Evidence for Quantum-Interference Phenomena in the Femtometer Scale of Baryons. Part II: Inclusion of all Baryon Octet and Decuplet Particles

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Abstract

This work supplements the paper vixra: 1706.0040. It contains a single Figure in which quantum interference is demonstrated for all particles of the octet and decuplet, through the joint analysis of their rest energy and magnetic moments data. Some tendency for alignment on Shapiro step-like structures is also present. This analysis serves as a proof of the importance of dominating electromagnetic effects in the nuclear scale of particles.

This short letter supplements the data analysis in vixra: 1706.0040. In that paper we argued that a number of flux quanta *n* might be directly defined from the product of rest mass times the magnetic moment of each baryon. The plot of such number against the magnetic moment can make evident interference effects between currents in the nuclear scale. Baryons contain constituents widely regarded as moving in asymptotic freedom inside something comparable to a bag. We take this concept to the limit and show that the motion of such charged constituents is subject to quantum interference similar to that observed in Josephson Junctions between superconductors. With such a picture it is possible to simultaneously fit with a single expression the masses of all baryons to their respective magnetic moments.

For details of the theory the reader should consult vixra: 1706.0040. Figure 1 displays all data for the baryon octet and decuplet particles, fitted by a single squared sinusoidal curve. The decuplet masses (masses are part of the definition of the number of flux quanta *n*)in this plot are divided by 1.2 since this 21% difference accounts for the displacement of the averaged values of the rest energies of the decuplet in comparison to those for the octet particles, so that the same diagonal (base)line applies to both families of baryons. Considering the same diagonal baseline, a single curve fits all data. There is also a clear tendency of several prticles towards adopting integer values on *n*, which displays the dominance of coherent currents inside a given baryon as compared to phase-displaced incoherent currents involving several charged constituents.

These results indicate that ordinary electromagnetic effects inside baryons are too relevant (as widely defended by A.O.Barut , H. Jehle, and many others) to be ignored. Our data analysis demonstrates this fact quite clearly.

Figure 1:

The vertical scale in this plot is essentialy the rest energy of baryons multiplied times the respective moments. The undulations can therefore be interpreted in the same way as in the theory of shunted Josephson Junctions. For such Junctions the undulations are related to a potential energy variation associated to changes of phase across Junctions, i.e., coherence-breaking regions across the current motion. The variations of mass across the whole baryons families are thus related to the internal currents effects of interference of currents across charged constituents boundaries. The diagonal traced line is a common baseline for as particles.