Note''

Let history record that on this date 2022-August-03, I, John Wsol discovered the exact solution for the Fine Structure Constant from first principles.

Step:

(1) The geometry of a 4 x 11 x sqrt(137) triangle. 4 Space~Time dimensions in which 4 Degrees-of-Freedom oscillate within: Length^3, time^1,

Where Planck Mass spreads forth filling 3D-Space
while Fundamental Charge spreads forth filling time.

There are 11 dimensions of M-theory (a super-set of String Theory). These 11 dimensions twist together (phase shifted by 1/12th) thru this quada-polar sequence:

1. negative electric potential (-E-field)
2. South-to-North dipole (B-field)
3. positive electric potential (+E-field)
4. North-to-South dipole (B-field)

(2) The value known as the PrimeConstant: here the 46th prime is 211. This is the number of bits of precision to which these computations are being performed.
(Why 211 bits? Because 211 > 203 bits which is sufficient to represent the age of the universe in Planck time quantum-increments. See footnote at *
Note: In J-language numbers with the x-suffix tells the J-language to use extended precision calcs generally result in precise rational fractions.)

```
fmtDec PrimeConstant =:  (1r2^211) * 2x #. (1+i.211x) e. p:i.46

0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`916`977`868`245
'!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!
 0   3   6   9  12  15  18  21  24  27  30  33  36  39  42  45  48  51  54  57 60

PrimeConstant = 0.414682509851111660248109622154307708365774238137916977868245
```

See: https://mathworld.wolfram.com/PrimeConstant.html

(3) The value of 1/(Fine Structure Constant) is... (Relative Uncertainty 1.1x10^-63)**

```
    fmtDec a137ph_x =: precSqrt( (137x^2)+(30x*(PrimeConstant+5x)) % ((59x*PrimeConstant)-8x) )

  137.035`999`084`114`069`051`510`536`990`526`283`083`923`808`685`605`940`625`219`167`076
  '''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''|
     0   3   6   9  12  15  18  21  24  27  30  33  36  39  42  45  48  51  54  57  60  63
```

Currently the Planck time is: 5.39124334778149x10^-44 of a second. It's reciprocal,
omega_P = 1.85485969653271x10^43 counts 1-quantum increments since the beginning of time.
Our Planck time value in seconds shrinks as the recipocal of omega_P growing 4.27x10^25/second^2.

(4) So the EXACT value of the Fine Structure Constant, just in time for CODATA 2022 is:

```
  fmtDec alpha_x =: 1 % precSqrt( (137x^2)+(30x*(PrimeConstant+5x)) % ((59x*PrimeConstant)-8x) )
  0.007`297`352`569`277`726`665`783`313`402`330`653`912`423`078`499`989`495`271`648`995`938
  '!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!'''!
   0   3   6   9  12  15  18  21  24  27  30  33  36  39  42  45  48  51  54  57  60  63  66
```

```
 * The age of the "observable universe"...  (Note: relative to Earth-bound reference frame.)
                 is 4.0278129150e60 time quanta (relative uncertainty 2.6e_10)
  This translates to 4.3429839167e17 seconds
                 or 13.762`085 Billion Years (relative uncertainty 2.1e_10)
```

This value is based on the best measurements of the electron mass & Bohr radius.
Turns out that we can determine how long, since the beginning of time, it has taken
for our [meter] to have grown to it current length -- relative to Planck length.

4π^2 * (1+alpha) * (Bohr radius) / (Planck length)*c

```
   'age_meter' defQty '4p2*(1+alpha)*a_0%l_P*c';    's/m| How long it took for meter to grow.'
```

age_meter	4.34298391676e17	2.1e_10	_1 1 0 0 0	s/m	4p2*(1+alpha)*a_0%l_P*c

units = [seconds/meter]

)

```
Note''
  ** The relative uncertainty was calculated by comparing the value of the PrimeConstant
     computed to 199 bits vs. 211 bits.  (The difference between the 45th & 46th prime.)
     Seriously precise!   1.1x10^-63

       (1+i.9 1); fmtDec a1pha_x ^ 1+i.9      NB.  integer powers of 1/alpha
```

