Stealth Elliptic Curves and The Quantum Fields

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Abstract

The complete abstract was accepted by the organizing committee of the International Congress of Mathematicians, as the Keynote part of the short communications at Coex in Seoul 2014.

The present communication is a series of articles called SO PRIME[1]. The goal of which is to build and to applied a new approach in number theory, beyond a genuine and complete statement on the abc-conjecture. So far, as a major advancement, we can observe a new breakthrough for the RSA cryptography. Finally, as the consequence of the Riemann Hypothesis, we will release, in the next article, a complete statement on the prime number theorem $\pi(N)$.

Mathematics Subject Classification 2010 codes: Primary: 11MXX; Secondary: 94A60, 11P32

1 INTRODUCTION

The original manuscript is over 727 pages long, including very tough demonstrations and complicated figures. Nevertheless, we do believe that Mathematics are based in a careful analysis. In particular, the complexity is not necessarily mathematical since Math is all about the truth. One way to see this is to consider the character of the famous irrational number π, which will be used in the present article. Under suitable logarithms conditions, we assume: *for any function* $f(\omega)$ *and constant* $\Delta > 1$

$$\int_{-\infty}^{3} \left[\omega + \frac{\log\left(\Delta^{-1}\right)}{\log\left(\left(\Delta\sqrt{\gamma}\right)^{-1}\right)} \right] f(\omega) d(\omega) = \pi \int_{-\infty}^{3} f(\omega) d(\omega), \tag{1}$$

where

$$\gamma = (\pi - \omega)^{-2}. \tag{2}$$

*We dedicate the present article to the vivid memory of **Nelson Mandela.**

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Now, if we build a new general set of primes on the form $2p+3$, according to the African fractions such that with $\alpha = 3p$

$$\alpha\left(\frac{1}{3}+\frac{1}{3}+\frac{1}{p}\right) = \text{prime}, \tag{3}$$

we assume: *for every pair of twin primes x, y there exists α, β integers such that*

$$\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{\alpha}\right)\beta = \zeta, \tag{4}$$

where β denotes the product of x, y, α and ζ is a twin prime.

We will provide in the next article a complete statement on the deep connections between the twin primes and they infinitude.

Finally, let us observe how to generalize the Goldbach theorem. We assume: *if 2^p is the product and the sum of at least two primes p then, with $\alpha \in \mathbb{Z}$, every even number Ω can be expressed as the sum of two primes if*

$$\lim_{\alpha\to\pm\infty}\frac{\alpha\cdot 2^p}{2^{p-1}} = 2\alpha = \Omega. \tag{5}$$

We have a straightforward convergent Goldbach function in the entire complex plane as $\alpha \to \pm\infty$.

■

2 THE ABC THEOREM

2.1 THE NOTATION AND THE FORMULATION

We shall denote the new stealth elliptic curves of the (a,b,c) triples by $\underset{\vdots}{\underset{abc}{\diamondsuit}}$. We shall write $\underset{\vdots}{\underset{abc}{Q}}$ for the quality triples of (a,b,c). So far, the formulation of the abc-conjecture is: for every $\epsilon > 0$, there are only finitely many triples of coprime positive integers $a+b=c$ such that $c > d^{1+\epsilon}$, where d denotes the product of the distinct prime factors of abc.

Theorem 4. *There does not exist any triple of coprime positive integers $a+b=c$ such that $c > d^{1+\epsilon}$.*

Proof.

$$d^{1+\epsilon} = \frac{\log\left(\pi^{c}\right)}{\log\left(\sqrt{\pi^{2abc}}\right)} = \frac{1}{ac}+\frac{1}{bc} < 1 < c. \tag{6}$$

We can also separate the special cases where $a=1$ such that

$$d^{1+\epsilon} = \left[\frac{\log\left(\pi^{-1}\right)}{\log\left(\pi^{-3ac}\right)}+\frac{\log\left(\pi^{-1}\right)}{\log\left(\pi^{-\frac{3}{2}ac}\right)}\right]+\left[\frac{\log\left(\pi^{-1}\right)}{\log\left(\pi^{-3bc}\right)}+\frac{\log\left(\pi^{-1}\right)}{\log\left(\pi^{-\frac{3}{2}bc}\right)}\right] < c. \tag{7}$$

