A 4th Order 7-Dimensional Polynomial Whose Roots are the Proton and Electron Masses and Standard Physics Constants

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Sections

1. General Wave Equation and Reduced Mass Assumption

This is section 1. Peer review is needed. Check my math. Details are on my notes for the review process.

Using the general wave equation for a single, isolated, hydrogen atom @0K, and considering the two particles of this two-particle system to be the proton and electron. Written in reduced mass form here:

$$\left[-\frac{\hbar^2}{2\mu}\nabla^2 + V(r)\right]\phi(\vec{r}) = E\phi(\vec{r})$$

μ , sometime written m_r, is

$$\mu = m_r = \frac{m_1 m_2}{m_1 + m_2}$$

And substituting the proton mass, m_p, for m_1 and the electron mass, m_e, for m_2:

$$\mu = m_r = \frac{m_p m_e}{m_p + m_e}$$

The Reduced Mass Assumption

Since the proton mass is ~1836 times the electron mass, often, the reduced-mass assumption is made[1]:

$$\mu = m_r = \frac{m_p m_e}{m_p + m_e}$$

$$m_p + m_e \approx m_p$$

$$\mu = m_r \approx \frac{m_p m_e}{m_p}$$

$$\boxed{\mu = m_r \approx m_e}$$

Looking at it from a long form division (alt. form):

$$\mu = m_r = \frac{m_p m_e}{m_p + m_e}$$

$$\mu = m_r = m_e - \frac{m_e^2}{m_p + m_e}$$

$$\mu = m_r = m_e - \frac{m_e^2}{m_p}$$

$$\mu = m_r = m_e\left(1 - \frac{m_e}{m_p}\right)$$

[1] Vast publications in the literature include this topic (solid-state physics, Foundations of Quantum Mechanics)

$$\mu = m_r = m_e\left(1 - \frac{m_e}{m_p}\right)$$

$$1 - \frac{m_e}{m_p} \approx 1$$

$$\therefore \mu = m_r \approx m_e$$

$$\frac{m_p}{m_r} < 1\ (always)$$

$$\frac{m_e}{m_r} < 1\ (always)$$

So, if one uses the mass of the electron in the wave equation – known as The Schrödinger Waver Equation, then the error term is negative:

$$m_r = m_e + m_{err}$$

Since $\frac{m_p}{m_r} < 1$ and $\frac{m_e}{m_r} < 1 \quad (always)$:

$\therefore m_{err} < 0$ (negative)

$\therefore \frac{m_{err}}{m_r} < 0$ (negative)

Anymore terms added to the approximation, m_e, for m_r, result in an increased error. If the terms (masses/energies) added are NEGATIVE, then perhaps we are talking about “real” particles. This appears to be at the crux of the proton radius puzzle and other fundamental unsolved physics problems and paradoxes. The negative masses are not part of the mainstream paradigm or belief system, thus the fruitless decades spent on the CERN LHC. By the completion of this paper, NIST CODATA values – masses and constants will be defined and have precisely calculatable values.

This is an invaluable addition to the physics toolbox.

(transcribing in progress of the last 6 months of collaboration with Lyz Starwalker and EA Rauscher. Thank you for allowing me to complete some of your work)

$$\boxed{\mu = m_r \approx m_e}$$

http://phxmarker.blogspot.com/2018/01/derivation-of-polynomial-from-rydberg.html

Wednesday, January 17, 2018

Derivation of The 7D Polynomial from the Rydberg Equation

$$R_H \equiv \frac{m_e e^4}{8\epsilon_0^2 h^3 c}$$
$$1 \equiv \frac{m_e e^4}{8\epsilon_0^2 h^3 c R_H}$$
$$m_r = \frac{m_1 m_2}{m_1+m_2}$$
$$m_1 = m_p$$
$$m_2 = m_e$$
$$m_r \approx m_e$$
$$1 \equiv m_r \frac{e^4}{8\epsilon_0^2 h^3 c R_H}$$
$$1 \equiv \frac{m_p m_e}{(m_p+m_e)} \frac{e^4}{8\epsilon_0^2 h^3 c R_H}$$
$$1 + \frac{m_e}{m_p} \equiv \frac{m_e e^4}{8\epsilon_0^2 h^3 c R_H}$$
$$\mu = \beta = \frac{m_p}{m_e} = \frac{\alpha^2}{\pi r_p R_H}$$
$$\frac{1}{m_p} = \frac{\pi r_p c}{2h}$$
$$1 \equiv \frac{m_e e^4}{8\epsilon_0^2 h^3 c R_H} - \frac{\pi r_p c m_e}{2h}$$