1	137.035`999`084`114`069`051`510`536`990`526`283`083`923`808`686
2	18,778.865`044`981`311`971`932`634`403`448`728`204`274`295`590`556
3	2,573,380.533`104`760`773`507`004`117`635`644`071`513`091`911`812`990
4	352,645,772.377`620`972`110`931`887`829`768`545`694`218`089`980`069`495
5	48,325,165,740.556`366`005`067`167`676`304`431`901`937`239`415`142`310`092
6	6,622,287,368,162.542`759`340`867`890`614`602`696`909`740`346`867`259`917`802
7	907,491,765,718,262.378`371`062`516`231`674`565`786`392`334`055`012`537`032`883
8	124,359,040,775,808,862.609`497`689`024`297`465`383`759`849`812`404`593`623`358`785
9	17,041,665,397,855,047,463.742`263`873`971`415`886`071`407`072`788`270`594`288`701`994
	'''|'''|'''|'''|'''|'''|'''!'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|
	18 15 12 9 6 3 0 -3 -6 -9 -12 -15 -18 -21 -24 -27 -30 -33 -36 -39 -42 -45

```
    'speed_e' defQty '(e^2)%4p1*eps_0*hBar c*alpha'        NB. Might this be the speed of an electron?
```

Symbol	Value	relUnc	-L-T+M+C+K	SIunits	Formula
speed_e	2187691.26363638	8.8e_11	1 _1 0 0 0	m/s	(e^2)%4p1*eps_0*hBar

```
)
NB.   PrimeConstant function: limits precision to the requested number of bits
PrimeConst_f =: 3 : 0
 if. 1>: #y do.
  (1r2^lastPrime)*(lastPrime $ 2x) #. (x:1+i.]lastPrime=._1 pick primes) e. ]primes=.p:i.x:>y
 else.  o =. 0$y
  for_i. i.#y do.
    o =. o, PrimeConst_f i{y
  end.
 end.
)
```

```
Note''
          This table shows how QUICKLY the  Prime Constant converges...
          After just 50 time quantums since the beginning of time we
          are already at 63-digits of precision.
    __n__ 1st, 2nd, 3rd,... Ordinal position of each prime number.
   /    _________
  |    / n'th prime     ((+&1,. p:) i); <fmtDec PrimeConst_f 1+i=. i.51
```

1	2	0.250`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`0
2	3	0.375`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`0
3	5	0.406`250`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`0
4	7	0.414`062`500`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`0
5	11	0.414`550`781`250`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`0
6	13	0.414`672`851`562`500`000`000`000`000`000`000`000`000`000`000`000`000`000`000`000`0
7	17	0.414`680`480`957`031`250`000`000`000`000`000`000`000`000`000`000`000`000`000`000`0
8	19	0.414`682`388`305`664`062`500`000`000`000`000`000`000`000`000`000`000`000`000`000`0
10	23	0.414`682`507`514`953`613`281`250`000`000`000`000`000`000`000`000`000`000`000`000`0
11	29	0.414`682`509`377`598`762`512`207`031`250`000`000`000`000`000`000`000`000`000`000`0
12	31	0.414`682`509`843`260`049`819`946`289`062`500`000`000`000`000`000`000`000`000`000`0
13	37	0.414`682`509`850`536`007`434`129`714`965`820`312`500`000`000`000`000`000`000`000`0
14	41	0.414`682`509`850`990`754`785`016`179`084`777`832`031`250`000`000`000`000`000`000`0
15	43	0.414`682`509`851`104`441`622`737`795`114`517`211`914`062`500`000`000`000`000`000`0
16	47	0.414`682`509`851`111`547`050`095`396`116`375`923`156`738`281`250`000`000`000`000`0
17	53	0.414`682`509`851`111`658`072`397`858`632`029`965`519`905`090`332`031`250`000`000`0
18	59	0.414`682`509`851`111`659`807`121`334`608`837`059`931`829`571`723`937`988`281`250`0
19	61	0.414`682`509`851`111`660`240`802`203`603`038`833`534`810`692`071`914`672`851`562`5
20	67	0.414`682`509`851`111`660`247`578`467`181`073`236`247`357`272`077`351`808`547`973`6
21	71	0.414`682`509`851`111`660`248`001`983`654`700`386`416`891`433`327`691`629`528`999`3
22	73	0.414`682`509`851`111`660`248`107`862`773`107`173`959`274`973`640`276`584`774`255`7
23	79	0.414`682`509`851`111`660`248`109`517`134`332`280`014`624`716`457`660`724`699`962`8
24	83	0.414`682`509`851`111`660`248`109`620`531`908`849`143`084`075`383`747`233`445`319`5
25	89	0.414`682`509`851`111`660`248`109`622`147`495`983`035`716`252`866`967`335`144`465`7
26	97	0.414`682`509`851`111`660`248`109`622`153`806`870`277`484`347`310`261`163`666`728`0
27	101	0.414`682`509`851`111`660`248`109`622`154`201`300`730`094`853`212`967`027`949`369`4
28	103	0.414`682`509`851`111`660`248`109`622`154`299`908`343`247`479`688`643`494`020`029`8
29	107	0.414`682`509`851`111`660`248`109`622`154`306`071`319`069`518`843`373`273`149`446`0
30	109	0.414`682`509`851`111`660`248`109`622`154`307`612`063`025`028`632`055`717`931`800`1
31	113	0.414`682`509`851`111`660`248`109`622`154`307`708`359`522`247`993`848`370`730`697`2
32	127	0.414`682`509`851`111`660`248`109`622`154`307`708`365`399`719`747`959`808`270`540`9

```
│33 131│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`767`061`732`591`773`116`781`1│
│34 137│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`772`801`451`101`647`567`503`6│
│35 139│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`236`380`729`116`180`184`3│
│36 149│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`237`782`027`580`505`001`3│
│37 151│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`132`352`196`586`205`6│
│38 157│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`826`018`712`474`4│
│39 163│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`911`547`183`197`4│
│40 167│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`916`892`712`617`6│
│41 173│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`916`976`236`514`8│
│42 179│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`916`977`541`575`6│
│43 181│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`916`977`867`840`9│
│44 191│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`916`977`868`159`5│
│45 193│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`916`977`868`239`1│
│46 197│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`916`977`868`244`1│
│47 199│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`916`977`868`245`4│
│48 211│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`916`977`868`245`4│
│49 223│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`916`977`868`245`4│
│50 227│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`916`977`868`245`4│
│51 229│  0.414`682`509`851`111`660`248`109`622`154`307`708`365`774`238`137`916`977`868`245`4│
│^   ^ │'''!'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'│
││   │ │   0  -3  -6  -9 -12 -15 -18 -21 -24 -27 -30 -33 -36 -39 -42 -45 -48 -51 -54 -57 -60 │
└|───|─┴──────────────────────────────────────────────────────────────────────────────────────┘
 |   \_The_n'th_prime_number___
 \_n__
)




a1pha_pf =: 3 : 0
 precSqrt ( (137x^2) + (30x*(5x+PrimeConst_f y)) % (_8x+59x*PrimeConst_f y) )
)

   |.(1+i.27 1); fmtDec (1%alpha_x)^ 1+i. 27
```

