of F_π and m_π: $F_\pi^* = F_\pi\sqrt{(1 - \chi_p)}$, $m_\pi^* = m_\pi\sqrt{(1 + \chi_s/m_\pi^2)/(1 - \chi_p)}$. In this report we concentrate on modification of electromagnetic (EM) properties of the nucleon within the Lagrangian (1). The results for static properties and EM form - factors are given in tables 1 and 2 respectively. It is seen that the charge radius of the nucleon increases in the medium and the mass and axial coupling constant are reduced. The enhancement of magnetic moment of proton is smaller than that obtained in non - topological soliton model [3] or in CBM [4]. The quenching of charge distribution of proton is in good agreement with the previous calculations [4,5]. The dependence of results on the parameters of pion nucleon scattering lengths and g_0' (which are included in χ_p and χ_s) will be given in an extended report. Here in tables 1 and 2 the following set of parameters $g_0' = 1/3$, $b_0 = -0.029 m_\pi^{-1}$, $b_1 = -0.08 m_\pi^{-1}$, $c_0 = 0.21 m_\pi^{-3}$, $c_1 = 0.17 m_\pi^{-3}$ has been used. This results may be useful in electron nucleus scattering analyses.

Table 1. Ratios of values of nucleon properties in ^{16}O to free space ones.

M_N^*/M_N	g_A^*/g_A	$\sqrt{<r^2>_p^* / <r^2>_p}$	μ_p^*/μ_p
0.851	0.961	1.059	1.004

Table 2. Medium (in ^{16}O) effects on EM form - factors of nucleon.

$q^2(fm^{-2})$	F_E^{p*}/F_E^p	F_E^{n*}/F_E^n	G_M^{p*}/G_M^p	G_M^{n*}/G_M^n
0.040	.9999	.9059	.8724	.8656
0.644	.9932	.9047	.8748	.8674
1.972	.9776	.9034	.8811	.8726
4.025	.9504	.9069	.8932	.8833
6.802	.9105	.9098	.9130	.9015
10.303	.8590	.9066	.9415	.9283

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