THE PERIODICITY OF PROTONS IN ATOMS

James Decandole
1602-3 Massey Square, Toronto, Ontario, M4C5L5, CANADA
Email: jdecandole4@gmail.com

Abstract

The uniformitarian hypothesis of the microcosm is a description of nature at the smallest scale from the point of view of the center of a fundamental particle. Using the periodicity of the atomic numbers of the noble gases, the arrangement of protons in the atomic nucleus is found to be a hexagonal planar packing of spheres separated by their common tangents. The arrangement is illustrated by this alternative periodic table of elements.

Introduction

The sphere packing hypothesis is developed in a paper "Notes on a Uniformitarian Hypothesis of the Microcosm" archived at https://vixra.org/abs/2003.0293. A first draft of the poster below is found in Figure 12, Section 22.3, Page 53, in "Notes on a Uniformitarian Hypothesis of the Microcosm".

22. The Sphere Packing Hypothesis (excerpted from pages 51-54 of "Notes on a Uniformitarian Hypothesis of the Microcosm")

The ratio of a proton's mass to an electron's mass is a fundamental quantity of the microcosm. The mass of a proton is 1836.153503 times that of an electron. Although a proton's mass is not an even multiple of an electron's mass, the number 1836 is a very interesting number, which warrants close investigation. The questions arise, "Why that number and not some other?" and "Is it a clue to the composition, arrangement, motion, and interaction of these particles?"

The prime factors of 1836 are 1, 2, 2, 3, 3, 3, and 17. One of the combinations of these factors is 18×102. 18 is the product of $1 \times 2 \times 3 \times 3$, and 102 equals $2 \times 3 \times 17$.

The number 102, a very interesting number (see Figure 11, below), is the sum of 2 + 8 + 14 + 20 + 26 + 32. Each number is 6 more than the previous one. The sequence 2, 8, 14, 20, 26, and 32 represents the number of spheres in the "layers" or "rings" of a sphere packing. This is a Groemer packing,[1] whose base is two spheres rather than one. Any number of spheres from 2 to 102 can be assembled into a disk or layer of minimal area that, for larger numbers, always has a hexagonal shape.

22.1 Groemer Packing

Each circle in Figure 11, like those dealt with by Groemer packing, represents a proton—that is, its toroidal shape and spherical frame of reference—as seen from above or below. Whereas in a

[1] Groemer packing is described by Ian Stewart, "Mathematical Recreations: A Bundling Fool Beats the Wrap," *Scientific American*, 268(6), June 1993, 142–144.

Groemer packing the circles are contiguous, the uniformitarian hypothesis assumes that protons are not touching, but share a common tangent at 60° to the line joining their centers.

The uniformitarian hypothesis further modifies the assumptions of Groemer packing by stipulating that the number of protons in the base is 2, rather than 1. This assumption is derived from the following clues: (a) the atomic numbers of the noble gases; (b) the electron shell structure; (c) the alpha particle; (d) the cosmic abundance of the elements; and (e) the proton-to-electron mass ratio of 1836 to 1.

Groemer packing is used with the objective of minimizing the area of the convex hull containing the circles. To that end, when there are alternative choices, nature selects the packing with the smallest number of larger edge holes and the biggest number of smaller central holes (the fewest circles in the perimeter). Nature also selects the arrangement that is as hexagonal as possible, since six sides are better than five or four for minimizing area.

The adaptation of the rules of Groemer packing to questions of atomic structure results in the minimization of the area of the disk of protons while promoting symmetry, balance, and harmonious motion. Therefore, when there are two alternative arrangements, nature selects the one with greater symmetry about both axes. Nature also chooses to complete filling the inner layer before starting the next one.