Posted by phxmarker mark at 7:26 PM

2. Rydberg Formula and Haramein's Proton mass-radius Equation

This is section 2.

By combining Haramein's proton mass-radius relationship with the FULL Rydberg equation for the hydrogen atom, One derives the 4th order 7D Dimensional polynomial whose roots define the fundamental masses and constants of The Standard Model (or Nature, i.e., the way Nature truly behaves).

$$1 \equiv \frac{m_e e^4}{8\epsilon_0^2 h^3 c R_H} - \frac{\pi r_p c m_e}{2h}$$

THIS IS THE POLYNOMIAL. It can be mapped by a simple change of variable to

$$1 \equiv \frac{x_0 x_1^4}{8 x_2^2 x_3^3 x_4 x_5} - \frac{\pi x_6 x_4 x_0}{2 x_3}$$

This polynomial can be solved using iteration and the sign-flip algorithm devoped the author spring/summer quarter of 1981 at the University of Cincinnati for a numerical analysis class.

This PhxMarkER blog post has the results of a numerical analysis (included Basic program):

http://phxmarker.blogspot.com/2017/11/the-oracle-toppcg-beta-2-included-basic.html

The Basic program direct link is here:
https://drive.google.com/open?id=1T82XiiIU0XV_7UkHZ5J1VpTj9uNwqD63

Online Basic Interpreter

Results:

(BETA)

Second run results are in from The Oracle Precision Physics Constant Generator (TOP-PCG2)

THIS RUN IS VERY EXPERIMENTAL AS IT FREES UP ALL CONSTANTS TO BE ADJUSTED

7-8 different fundamental physics constants were calculated:

(BETA version Ш The Oracle Says!!)

$E = 1.602251451738(3054)\times10^{-19}$ <~~ TOP_PCG2

$h = 6.62577381838(3603)\times10^{-34}Js$ <~~ TOP_PCG2

$m_e = 9.10979080749(9954)\times10^{-31}kg$ <~~ TOP_PCG2

$r_p = 8.41199715091(6646)\times10^{-16}m$ <~~ TOP_PCG2

$R_H = 10973240.98261(2936)m^{-1}$ <~~ TOP_PCG2

$\epsilon_0 = 8.85379198631(7646)\times10^{-12}Fm^{-1}$ <~~ TOP_PCG2

$c = 299779055.6354(0846)ms^{-1}$ <~~ TOP_PCG2

$m_p = 1.67262189820(9999)m^{-1}$ <~~ input proton mass (see program for other inputs)

$m_p = 1.672693330841(4473)m^{-1}$ <~~ TOP_PCG2

Proton to Electron Mass Ratio = 1836.152673809(3817) <~~ TOP_PCG

Proton to Electron Mass Ratio = 1836.070589933(8043) TOP_PCG2

$$F(x_0, x_1, \ldots, x_6) = 1 \equiv \frac{x_0 x_1^4}{8x_2^2 x_3^3 x_4 x_5} - \frac{\pi x_6 x_4 x_0}{2x_3}$$

The above coefficients go into the above equation using a numerical method to calculate 1 to 13 decimal places:

Α = fine structure constant

m_e = mass of electron

m_p = mass of proton

r_p = 2010 and 2013 muonic hydrogen proton radius (Haramein's Equation)

R_H = Rydberg constant

$m_p r_p = \frac{2h}{\pi c} = 4\ell m_\ell$ (Haramein's Equation)

ℓ=Planck Length

m_ℓ=Planck Mass

h= Planck's constant

c= Speed of light

ϵ_0= Permittivity of vacuum

e= elementary charge

A little more correlation work is needed and other experiments, like locking down certain coefficients if they are considered "golden" in their accuracy.