■

2.2 THE STEADY ABC THEOREM

Theorem 5. *For every $n \geqq 1$, there are only finitely many triples of coprime positive integers $a+b=c$ such that*

$$\underset{\vdots\vdots}{\diamondsuit}_{abc} = \left(\frac{a}{b}\right)^n + \left(\frac{b}{c}\right)^n = 1+\epsilon. \tag{8}$$

Theorem 6. *For every (a,b,c) triples, there exists a quality $1 < \underset{\vdots\vdots}{Q}_{abc} < 2$ such that*

$$\underset{\vdots\vdots}{Q}_{abc} = \frac{\log\left(\pi^c\right)}{\log\left(\sqrt{\pi^{ab}}\right)} = 1 + \frac{\log\left(\pi^c\right)}{\log\left(\sqrt{\pi^{bc}}\right)} = \frac{c}{b} = 1+\epsilon. \tag{9}$$

If $a=1$, then replace π^{ab} by π^{2ab}, and, π^{bc} by π^{2bc}.

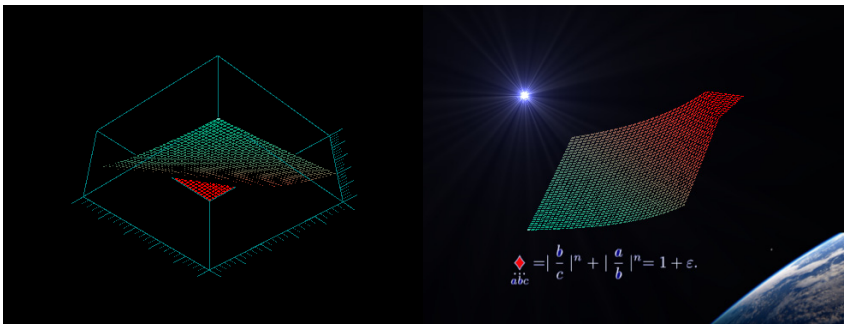
Finding the perfect (a,b,c) triples means that $\lim_{q\to 1}$. Example with $n=1$.

$\underset{\vdots\vdots}{\diamondsuit}_{abc}$	$\underset{\vdots\vdots}{Q}_{abc}$	**a**	**b**	**c**
$1,00 \approx$	$1,00 \approx$	3	13.71^2	2^{16}
$1,00 \approx$	$1,00 \approx$	1	$2^3.11^2.61$	3^{10}

(10)

