```
Note''
  Let history record that today 2022-August-13, I, John Wsol determined how to
  calculate the mass of the neutron to the same precision that we can now calculate
  the mass of the electron.  Which can now be more accurately computed using the
  precise value for alpha, the Fine Structure Constant.
(

  whats 'm_p'
```

m_p	kg	-l-t+M+C+K: 0 0 1 0 0	dt=1	proton mass

Value digit┬16	relUnc	Formula
1.672621923690000e_27	3.1e_10	m_p2018
1.672621923672491e_27	2.1e_11	m_e*MpMe
1.672621923662282e_27	2.1e_11	MpMe*2*R∞*h / c*α²
1.672621923667387e_27	2.1e_11	MpMe*hBar / c*α*a₀

```
   whats 'd2tP_p_sec2'
```

d2tP_p_sec2	/s2	-l-t+M+C+K: 0 _2 0 0 0	dt=2	

Values digit┬15	relUnc	Formulae
4.27093383738923e25	1.9e_12	omg_P % ageUniv_s
4.27093383738923e25	1.9e_12	tP_p_sec%ageUniv_s*second

2nd derivative of the number of Planck times per second that each second grows from this to the next.

```
   whats 'm_e'
```

m_e	kg	-l-t+M+C+K: 0 0 1 0 0	dt=1	electron mass

Values digit┬15	relUnc	Formulae
9.10938370150000e_31	3.0e_10	m_e2018
9.10938370157333e_31	1.9e_12	hBar % c*alpha*a_0
9.10938370157333e_31	1.9e_12	2*Roo*h % c*alpha^2
9.10938370157333e_31	1.9e_12	Roo*((2*h%c)^3)%(e^4)*(mu_0^2)
9.10938370157333e_31	1.9e_12	4p1*hBar*Roo % c*alpha^2
9.10938370157333e_31	1.9e_12	e*hBar % 2*mu_B

In 2018 CODATA had determined that mass of electon was known to almost 10 digits But now with the higher certainy of alpha we can upgrade that to almost 12-digits .

9.10938370157333e_31	4.2e_12	(hBar^2) % E_h*a_0^2

```
calc 'd2tP_p_sec2 m_e omg_e omg_p omg_n d2tP_p_sec2%omg_n'
```

Quantity	Value	relUnc	-L-T+M+C+K	dt	SIunits	
d2tP_p_sec2	4.27093383738923e25	1.9e_12	0 _2 0 0 0	2	/s2	
m_e	9.10938370157333e_31	1.9e_12	0 0 1 0 0	1	kg	Now that we know the mass of the electron
omg_e	7.7634407063558e20	1.9e_12	0 _1 0 0 0	1	Hz	to 1.9x10^-12...
omg_p	1.42548624078042e24	2.1e_11	0 _1 0 0 0	1	Hz	
omg_n	1.42745114886004e24	1.9e_12	0 _1 0 0 0	1	Hz	
d2tP_p_sec2%omg_n	29.9199997969147	5.7e_10	0 _1 0 0 0	1	Hz	<--Based on old m_n2018
d2tP_p_sec2%omg_n	29.92	2.7e_12	0 _1 0 0 0	1	Hz	<--New upgraded precision for 2022.

```
calc 'd2tP_p_sec2%29.92 omg_n'
```

Quantity	Value	relUnc	-L-T+M+C+K	dt	SIunits	
d2tP_p_sec2%29.92	1.42745114886004e24	1.9e_12	0 _2 0 0 0	2	/s2	After studying the radian rotation spirals
omg_n	1.42745115854902e24	5.7e_10	0 _1 0 0 0	1	Hz	see that the neutron maintains a ratio of
						The expansion rate of out "second" per sec
						The omega frequency of the neutron

```
whats 'omg_n'
```

omg_n	Hz	-l-t+M+C+K: 0 _1 0 0 0	dt=1	frequency of neutron wavicle

Value digit┬15	relUnc	Formula	
1.42745115854902e24	5.7e_10	(m_n*c^2)%hBar	Just needed to solve this formula for omg_n back to kilograms.

```
'omg_n' defQty 'd2tP_p_sec2%29.92%second'
```

Symbol	Value	relUnc	-L-T+M+C+K	SIunits	Formula	
omg_n	1.42745114886004e24	1.9e_12	0 _1 0 0 0	Hz	d2tP_p_sec2%29.92%second	Updates accuracy of omg_n to ma

```
15 calc 'm_n m_neutron = omg_n*hBar%c^2'
```