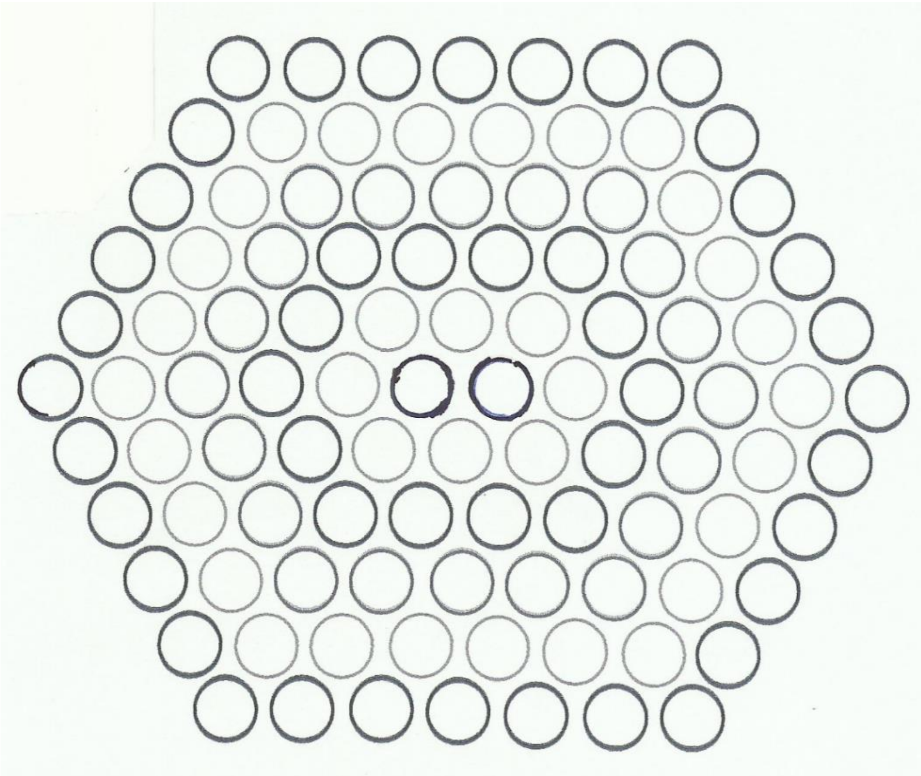


Fig. 11: Diagram of a Packing of 102 Non-Contiguous, Co-Tangential Spheres

(Circles of the same shadings are in one of six hexagonal layers)

22.2. The Periodic Table of Elements

The periodic table of elements is a fundamental quantification of nature (see Figure 12, below) The table is an arrangement of the ninety-two naturally occurring elements according to their number of protons—that is, the atomic number of the element. The rows and columns of the table reveal the similarities and differences of the elements.

One such column is the noble gases, so-called because they are inert and seldom combine with other elements. These elements and their atomic numbers are: helium, 2; neon, 10; argon, 18; krypton, 36; xenon, 54; and radon, 86. The differences in their atomic numbers, and the number of elements in the corresponding rows of the periodic table, are 8, 8, 18, 18, and 32.

There is a hypothesis of the structure of the atom in which the electrons orbit the nucleus in shells that vary in distance from the nucleus. The electrons in each shell share an orbit—that is, the electrons are co-orbital. There is a limit to the number of electrons that can share an orbit, with the more distant shells having a greater capacity. The sequence of numbers of such limits is also 2, 8, 8, 18, 18, 32.

There is a correspondence between the latter sequence of numbers and that of a packing of 102 spheres. The first, second, and sixth layers are identical. This may not be a perfect match, but neither is it a coincidence.

The microcosm has been stingy in revealing numerical clues, despite our assuming that nature is mathematical. The familiar numerical demonstrations are Euclidean solid geometry; the spherical frame of reference; the tangential frame of reference; the periodic table of elements; the speed of light; and the relative size of the proton and the electron. These are a set of natural, fundamental measurements that reveal much about the relativity, motion, interaction, transformation, and accumulation of minimal, self-generating, self-measuring oscillating particles.

22.3. The Periodicity of Protons in Atoms

Figure 12, below, is a representation of the order of self-assembly of protons in atoms. Based on the sphere packing hypothesis of formation of atoms, it is an alternative to the familiar periodic table of the elements. Each sphere is labeled with an atomic number from 1 to 86 and the symbol of the name of the atom. There are 16 gaps in the order where no atom is located.

At the center of the figure are the pair, hydrogen (1) and helium (2). The groups of elements in the columns of the periodic table are represented here in lines radiating from the central pair. The rows of elements of the periodic table are shown in the hexagonal rings surrounding the central pair.

Thus, the diagonal ray down and right from He is that of the other noble gases, 10, 18, 36, 54, and 86. The horizontal ray to the right of He is the group of 3, 11, 19, 37, and 55. Continuing in the counter clockwise direction are the lines of the other groups, each of five atoms: 4, 12, 20, 38, 56; 5, 13, 31, 49, 81; 6, 14, 32, 50, 82; 7, 15, 33, 51, 83; 8, 16, 34, 52, 84; and 9, 17, 35, 53, 85.