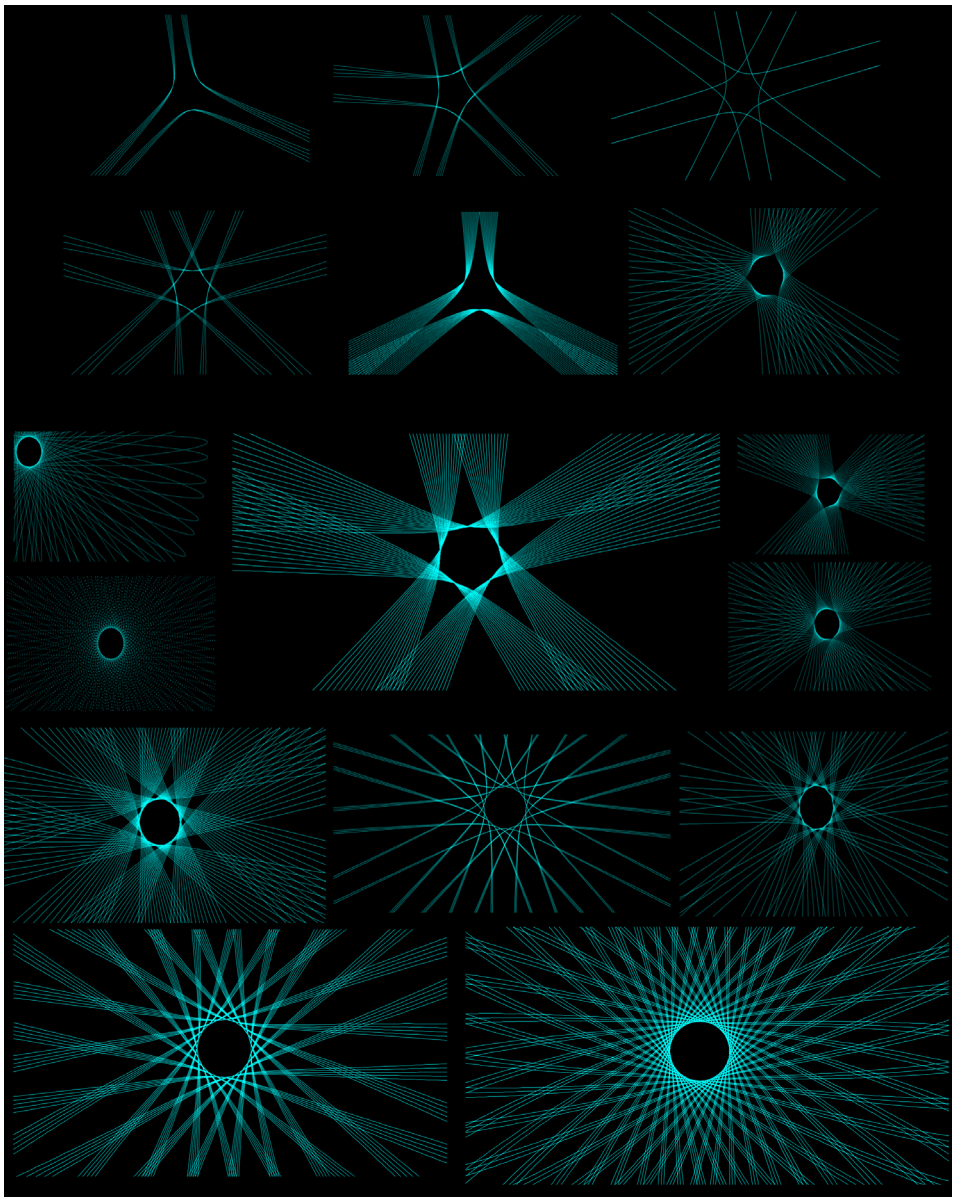
2.2.1 THE AMPLITUHEDRON

We assume: *this new structure of $\underset{\vdots\vdots}{\diamondsuit}_{abc}$ has the same properties of the Amplituhedron well re-introduced in Physics by Nima Arkani-Hamed and his research group.* Here we get a glimpse of this 3D pattern which could be considered as a new path for the next generation of stealth aircraft.



2.2.2 THE ABC AND THE QUANTUM FIELDS

With the new approach and the strong version of the abc theorem we observe the deep connections in between and the modern Physics. Indeed, the sequence below is the perfect illustration of the cycle of the rise of a shining star. Maybe, is it a wink to the secret story of the *"Vitruvian Man"* by Leonardo da Vinci. Who knows?



With a discrete algorithm and the central force of the charged particles, we can observe that every frame corresponds to a genuine and precise distribution of primes and generates a “prime-number-sided polygon”.

3 THE GOLDBACH THEOREM

Theorem 8. *For every even integer Ω greater than two, there exists a real $\varphi \geq 1$ and ψ prime such that*

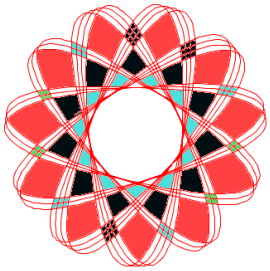
$$\Omega = 2 + \frac{\log\left(\psi^{\varphi}\right)}{\log\left(\sqrt{\psi}\right)}, \tag{11}$$

and for any function $f(\varphi)$ we have

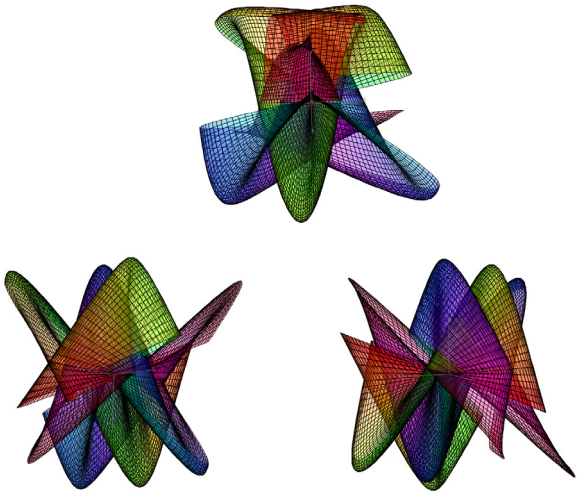
$$\int_1^{+\infty} \left[2 + \frac{\log\left(\psi^{\varphi}\right)}{\log\left(\sqrt{\psi}\right)}\right] f(\varphi) d(\varphi) = \Omega \int_1^{+\infty} f(\varphi) d(\varphi). \tag{12}$$

■

We will see in the next articles how the Goldbach theorem is useful in cryptography and how this formulation is stronger than $2 + 2\varphi$. Indeed, follow up to the Baron John Napier, Carl Friedrich Gauss was well inspired to say: "*you have no idea how much poetry there is in a table of logarithms*". Moreover, the Goldbach ODE generates the regular Hendecagon (11-sided polygon) below.



