Predictions of High Energy Experimental Results (2010, 2015)

Remark: Some remarks are added on Nov. 19, 2020.

The predictions rely on the Regular Charge-Monopole Theory (RCMT) [1].

I. ***No Higgs***

It is proved that that Klein-Gordon equation is not valid [1]. An analogous proof shows that also the Higgs equation contains fundamental errors [1].

Prediction 1: A genuine Higgs boson will not be found.

Schedule: LHC should confirm or deny this prediction until 2013-14 (according to CERN's March 2010 published plan).

Remark: (Nov. 19, 2020)

The serious theoretical errors of the Higgs idea mean that the 125 GeV CERN particle is a meson, probably, a $t\bar{t}$ meson.

II. ***Proton-Proton cross section***

The first problem to be discussed here is the specific structure of the baryonic closed shells of quarks. One may expect that the situation takes the simplest case and that the core's closed shells consist of just two u quarks and two d quarks that occupy an S shell. The other extreme is the case where the baryon is analogous to a very heavy atom and the baryonic core contains many closed shells of quarks. The presently known proton-proton (p-p) cross section data which is depicted in fig. 1, is used for describing the relevance of the LHC future data to the problem of how the closed shell structure affects the elastic p-p cross section.

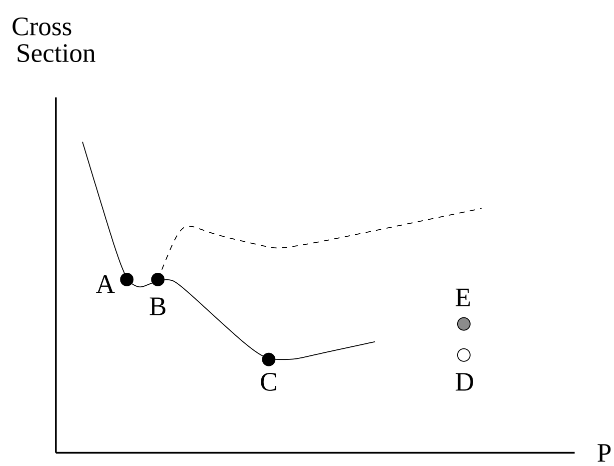

Figure 1: *The solid line describes the proton-proton elastic cross section. The broken line describes the total cross section. Axes are drawn in a logarithmic scale.*

Prediction 2: The elastic cross section graph will pass near E (for many inner closed shells) or near D (for very few inner closed shells) [2].

Schedule: Depends on the LHC performance.

Remarks: (Nov. 19, 2020)

1. The LHC TOTEM 2013 and 2019 reports show that the total and the elastic cross-section continue to rise with the collision energy. The rise of the elastic cross-section indicates that the proton's inner closed shells are really rigid.
2. QCD has no explanation for these experimental data: Indeed, the ep total cross-section decreases with energy and the portion of the ep elastic cross-section is negligible. In contrast, fig. 1 and the new LHC TOTEM 2013 and 2019 reports show that the pp high energy total cross-section increases with energy and also the pp elastic cross-section increases. Moreover, the number of the elastic events are about 1/6 of the total events.

III. *Pion-Pion cross-section*

Unlike protons, pions are characterized by a pair of quark-antiquark and they do not have inner quark shells. Moreover, in deep inelastic electron-proton cross section, the electron collides with one quark at a time. This property should also hold for quark-quark interaction of the pion-pion collision. Therefore, relying on RCMT, the pion-pion elastic cross section is analogous to an ordinary electromagnetic elastic cross section of charges. It is well known that this cross section decreases.

Prediction 3: Unlike the proton case, where the elastic cross section increases for collision energy greater than that of point C, a decrease of the elastic cross section is predicted for pion-pion scattering, and its graph will not increase at any stage.

Schedule: Unknown.

IV. *Pion momentum carried by quarks*

The deep inelastic electron-proton scattering data are used for calculating the portion of the proton's momentum carried by quarks, as seen in a frame where the proton's momentum is very very large. It turns out that for a proton, the overall quarks' portion is about one half of the total momentum. The fact that baryons have a core is the reason for this effect.

Prediction 4: Unlike the proton case, it is predicted that an analogous experiment of deep inelastic electron-pion scattering will prove that in this case the pion's quarks carry all (or nearly all) the pion's momentum [3].