Then there are the groups of three atoms shown in lines radiating from the gaps in the second ring. Starting from the gap between 11 and 12, the line horizontally to the right is the group of 21, 39, and 57. Continuing in the counter clockwise direction are the lines of the remaining groups, each of three: 22, 40, 72; 23, 41, 73; 24, 42, 74; 25, 43, 75; 26, 44, 76; 27, 45, 77; 28, 46, 78; 29, 47, 79; and 30, 48, 80.

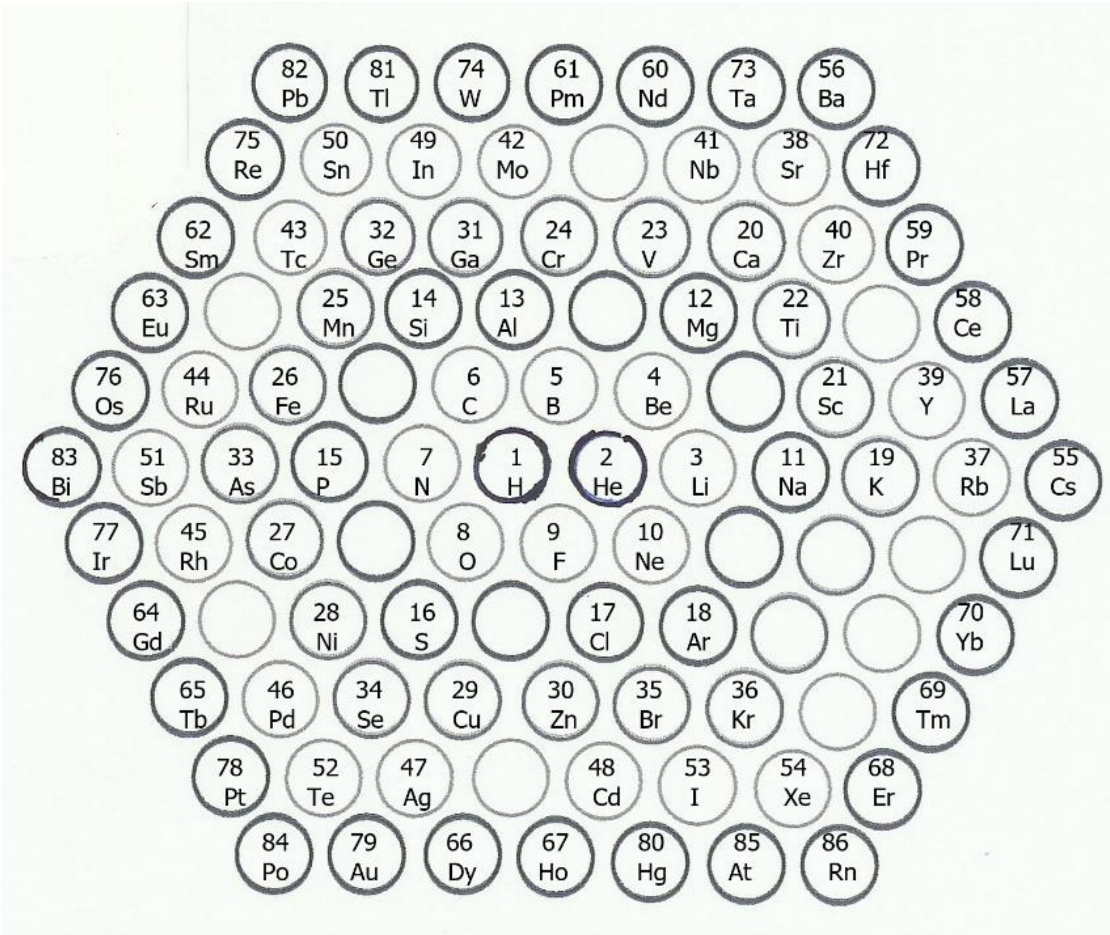


Fig. 12: Diagram of the Periodicity of Protons in Atoms According to the Sphere Packing Hypothesis