In the second graph below we have the Goldbach parametric surfaces.



3.1 THE GOLDBACH CORRELATIONS

3.1.1 ATOMS, ELEMENTS AND MOLECULES

The set of primes gathering around the even numbers are similar, in many different ways to the molecules and the atoms fields. So, the Goldbach theorem remains of interest for the deep connections between primes and the atoms it would prove. The following are some examples of the Goldbach connections.

Figure 3.1.1:

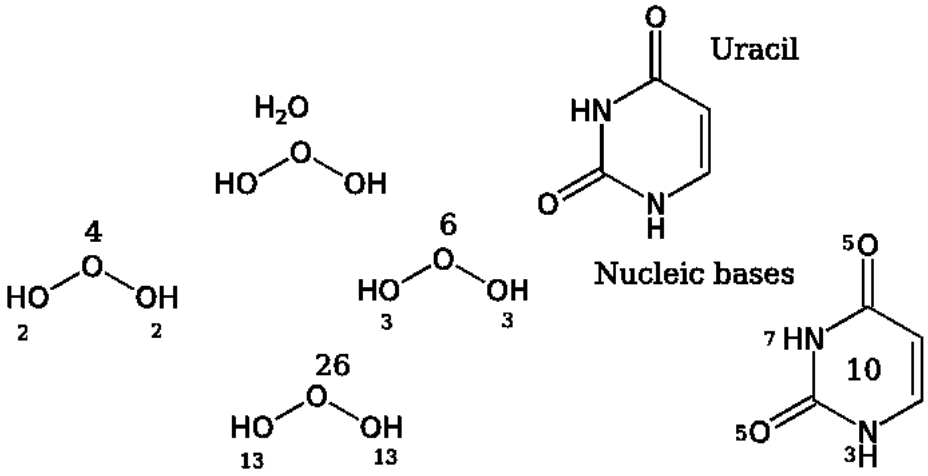
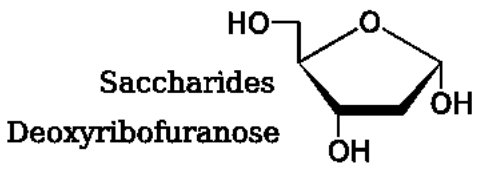


Figure 3.1.2:



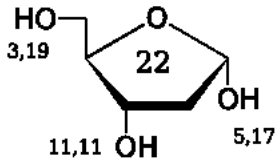


Figure 3.1.3.

The importance of the Goldbach theorem cannot be overstated. Many other techniques may be used to illustrate such structures correlations with the Goldbach partition, more effectively in Physics including the Design and the High-Tech Industry.

4 THE ERDOS-STRAUS THEOREM

4.1 THE NOTATION AND THE FORMULATION

The expression $\overset{\blacktriangle}{e}_{\blacktriangledown}$ may be thought of as denoting the Erdos-Straus elevator. Then we shall write $\frac{4}{n}\begin{pmatrix} \overset{\blacktriangle}{e}_{\blacktriangledown} \\ Q \end{pmatrix}$ or $\begin{pmatrix} 4 & e_x \\ n & e_y \\ Q & e_z \end{pmatrix}$ for the matrices of the Erdos-Straus triples. So far, the formulation of the Erdos-Straus conjecture is: for all integers $n \geq 2$, there exists x, y, and z positive integers such that $\frac{4}{n} = \frac{1}{x} + \frac{1}{y} + \frac{1}{z}$.

Theorem 9. *For every integer $n > 2$, there exists x, y, and z positive integers such that $\frac{4}{n} = \frac{1}{x} + \frac{1}{y} + \frac{1}{z}$ if and only if n cannot divide the sum of x, y, and z and*

$$\frac{xyz}{n?} = 4. \tag{13}$$

For the λ case, which means that $\frac{4}{n} = \frac{1}{x} + \frac{1}{y} + \frac{1}{z} + \frac{1}{\lambda}$, one of the integers x or y or $z = 1$ such that $\lambda = 2$. More precisely, there are two major set of Erdos-Straus triples satisfying $2x = z?$ and $x = z?$.

