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SYMMETRY-MOTIVATED ANALYSIS OF PARTICLE MASS DATA

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In this work a continuation of an analysis of fine structure effects in nuclear
data is combined with the analysis of particle mass data.
The material used in the work is based on nuclear data compilations collected
in PNPI and data from the Compilations PDG-2016 and the evaluation CODATA.
These data provide a base for the combined analysis of all existing information
for suggested by Y.\,Nambu further development of the Standard Model (SM).
Involvement of nucleon masses into correlations with masses of other particles,
including such fundamental particles as leptons, the pion
and masses of vector and scalar fields allowed a combined consideration of data
in all these data files due to the commonly accepted basic role of the QCD
(one of SM components) in the mass generation and in the nucleon interaction.

We start with CODATA relations for the electron and nucleon masses:

\begin{equation}
{m_n = 115\cdot16m_e - m_e - \delta m_N/8}~~~~~~~~~~~~~{m_p = 115\cdot16m_e - m_e - 9\delta m_N/8}.
\end{equation}

Here the shift in the neutron mass (relative to the integer number
of m_e) δm_n=161.65 keV is exactly rational 8(1.000(1))
to the nucleon mass splitting δm_N=1293.3~keV. It was found that the
fine structure period 161 keV from this ratio is very close
(but not coincident) with the value m_e/3=170.3 keV which can be considered
as an additional shift (assigned to each of three quarks of the nucleon).

The relation in mass shifts confirmed with analysis of nuclear data
was an indication on the presence of very general dynamics connected with charge
discreteness in the Standard Model, with
symmetry properties of the fermion system and the nature of the physical condensate [1].

\noindent
1. S.I.~Sukhoruchkin, Nucl. Part. Phys. Proc. {\bf 282--284} (2017) 189.

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