ADDENDUM TO PAPER ENTITLED "DO PRIME NUMBERS OBEY A THREE DIMENSIONAL DOUBLE HELIX?"

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It is important to point out the major points and elucidations of the above referenced article.

Point 1:
This article **does not assume** a certain form/curve for prime numbers, it simply allows the prime numbers to 'speak for themselves'. The seven column array of all sequential numbers **self-determines** the two dimensional equivalent of the three dimensional double helices. **Unfortunately, prime products also fall along the double helix curves.**

Point 2:
This theory explains the repetition of 42 that occurs in prime numbers. The equations representing the two dimensional representation of the prime number double helix make this very clear.

Case I : Difference of two primes on Helix 1
The equation for the two dimensional representation of Helix 1 is (remembering that the x's represent the column values and the n's represent the values of the complex in which the prime number is located).
$P_1(n_1)x_1 = 6x_1 - 35 - 42n_1$ but remembering that P_1 is negative, we take the absolute value as
$| P_1(n_1)x_1 |_A = - 6x_1 + 35 + 42n_1$ as representing prime number A on Helix 1. Similarly for prime number B on Helix 1 which is greater than A, we have
$| P_1(n_2)x_2 |_B = - 6x_2 + 35 + 42n_2$
$| P_1(n_2)x_2 |_B - | P_1(n_1)x_1 |_A = - 6x_2 + 35 + 42n_2 - (- 6x_1 + 35 + 42n_1)$
$= - 6x_2 + 35 + 42n_2 + 6x_1 - 35 - 42n_1 = 6(x_1 - x_2) + 42 (n_2 - n_1)$

Thus we can see that there is an integral multiple of 42 between two prime numbers on Helix 1 if and only if $x_1 - x_2 = 0$.

Example (1) x = 2 and prime number A is 23, and B is 107, we have $n_2 - n_1 = 2$
Example (2) x = 2 and A is 23 and B is 233, we have $n_2 - n_1 = 5$.
Example (3) x = 5 and A is 5 and B is 47, we have $n_2 - n_1 = 1$.

Case II : Difference of two primes on Helix 2
The equation for the two dimensional representation of Helix 2 is
$P_2(n_1)x_1 = 6x_1 - 49 - 42n_1$ and taking the absolute value we obtain
$| P_2(n_1)x_1 |_A = - 6x_1 + 49 + 42n_1$ represents prime number A on Helix 2
$| P_2(n_2)x_2 |_B = - 6x_2 + 49 + 42n_2$ represents prime number B on Helix 2 which is greater than A
$| P_2(n_2)x_2 |_B - | P_2(n_1)x_1 |_A = - 6x_2 + 49 + 42n_2 - (- 6x_1 + 49 + 42n_1)$
$= - 6x_2 + 49 + 42n_2 + 6x_1 - 49 - 42n_1 = 6 (x_1 - x_2) + 42 (n_2 - n_1)$

Thus we can see that there is an integral multiple of 42 between two prime numbers on Helix 2 if and only if $x_1 - x_2 = 0$.

Example (1) x = 1 and prime number A is 43 and B is 127, we have $n_2 - n_1 = 2$
Example (2) x = 1 and prime number A is 43 and B is 211, we have $n_2 - n_1 = 4$
Example (3) x = 4 and prime number A is 67 and B is 151, we have $n_2 - n_1 = 2$

Case III : Difference of two primes - one on Helix 1 and the other on Helix 2

$| P_1(n_A)x_A |_A = - 6x_A + 35 + 42n_A$ as representing prime number A on Helix 1.
$| P_2(n_B)x_B |_B = - 6x_B + 49 + 42n_B$ represents prime number B on Helix 2 which is assumed to be greater than A. If the situation were reversed, it would simply be a matter of sign difference.
$| P_2(n_B)x_B |_B - | P_1(n_A)x_A |_A = - 6x_B + 49 + 42n_B - (- 6x_A + 35 + 42n_A)$
$= - 6x_B + 49 + 42n_B + 6x_A - 35 - 42n_A = 6(x_A - x_B) +14 + 42 (n_B - n_A)$
Thus we can have a difference of multiples of 42 if and only if
$6(x_A - x_B) +14 = 0$ or $x_B - x_A = 7/3$, but this is impossible since the x's are integers .
Therefore we must draw the conclusion that in no case can there be differences between prime numbers of multiples of 42, if the prime numbers reside on different helices.

Point 3:
6 s + 1 and 6 s - 1 are used in designating the terms, respectively, of Helix 1 beginning with prime number 5 and Helix 2 beginning with prime number 7. Few people realize that the s values are themselves composite numbers which are sums of two other numbers. The proof was given in the author's paper entitled "Interesting Facts Concerning Prime Products and Their Relationship to Lorentz-Like Transformations" but will be given again here.