■

4.2 THE FOUR SEASONS THEOREM

As we learned it from the Topology, counting the Erdos-Straus triples doesn't make sense since the physical dimensions have no effects on the mathematical problem. Then, we fixed the set of the Erdos-Straus triples such that x, y, and z are constants and

$$\frac{4}{n} = \frac{1}{Q\overset{\blacktriangle}{e}_{\blacktriangledown}}, \tag{14}$$

where $\frac{1}{Q}$ denotes the quarter part of every Erdos-Straus triples.

Theorem 10. *With $\overset{\blacktriangle}{e}_{\blacktriangledown} \neq -3$*

$$\frac{4}{n} = \frac{1}{\frac{1}{4} + \frac{1}{2} + \frac{1}{4}\overset{\blacktriangle}{e}_{\blacktriangledown}}. \tag{15}$$

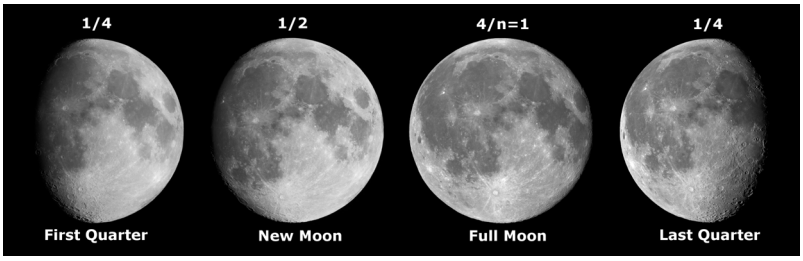
Proof.

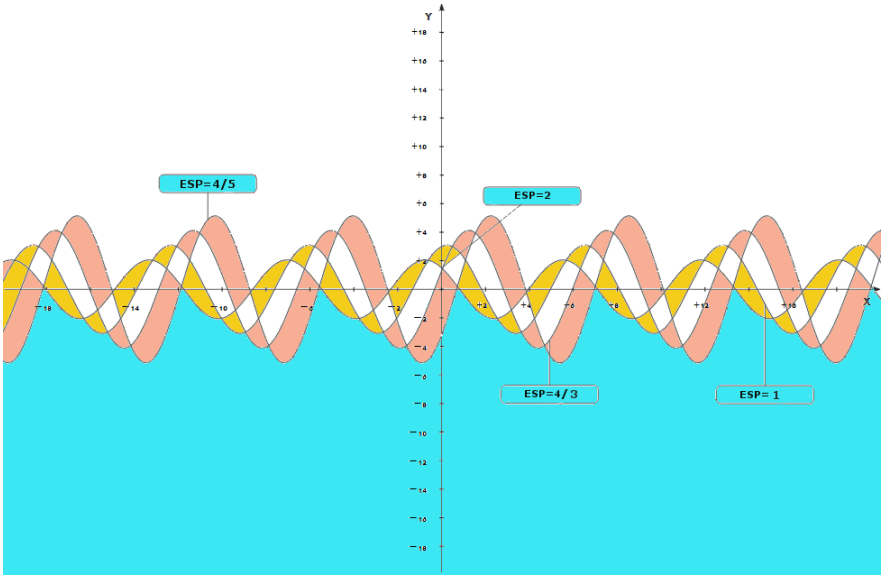
$$\frac{4}{n} = \frac{\log\left(\pi^{-1}\right)}{\log\left(\sqrt{\pi^{-2Q}}\right)}. \tag{16}$$

■

4.3 BEYOND THE ERDOS-STRAUS THEOREM

The major keynote from the Erdos-Straus theorem may be understood as a new Physics particles Hypothesis (Entanglement) since every particle **n** may exists simultaneously at different places in the space represented by the three denominators. In the graph below, we can observe the truly connections between the four seasons theorem and the synodic period and phases of the moon. If it becomes true by the light of the physical experiments, it will confirm that any point around an elliptic surface like the planets can be reached by the means of the four seasons theorem. It may change our way to navigate and to communicate beyond the globe. Who knows?





In the complex plane, the sinusoidal waves correspond to the harmonic phenomena between the set of all Erdos-Straus triples and, finally, may be considered as a new way to put quantum gravity predictions to experimental tests.