Quantity	Value	relUnc	-L-T+M+C+K	dt	SIunits

m_n	1.67492749804000e_27	5.7e_10	0 0 1 0 0	1	kg	CODATA 2018 value
m_neutron = omg_n*hBar%c^2	1.67492748667124e_27	1.9e_12	0 0 1 0 0	1	kg	CODATA 2022 My new recommendat

'm_n' defQty 'omg_n*hBar%c^2'

Symbol	Value	relUnc	-L-T+M+C+K	SIunits	Formula
m_n	1.67492748667124e_27	1.9e_12	0 0 1 0 0	kg	omg_n*hBar%c^2

whats 'm_n'

m_n	kg	-l-t+M+C+K: 0 0 1 0 0	dt=1	neutron mass

Values digit┬15	relUnc	Formulae
1.67492749804000e_27	5.7e_10	m_n2018
1.67492748667124e_27	1.9e_12	omg_n*hBar%c^2

Deep Analysis of d2tP_p_sec2 : The 2nd differential of time with respect to duration of a second

it; mergeColms ": each factors each (x:omg_P%age_meter) + it=.(i:11) +/22*i:1

_33 _11 11	3^2 ×89×101×449×467×2517710158644097	97×353×1247315743520699846453	5×7×15217×1
_32 _10 12	2^5 ×13×79×103×44146351×285805370381	2×7×281×311×34908251727370000051	2^2 ×3^3 ×4
_31 _9 13	7×145553657×41918108958356047	3×5^2 ×569457844985230445898629	73×5850594
_30 _8 14	2×3×45863×155206224239918465293	2^3 ×4679×10004669×114045219838397	2×3671×222
_29 _7 15	5×17×223×21980502763×102508866907	592453×72088989968642716709	3×29×16008
_28 _6 16	2^2 ×277×25219717×1528420571589521	2×3^2 ×13^2 ×549831131×25534908638839	2^4 ×5^2 ×1
_27 _5 17	3×23×127×6301×1502909×514668830471	599939×71189468219089413161	6197×34022
_26 _4 18	2×11^2 ×30307×5823237843191489657	2^2 ×5×11×23×8440580706302822814703	2×3×7×11×13
_25 _3 19	3386671×12611008974267734729	3×7×2033778017804394449637961	19×23×307×2
_24 _2 20	2^3 ×3^2 ×5×7×47×10711×9924979×3392070181	2×41×5231×99569028852134515721	2^2 ×13×43×
_23 _1 21	31×43×61×525246127604347194697	53×13217×60969703646236455683	3^2 ×5×109×
_22 0 22	2×499483×1601953×26688389447119	(2^33)×3×19×87228445119511	2×17×12561
_21 1 23	3×941×7560823×2000980674498347	5×59×7993×16657×1087412269614943	47×2161×60
_20 2 24	2^2 ×5339287×1999767870405368893	2×2135466918694614172119859 3	2^3 ×3×167×
_19 3 25	5×13×19×369086891×93697340829629	3^2 ×37×349×6871×53485152035555741	7×631×1079

_18 4 26	2×3×7159×1631583607×609410450797	2^2 ×7^2 ×107×713927×2852523216324277	2×5×427093
_17 5 27	7×19759×308787593168337635959	17×131×2967893×6461813021405899	3×433×1567×
_16 6 28	2^4 ×769×1913×79229×22902209163971	2×3×5×239×1669×3569006601961628903	2^2 ×1033×3
_15 7 29	3^3 ×11×265579×150980399×3586345237	11×13×883×912797×370554335215087	11×1997×101
_14 8 30	2×5×29×90803×5012473×323573243467	2^3 ×31×2084507×24414161×3383966077	2×3^2 ×7660
_13 9 31	2428303×249023197×70628529281	3×14236446124630761147465731	5×8053×1060
_12 10 32	2^2 ×3×17×181×7057×11867×13811887794937	2×67×33857×434201×21680972193263	2^5 ×7×83×3
_11 11 33	97×353×1247315743520699846453	5×7×15217×172883×463845629123507	3×13×229×52

```
calc 'd2tP_p_sec2 d2tP_p_sec2%omg_n d2tP_p_sec2%Cs133 omg_n%Cs133'
```

