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Checkerboard Model THEODORE LACH, Bell Labs Retired — The CBM uses the basic constants of nature (mass and magnetic moment of proton/neutron) and a few simple equations (relativistic mass equation, de Broglie wavelength, and binding energy of He 3) to describe the structure of the proton and neutron and explain the strong nuclear force. The CBM was described over 20 years ago. It was conceived just short of 30 years ago, 1989. It makes a prediction about the size of the proton and its shape. Since the mass and speeds of the "up" and "dn" quark are calculated in this model, it allows a cross check of the theory. Determining the relativistic de Broglie wavelength of the up quark in the proton, it turns out that the de Broglie wavelength turns out to be less than 1% different than the calculated circumference of the proton (using the magnetic moment...). By iterating one sees that the equations hit a natural maximum at exactly a radius of 0.519406 fm. While this number disagrees with the two disputed sizes of the proton, one will note that a value of 0.5 fm falls at about the 50% point of the proton's charge distribution. Also the size of the neutron (using CBM) of 0.607939 fm is consistent with the negative dip in the charge distribution of the neutron at about 0.6 fm. It is understood that this theory disagrees with some currently held beliefs: 1. There are only 3 generations of quarks and leptons. 2. The new generation mass of the "up" and "dn" are much heavier than the u and d quarks which are in the lightest generation. 3. The mass of the top quark. This presentation will describe this theory in more detail.

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