Schedule: Unknown.

V. *Charge Radius of the Sigma Plus Baryon*

There is an analogy between electromagnetic bound states of electrons in an atom and quark bound states in a baryon. This analogy may be used for finding an estimate of physical values pertaining to baryonic structure.

Prediction 5: Phenomenological calculations based on RCMT and on the experimentally known charge radius of some particles, yield the following estimate for the square of the charge radius of the Sigma Plus baryon and for the charge radius itself [4]. The estimates fall in the following ranges:

$< r^2 >= 0.881.16$ fm^2

$< r >= 0.941.08$ fm.

These values are greater than the recently published QCD based estimates [5].

Schedule: Unknown.

VI. ***Pentaquarks, Strange Quark Matter, and Glue Balls***

Several decades age, claims concerning the existence of Pentaquarks, SQM, and Glue Balls have been published by QCD supporters. RCMT clearly contradicts the existence of these objects. No specific article was published by Comay which claims that these objects will not be found [6]. During the nineties Comay offered bets to physicists who were building an experimental device aiming to find Pentaquarks (and one of them has indeed lost this bet)

Prediction 6: Like results of earlier searches, the existence of Pentaquarks, SQM and Glue Balls will not be established.

Schedule: These kinds of experiments continue.

Remark: (Nov. 19, 2020)

Few years ago, CERN people have declared a pentaquark detection. Contrary to the original pentaquark, their "pentaquark" comprises quarks having the flavor $uudc\bar{c}$ (see fig. 1 of `https://arxiv.org/pdf/1507.03414.pdf`). In contrast, the original pentaquark comprises quark whose flavor is $uuds\bar{c}$. Here the two new quark are *not* a quark-antiquark pair of the same flavor. For example, the title of the H. Lipkin 1987 paper is "POSSIBILITIES FOR EXOTIC HADRONS – ANTICHARMED STRANGE BARYONS." The first line of the Abstract of the C. GIGNOUX et al. 1987 paper is: "Some of the heavy baryons ($\bar{Q}qqqq$) where Q denotes an heavy quark c or b, and q a light quark u, d or s, are likely to be stable..." Furthermore, if the claim of these CERN people is right then "pentaquarks" are already known for many decades. Indeed, the proton has a state where additional quark-antiquark pairs of the u, d, s flavor exist. Hence, one can rightly tell these CERN people that the proton is a "pentaquark"...

Conclusion: Genuine pentaquarks have not been detected yet.

VII. ***Dirac Monopoles will not be Detected***

The Dirac monopole search is based on its supposed direct interaction with charge. The RCMT proves that there is no such interaction.

Prediction 7: Like results of earlier searches, the existence of a Dirac monopole will not be established [7]. (This prediction has been made 25 years ago.)

Schedule: Search for monopoles continues [8].

Remark: (Nov. 19, 2020)

As of today, the CERN MoEDAL monopole search has ended in vain. See `https://en.wikipedia.org/wiki/MoEDAL_experiment`

Conclusion: This successful prediction is another support for the veracity of the RCMT.

References

[1] E. comay, Prog. In Phys. 4, 91 (2009) and references therein.
`http://www.tau.ac.il/~elicomay/MathPhys.pdf`

[2] E. Comay, Prog. In Phys. 2, 56 (2010).
http://www.tau.ac.il/~elicomay/protonsc2.pdf

[3] In RCMT, baryons have a core that attracts the 3 valence quarks. The core carries momentum. Mesons are bound states of quark-antiquark which do not have a core. Hence, in mesons, quarks are practically assumed to carry all the momentum.

[4] A paper is under preparation.

[5] P. Wang, D. B. Leinweber, A. W. Thomas and R. D. Young, Phys. Rev. D 79, 094001 (2009).

[6] The force between hadrons is a residual force, like the force between nucleons. Therefore, strongly bound states of pentaquarks do not exist. The same is true for SQM. Gluons do not exist. A fortiori, Glue Balls do not exist.

[7] E. Comay, Lett. Nuovo Cimento, 43, 150 (1985).

[8] A monopole search is planned to be carried out at the LHC. See
http://cdsweb.cern.ch/record/1243082/