Boson Creation in a Subquantum Lattice.

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Summary. - Photon emission from a cubic lattice in the resonant cavity of an electron implies a specific symmetry in particle groupings involved in boson creation. On this theory the $W^\pm$-boson at 82.0 GeV is the only proton-based resonance state between 40 GeV and 130 GeV, and the $Z^0$-boson found at 96 GeV implies the existence of the long-predicted 2.587 GeV primary constituent of the subquantum medium which mediates in gravitational interaction.

Cosmic-ray research in Japan has shown that multiple meson production takes place through an intermediate state involving a fundamental energy unit of mass energy $(2.4 \pm 0.4)$ GeV (1). This follows theoretical prediction by Hasegawa (2,3) by which the mass of a fundamental unit, called the $H$-quantum, was forecasted as approximately two nucleon masses. Independently, Aspden (4) in 1966 presented a theory of gravitation based upon there being a graviton in a cubic sub-quantum lattice constituting the vacuum state. This graviton was shown theoretically to have an energy of 2.587 GeV and further shown empirically to have such a value from the derived equation:

\[ G = \frac{1}{k_0\mu_0} \left(\frac{e}{m_e}\right)^2 (3/Kg^4)^\frac{3}{2}, \]

where $G$ is the constant of gravitation, $k_0$ and $\mu_0$ are the dielectric constant and magnetic permeability of the vacuum (unity in the system of units used here), $e/m_e$ is the charge-mass ratio of the electron, $g$ is the mass of the graviton in electron units and $K$ is a numerical parametr $(3/4\pi)(108\pi)^3$. Putting $e/m_e$ as $5.273 \times 10^{17}$ e.s.u./gm and $g$ as 5063 (equivalent to 2.587 GeV) gives $G$ as $6.67 \times 10^{-8}$ c.g.s.

The significance of the parameter $K$ is discussed in a recent paper (5). It is the ratio of the volume of a cubic cell of the vacuum lattice to the volume of the charge occupied by the electron according to the Thomson formula.

This theory awaits the discovery of the graviton with this energy of 2.587 GeV. In 1970 it was reported that the shape of the cosmic X-ray spectrum has an inexplicable kink or break in the range $(2 \div 5)$ GeV (6). A baryon of energy 2.585 GeV was listed in 1973 by the Particle Data Group (7) and recently PRENTICE (8) has discussed the measurement of lifetimes of the order of $10^{-13}$ s for a whole range of particles designated as $D^0$. One reported decay had a lifetime of $10.69 \times 10^{-13}$ s and was noted as "the longest-lived entry ... giving a fitted mass of $(2583 \pm 26)$ MeV/c$^2$". Earlier, when the discovery of the psi-particles was reported, the author (9) demonstrated how the underlying theory from which eq. (1) was derived permitted complementary resonances at 3.095 GeV and 3.683 GeV linked with the 2.587 GeV graviton. Later (10) the same principles were extended further to show how the decay modes of the psi-particles could be explained.

The theory required particle creation processes to observe three regulating conditions 1) charge conservation, 2) energy conservation and 3) the overall conservation of volume displaced by the charges supposing that each satisfies the Thomson formula

\[ E = 2e^2/3a, \]

where $a$ is the radius bounding a charge $e$ of energy $E$.

Very recently, these conditions have been applied to determine the resonance condition applicable when high-energy protons and antiprotons collide (11). It was shown that the boson resonance would have an energy $E'$ given by

\[ E' = 2(2N + 1)^{4/3}E_0, \]

where $E_0$ is the rest mass energy of the proton and $N$ is an integer.

We can now make an important advance on this proposition. It will be shown below that $N$ has to be 4, 8 or 12 and it is interesting then to tabulate the possible values of $E'$ for $E_0$ as the proton energy of 0.9383 GeV and also for $E_0$ as the graviton energy 2.587 GeV. We obtain

<table>
<thead>
<tr>
<th>$N$</th>
<th>$E_0 = 0.9383$ GeV</th>
<th>$E_0 = 2.587$ GeV</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>35.13 GeV</td>
<td>96.86 GeV</td>
</tr>
<tr>
<td>8</td>
<td>82.03 GeV</td>
<td>226.16 GeV</td>
</tr>
<tr>
<td>12</td>
<td>137.18 GeV</td>
<td>378.22 GeV</td>
</tr>
</tbody>
</table>

In this table there are two resonances between 40 GeV and 130 GeV. One resonance is based on proton-antiproton collisions and is at 82.03 GeV. It has recently been