The first set of double parallel lines in the below Table 1 is n = 0 or complex 0, the second set of double parallel lines is n = 1 or complex 1, and so on. The breakdown of s is as follows:
s = r + n, where r is the row number of where the prime number is located and n is the complex it is located in.

Prime numbers or prime products falling on H_1 are denoted by
$P_{1(n)x} = 6x - 35 - 42n$, where x represents the column number and n represents the complex number. For H_2, in similar fashion, $P_{2(n)x} = 6x -49 - 42n$.

It is also true that the numbers along the helical lines can be represented by
$P_{r, x} = 7(r - 1) + x$, again where r is the row number and x is the column number. Solving for x and substituting in the above two equations, we obtain
$P_{1(n)x} = 6(P_{r, x} - 7(r - 1)) - 35 - 42n = 6P_{r, x} - 42(r - 1) - 35 - 42n =$
$6 P_{r, x} -42(r + n) +7$. We now note that $P_{1(n)x}$ is always negative and $P_{r, x}$ is always positive, so we let $P_{1(n)x} = - P_{r, x}$.
$- P_{r, x} = 6 P_{r, x} -42(r + n) +7$, which rearranges into $P_{r, x} = 6(r + n) - 1 = 6s - 1$.
Similarly for H_2, we have $P_{2(n)x} = 6x -49 - 42n = 6(P_{r, x} - 7(r - 1)) - 49 - 42n$. Again we let $P_{2(n)x} = - P_{r, x}$ and upon rearranging, we obtain
$P_{r, x} = 6(r + n) + 1 = 6s + 1$, which concludes the proof.
See Table 2 for actual examples.

Table 1

	2	3		5		7
			11		13	
		17		19		
	23					
29		31				
	37				41	
43				47		
			53			
		59		61		
			67			
71		73				
	79				83	
				89		
					97	
		101		103		
	107		109			
113						
127				131		
			137		139	
	149		151			
		157				
	163				167	
				173		
			179		181	
	191		193			
197		199				
211						
					223	
		227		229		
	233					
239		241				
					251	
				257		
			263			
		269		271		
			277			
281		283				
					293	
					307	

Table 2

Prime number	s	r	n
293(H1)	49	42	7
197(H1)	33	29	4
181(H2)	30	26	4
241(H2)	40	35	5
97(H2)	16	14	2
239(H1)	40	35	5
199(H2)	33	29	4

Point 4:
From the point of view of this paper, the numbers 2 and 3 are not prime numbers, even though they fall under the definition of prime numbers. This paper shows quite clearly, that the true prime numbers begin with 5 and 7. This paper takes the position that all true primes fall along the helical curves designated as H1 (6s-1) and H2 (6s+1). Further, products of true primes also fall along one or the other of H1 or H2. If we consider the product of primes, then symbolically $H_1 \otimes H_1 = H_2 = H_2 \otimes H_2$ and $H_1 \otimes H_2 = H_1$.

More importantly, neither 2 or 3 fall along the two dimensional representations of the double helices. Further, the products of 2 or 3 do not fall along the double helices. For example:
2x3 = 6
2x5 = 10
2x7 = 14
3x5= 15
3x7 = 21
Thus, even though 2 and 3 satisfy the classical definition of prime numbers, neither they or their products fall along the double helices. Whenever one tries to form groupings of objects, one chooses those items which possess all of the characteristics of the group. This is the reason that this paper cannot consider 2 or 3 to be true prime numbers.

Point 5:
The Columbia Encyclopedia, Columbia University Press, Sixth Edition, (2000) defines mathematics: the deductive study of numbers, geometry, and various abstract constructs, or structures; the latter often “abstract” the features common to several models derived from the empirical, or applied sciences, although many emerge from purely mathematical or logical considerations.

The author did not use deduction, logic, postulates, or axioms, in the sense of the above definition, in arriving at the above 7 column array. In fact, the author used methods more in line with exploratory physics in arriving at the above double helices. The author believes that there may be areas of mathematics which fall more into the category of being discoverable, as opposed to being postulate or axiom driven, from which the deductive inferences known as modus ponens and modus tollens can be invoked to derive other true statements.

If what the author suspects is true, namely, that these double helices are in the discoverable category of mathematics (i.e. overlapping with experimental physics), then it may be a fair assertion that nature has a hand in determining which prime numbers are to be considered true prime numbers, irrespective of man's preconceived definitions of what is or is not a prime number.