ICHEP 2016 Chicago

38th INTERNATIONAL CONFERENCE
ON HIGH ENERGY PHYSICS
AUGUST 3 - 10, 2016
CHICAGO

Contribution ID: **1392** Type: **Poster**

# Tuning effect in particle masses and nuclear data

*Monday, 8 August 2016 18:30 (2 hours)*

Recent analysis of nuclear binding energies and nuclear excitations of the broad scope of nuclei allowed a conclusion that there exists a discreteness in both values with stable mass/energy intervals coinciding or rationally connected with charge mass splitting of the nucleon $\delta m_N$=1293.3˜keV and the lepton $m_e$=511˜keV. For example, periods $\delta m_N/8$=161˜keV and $m_e/3$=171˜keV were observed in excitations of near-magic nuclei
$^{odd}$Sb (Z=51, numbers of the period n=1,2,3,4,5,6) and
$^{101,133}$Sn (Z=50, N=51,83, n=1,5,8).
In neighbour nuclei $^{116,117,118}$Sn and $^{113}$In phonon-like excitations with values close to $\delta m_N$ and $2m_e$=$\varepsilon_o$ were found in first excitations, as well as many stable intervals D=511˜keV, 1533˜keV and 2045˜keV ($m_e$, $3m_e$, $4m_e$) - in all 183 levels of $^{113}$In.
Similar groupings of excitations at $\delta_N$ and $\varepsilon_o$ was reported in sum distribution for all nuclei [1].

Such tuning effect in nuclear data could be considered together with the empirical tuning effect in particle masses which consisted in rational relations between mass-values of the muon, pion, nucleon and standard (in NRCQM) estimations of the constituent quark masses $m_\rho/2$ and $m_\Xi/3$ [2.3].
We use evaluation by CODATA [4] of the ratio 1838.6836605(11) between masses of the neutron and electron for determination of the shift of the neutron mass $\delta m_n$=161.65(6) keV relative to the integer number of the electron rest mass, namely 115$\delta$ - $m_e$ where the parameter $\delta$=16$m_e$ was introduced in 70-ties as a common period in particle masses (close to double value of the pion $\beta$-decay energy [3,5]).
The value $\delta m_n$=161.65(6) keV forms the ratio 8×1.001(1) with the nucleon mass difference $\delta m_N$. This exact relation could be considered as important confirmation of the common tuning effect in particle masses and nuclear excitations (was considered in [3]). \\

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**Session Classification:** Poster Session

**Track Classification:** Beyond the Standard Model