4.3.1 THE GOLDBACH-ERDOS-STRAUS THEOREM

Theorem 11. *Let n be the sum of at least two primes, then for every $n > 3$ there exists an even number Ω such that*

$$\underbrace{p + \cdots + p_k}_{n} = 2 + \frac{\log\left(\pi^{\Omega}\right)}{\log\left(\pi^{2}\right)}. \tag{17}$$

Proof.

$$\frac{\log\left(\pi^{\Omega}\right)}{2\log\left(\sqrt{\pi^{2n}}\right)} + \frac{\log\left(\pi^{2^3}\right)}{2\log\left(\pi^{2n}\right)} = 1. \tag{18}$$

■

4.3.2 THE SIERPINSKI THEOREM

The Sierpinski conjecture states that for every $n > 1$, there exists a, b, and c positive integers such that $\frac{5}{n} = \frac{1}{a} + \frac{1}{b} + \frac{1}{c}$.

Theorem 12. *For every $n > 1$, there exists a, b, and c positive integers such that $\frac{5}{n} = \frac{1}{a} + \frac{1}{b} + \frac{1}{c}$ if and only if one of the following relations holds true:* $\underbrace{a = b \text{ and } n = c = 2a}$ or $\underbrace{c = nab}$ or $\underbrace{ac = nb}$ or $\underbrace{2b = c, \text{ when } a < b < c}$.

The Complete proof will be released in the next articles.

5 A VULNERABILITY IN THE RSA

5.1 THE GENERAL CASE

Theorem 13. *For every $n = pq$ where p and q are primes, there exists $\delta = \alpha\beta$ with α and β not necessarily distinct primes such that*

$$\frac{n\delta}{\left(\frac{\alpha + \beta}{2}\right)} = \Psi, \tag{19}$$

and

$$\frac{\Psi}{\delta} = p, q. \tag{20}$$

■

5.2 FACTORING BY THE AFRICAN FRACTIONS

Theorem 14. *For every $N = pq$ where p and q are primes, there exists $\zeta + \overset{\blacktriangle}{e}_{\blacktriangledown}$ such that*

$$\zeta + \overset{\blacktriangle}{e}_{\blacktriangledown} = \begin{cases} N\left(\frac{1}{p} + \frac{1}{p} + \frac{1}{2p}\right) \\ \\ N\left(\frac{1}{q} + \frac{1}{q} + \frac{1}{2q}\right) \end{cases} \tag{21}$$

where $\overset{\blacktriangle}{e}_{\blacktriangledown}$ is any positive integer and ζ is a complex number which switch and swing between two alternative values such that

$$\zeta = \begin{cases} 2 + \frac{1}{2} \\ \\ 7 + \frac{1}{2} \end{cases} \tag{22}$$

Proof. We will see in the next article that the relation above

$$\equiv 5 \pmod{10}. \tag{23}$$

■

5.2.1 THE ALGORITHM AND THE SPECIAL CASES

To build a discrete algorithm according to the Erdos-Straus theorem, we need to integrate in the code the following sequences.

Sort	**Compute**	**Output**	**Terminate**	♦
$n = pq$	$\frac{4}{n} = \frac{1}{x} + \frac{1}{y} + \frac{1}{z}$	x, y, z	$\rightarrow$	$\hookleftarrow$
x, y, z = primes	$\frac{n}{x, y, z}$	$\rightarrow$	p, q	**1**
x, y, z	$\frac{ny}{x}$	$\rightarrow$	p, q	**2**
x, y, z	$\frac{ny}{z}$	$\rightarrow$	p, q	**3**
Step **1**.	Step **2**.	Step **3**.	Step **4**.	■

This heuristic algorithm reduces the number of core instructions and makes it more *"Elegant"* but it is, above all, designed for the quantum computers. Nevertheless, it remains theoretical for the common computers and the personal laptops. Indeed, the Erdos-Straus triples will become larger as $n \rightarrow +\infty$. So, you will get lucky if one of the Erdos-Straus integer divides n. Ultimately, we will observe in the next article "*RSA-T. The Oval Pylon*", how the Riemann Hypothesis remains definitely the most elegant solution.

References

[1] Perelman, G. *Proof of the soul conjecture of Cheeger and Gromoll*. J. Differential Geom. 40 (1994), no. 1, 209-212.

[2] Sow, T. M. *The Square of Primes is The Prime Square*, Accepted. 2013.