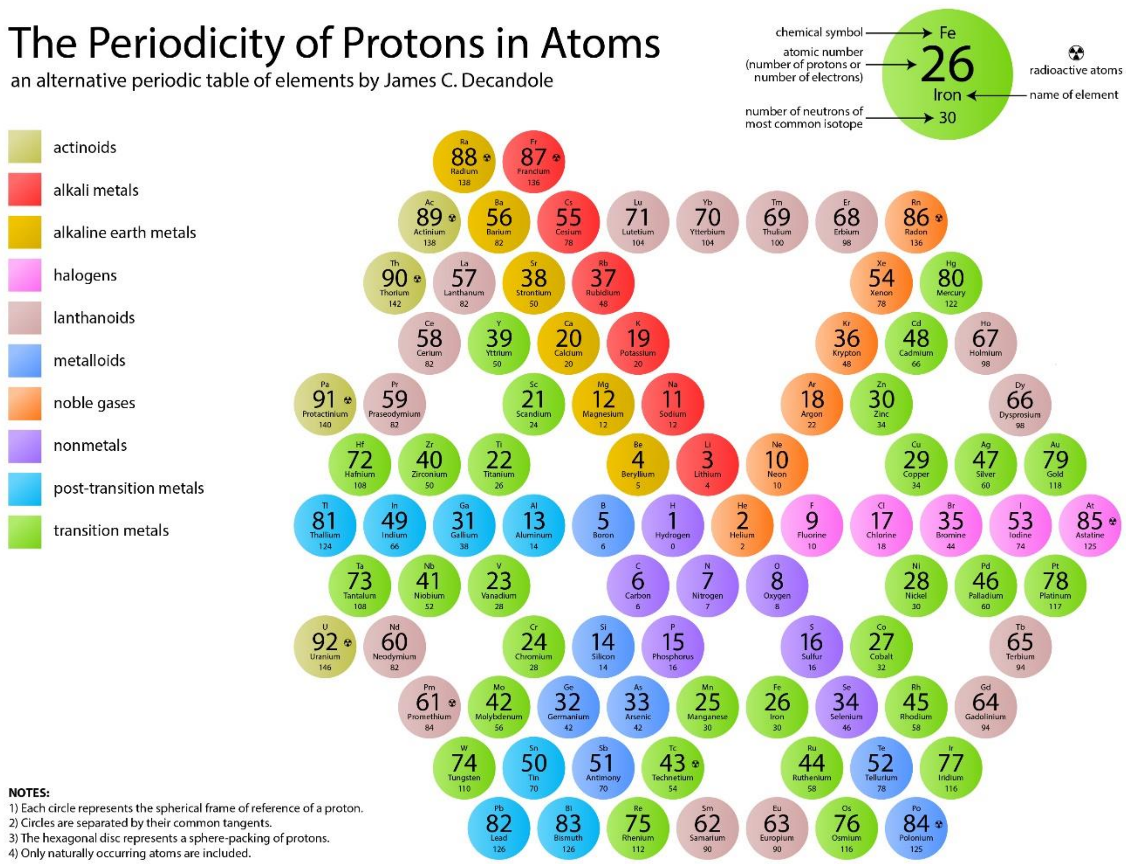
(Not Including Numbers 87 to 92)

The final group of fourteen atoms radiate singly from the gaps in the fourth ring. Their atomic numbers are 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71.

Surrounding the central pair of H and He is the six-sided ring of the group of 3, 4, 5, 6, 7, 8, 9, and 10. The next ring, where a gap is symbolized by ( ), is the group of 11, ( ), 12, ( ), 13, 14, ( ), 15, ( ), 16, ( ), 17, 18, ( ). The third ring is the non-sequential group of 19, 21, 22, 20, 23, 24, 31, 32, 25, 26, 33, 27, 28, 34, 29, 30, 35, 36, ( ), ( ). The fourth ring is 37, 39, ( ), 40, 38, 41, ( ), 42, 49, 50, 43, ( ), 44, 51, 45, ( ), 46, 52, 47, ( ), 48, 53, 54, ( ), ( ), ( ). The outer ring is 55, 57, 58, 59, 72, 56, 73, 60, 61, 74, 81, 82, 75, 62, 63, 76, 83, 77, 64, 65, 78, 84, 79, 66, 67, 80, 85, 86, 68, 69, 70, 71. The atoms numbered 87, 88, 89, 90, 91, and 92 presumably are grouped in the next ring possibly in line with numbers 55, 56, 57, 58, 59, and 60.

The sixteen gaps are grouped in the six segments of the hexagonal arrangement as follows: in the lower-right segment, a triangular group of 6 gaps, and in each of the other five segments a linear group of 2 gaps.

A poster illustration by a graphic designer of "The Periodicity of Protons in Atoms"



Acknowledgments

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