Do we see any pattern in powers of alpha? When is alpha closest to an integer? α^11th

```
                                                                         137.035`9 |  1
                                                                      18,778.865`0 |  2
                                                                   2,573,380.537`3 |  3
                                                                 352,645,773.145`5 |  4
                                                              48,325,165,872.091`9 |  5
                                                           6,622,287,389,792.673`2 |  6
                                                         907,491,769,176,386.671`5 |  7
                                                     124,359,041,317,394,597.015`8 |  8
                                                  17,041,665,481,348,882,466.063`0 |  9
                                               2,335,321,656,565,199,484,215.913`4 | 10
                                             320,023,136,564,393,700,889,154.048`4 | 11  <--Close to an integer
                                          43,854,690,273,007,056,887,487,775.346`6 | 12
                                       6,009,671,299,357,428,782,859,828,062.425`4 | 13
                                     823,541,311,122,888,266,267,155,305,930.542`3 | 14
                                 112,854,806,418,201,790,695,558,383,074,711.047`7 | 15
                              15,465,171,157,381,456,507,695,468,461,458,232.739`9 | 16
                           2,119,285,181,712,282,957,833,720,892,916,248,118.754`8 | 17
                         290,418,362,378,198,037,918,787,688,251,525,507,987.109`3 | 18
                      39,797,770,462,533,649,854,634,271,717,020,596,423,890.430`0 | 19
                   5,453,727,239,622,427,527,218,356,299,580,636,335,335,338.945`7 | 20
                 747,356,961,420,750,959,919,782,065,223,277,031,717,393,016.581`4 | 21
             102,414,807,936,512,580,512,926,383,517,698,809,947,059,853,399.340`4 | 22
          14,034,515,534,227,725,439,794,275,388,657,753,656,006,173,511,753.754`5 | 23
       1,923,233,858,941,379,769,759,135,643,600,711,407,092,373,536,823,725.748`0 | 24
     263,552,273,475,899,912,768,171,208,900,447,049,813,384,091,879,591,804.326`7 | 25
  36,116,149,126,320,406,396,706,179,028,483,165,120,734,909,087,614,206,692.046`2 | 26
4,949,212,581,290,408,444,239,034,043,630,447,057,680,338,663,365,704,620,957.051`6 | 27
'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''|'''!'''|
  57  54  51  48  45  42  39  36  33  30  27  24  21  18  15  12   9   6   3   0  -3
```

Quantum spirals of Fibbinocci interesting patterns for
ratios between every 2nd term in the Fibbinocci series.
These ratios converge on phi^2 = 1+phi = 2.61803398874989
See this link: https://1drv.ms/u/s!AtQceyfqMlsQun3ZD4r-MK7ks2Gj?e=62B3uB