Value	relUnc	units	-L-T+M+C+K	dt	Quantity
8.31188769853567e23	1.9e_12	/s2	0 _2 0 0 0	2	d²tP/sec²
29.92	2.7e_12	Hz	0 _1 0 0 0	1	d²tP/sec²/omg_n
90419021521795.00	1.9e_12	Hz	0 _1 0 0 0	1	d²tP/sec²/Cs133
3022026120380.85	1.9e_12		0 0 0 0 0	0	omg_n/Cs133

```
it; 0 mergeColms ": each factors each (3022026120381) + it=.(i:11) +/22*i:1
```

_33 _11 11	2^2 ×3×181×1391356409	2×5×302202612037	2^3 ×17×45497×488401	Caesium atc
_32 _10 12	61×331×149671939	47×9127×7044859	3×7^2 ×20558000819	Electron Cc
_31 _9 13	2×5^2 ×631×95785297	2^2 ×3×7×35976501433	2×1801×15259×54983	- 2, 8, 18,
_30 _8 14	3^2 ×7×73×149×4410101	13×232463547721	5×29×1951×10682501	
_29 _7 15	2^5 × 179^2 ×421×7001	2×43×1009×34826401	2^2 ×3^3 ×41×607×1124351	
_28 _6 16	302767×9981359	3×5^3 ×17×383×647×1913	101×29921050697	
_27 _5 17	2×3×71×1021×6948049	2^3 ×449×5813×144731	2×1511013060199	
_26 _4 18	5×11×41×157×1303×6551	11×229×1699×706117	3×11×13×7044349931	
_25 _3 19	2^2 ×67×11276216867	2×3^2 ×569×295062109	2^4 ×5^2 ×7×659×1637777	
_24 _2 20	3×160091×6292309	7×311 × 419^2 ×7907	127×1499×15874237	<-- 419^2
_23 _1 21	2×7×17×271×46854571	2^2 ×5×1559×3323×29167	2×3×503671020067	
_22 0 22	59×317×491×329083	3×439×2294628793	19×709×224335693	
_21 1 23	2^3 ×3^2 ×5×13×31×20830067	2×12539×120505069	2^2 ×446333×1692697	
_20 2 24	3022026120361	337×353×25403503 <<	3^2 ×5×79×379×2242949	Strong corr
_19 3 25	2×2341×645456241	2^6 ×3×19×37×22389359	2×577×787×3327497	see radianM
_18 4 26	3×89×103×109887863	5×604405224077	7×431718017201	
_17 5 27	2^2 ×755506530091	2×7×13×53×313293191	2^3 ×3×233917×538301	
_16 6 28	5×7×19×4544400181	3^2 ×571×5483×107251	17×177766242377	
_15 7 29	2×3×11×29×1613×978863	2^2 ×11×7823×8779549	2×5×11×61×450376471	

_14 8 30	796517×3794051	3022026120389	3×109×193×47884301
_13 9 31	2^4 ×23×8212027501	2×3×5×107×941441159	2^2 ×13×58115886931
_12 10 32	3^5 ×12436321483	23×31×11699×362293	1297×2330012429
_11 11 33	2×5×302202612037	2^3 ×17×45497×488401	2×3^2 ×7×23×83×12563821

NB. G E N E R A T E G R A P H I C S

```
]proton_row =: (>'proton';'qFactor'); (>'7*proton_qF';'1st Up'); (>'3*proton_qF';'Down'); (>'7*proton_qF';'2nd
```

proton qFactor	7*proton_qF 1st Up	3*proton_qF Down	7*proton_qF 2nd UP

```
  ]neutron_row =: (>'neutron';'qFactor'); (>'3*neutron_qF';'1st Down'); (>'7*neutron_qF';'Up'); (>'7*neutron_qF
```

neutron qFactor	3*neutron_qF 1st Down	7*proton_qF Up	7*proton_qF 2nd Down

```
 ]eachLabel =: proton_row,: neutron_row
```

proton qFactor	7*proton_qF 1st Up	3*proton_qF Down	7*proton_qF 2nd UP
neutron qFactor	3*neutron_qF 1st Down	7*proton_qF Up	7*proton_qF 2nd Down

These lines create the labels for each spiral in the image file:

proton_qF+UpDownUp_neutron-DownUpDown.png

```
 radianMatrix (29.92*(m_p%m_n),1) * 1 7 3 7,:1 3 7 3
 radianMatrix 71 * 1 3 7

)
```