Paper about connection between some fundamental mathematical constants

In this paper I will try to give connection between, nowadays, unpopular but significant constants and well known constants in mathematics.

Initial it has begun with research on prime numbers and their connections. That is the work I made sub consequent in great deal of time.

First constant I want to little talk about is a listed, but till now unknown, better said unpopular yet. That is so called “Prime constant”. It is listed on wolfram mathworld with very few description.

http://mathworld.wolfram.com/PrimeConstant.html

That constant marked as P is formed from binary array which is filled on special way and that is the successive prime number is marked with 1 otherwise 0. Decimal representation of on that way formed number is about 0.41……

On that way observed it is really very little to see. But I looked at ways on which I could “resolve” prime numbers as in chemistry. I come across in research with square root spiral. This spiral has more names to the scientist who studied it. It is called spiral of Theodorus and Einstein spiral. But I think, better said, I would always recommend to call all the constants and variables after its natural property. So I would further call it square root spiral.

The main idea which has spontaneously come was to add reciprocal sums of non-interlaping points of that spiral. My suspection was it has point of convergation. Therefore I made reciprocal sums.

(Please find below the c program and formula used to calculation.)

This practically was made with an Raspberry pi 1st generation. The sum after say 100000 iterations I have used to attack the former mentioned Prime constant. I have just divided the constant which I have operational called the “tsi” after theodorus spiral intersections, although it has nothing to do with intersections but with non-overlaps. So in further text the constant tsi I have divided with prime constant. The result has me intrigued on first sight. I was similar with famous e (2.71….) but the decimal point was one step left. I have divided with e or vice versa e with this tsi/P and came to a value which has 10 and 3 zeros after. That was the encouraging point to compute the tsi more precise, and to find precise decimal value of Prime constant. And in deed it appeared that the zeros after 10.0 becomes more and more. That is it was converged to 10 exactly. This conjecture was so strong probable to me, that I assumed it is in deed the truth and with reverse way with known constants I have computed “exactly” value of tsi. Making more iterations on Raspberry pi have proved that it converges to the computed value. It has been run on raspberry pi for couple of months with millions of iterations and it converged to computed value of tsi.

Mathematically tsi is formed so:

tsi = 1/sqrt(17)+1/sqrt(54)+1/sqrt(110)+…

17,54,110,… are non-intelaping points computed with computer.

So I will give the whole formula on this point, and it is : **e*P/tsi = 10** . It could be written on different arts which is obviously.

The constants involved are well known e = 2.71….
not known P (Prime constant) = 0.41…..
from me computed and new involved tsi = 0.1127….
Natural number 10

This formula gives the fundamental property if this conjecture is true. I speak till this point still as a conjecture, because I am not able to strictly on mathematical way prove it. But on the next paper I will give the new way, another way to come to tsi. And because of another way the same constant tsi I have named it different because of its property on which I have extracted it. But that latter. I will still remain on this formula to which chronologically I have come first.
I personally think it opens new horizons in mathematics especially in number theory. I wasn't able to find it on internet and therefore I contact you, because I think it is new. And not only new, it involves the non-known and non popular prime constant listed on wolfram, and very few other places.

This paper I will finish with this formula and way (tale) I came to it. On next paper I will introduce some new methods which I have used in research on prime numbers to give the connection with this new formula with amazing new properties.

The calculation of tsi I have made in mini c program which I will give bellow after a very simple property

the growth of the angle φ_n of the next triangle n is:

$$\varphi_n = \arctan\left(\frac{1}{\sqrt{n}}\right).$$

The c program for calculation of tsi
is:

```
#include <stdio.h>
#include <math.h>

int main(void)
{
   long double n = 1;
   unsigned long brojac = 1;
   long double br1 = 0;
   long double zbir_uglova_prirastaja = 0;
```

```
    long double reciproka = 0;


    unsigned long i;

    for(i = 1; i < 120000000000; i++) {



        n = (long double)i;
        zbir_uglova_prirastaja += atan(1/(sqrt(n)));
        br1++;

        if(zbir_uglova_prirastaja > (long double)brojac*2*M_PI){
        brojac++;
        reciproka += 1/br1;
        printf("%5.12Lf\n" , reciproka);}

}

    return 0;
}
```

I am looking forward for your professional review, and latter I could give more new properties in Prime number relations.