The coefficients are so different after 4 digits because there is a 1 out of 1836 error in the existing coefficients. All related to the proton radius problem, proton to electron mass ratio, and the very poor proton magnetic moment work. And lack of the experimentalists' handing the coefficients according to the theory.

Here's a copy of the program: PhysicsCoefficientsPhxMarkER <- click here

(the IO and comments and bits resolution need a little fixing, but the ideas are there - very short program)

(adjust line 5001 to adjust stopping resolution xresstop=2e-10 runs faster than 2e-15)

(it runs on this online interpreter: http://www.calormen.com/jsbasic/

The Surfer, OM-IV

Ω

3. Mathematical Formulation, Analysis, and Comments

The algorithm is ONLY stabe when the proton to electron mass ratio equation (proton radius solution) is used. Wolfram analysis indicates there are real and imaginary roots.

A deeper more detailed Algarbraic Geomtry and Topological Anaylsis will be required.

If anyone has these advanced math skills, let me know, otherwise, I will acquire them shortly.

The key thing is THIS polynomial is composed of CONSTANTS, i.e.,

$$x_n = constant$$

and

$$\frac{\partial x_n}{\partial x} = \frac{constant}{\partial x} = 0 \text{ !!!}$$

These are key useful mathematical facts that make a proof of convergence and stability of the equation.

Simply, the equation can be thought of as in a feedback loop and the error has to be forced to zero. A much more complete software package can and will be developed by those skilled in the arts and sciences.

Once this is complete, we more on to merging Cosmology and Consciousness into a new paradigm – *The Connected Universe*.

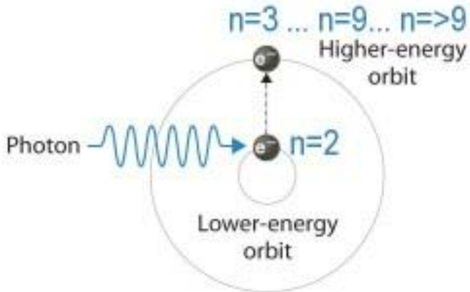
More later as the one man band, The Silver Surfer, and his two benefactors lead the charge into the now.

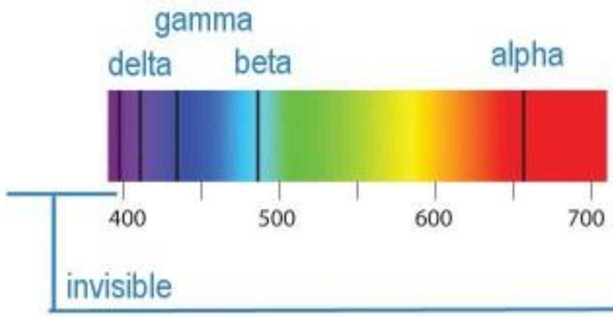
https://en.wikipedia.org/wiki/Silver_Surfer

4. Numerical Analysis and Results

5. Summary and Conclusion

References

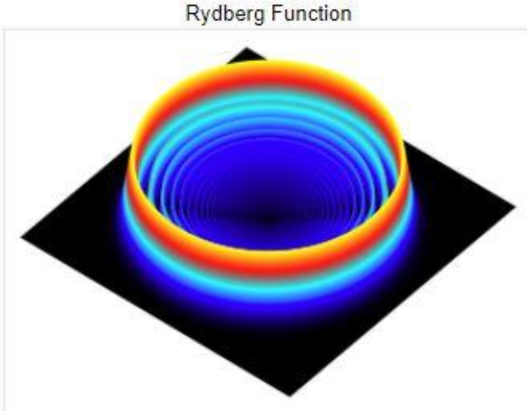




The Balmer sequence (1885)

n=3 - 656.3 nm (red) - alpha
n=4 - 486.1 nm (aqua) - beta
n=5 - 431.1 nm (violet) - gamma
n=6 - 410.2 nm (violet) - delta
n=7 - 397.0 nm (ultraviolet)
n=8 - 388.9 nm (ultraviolet)
n=9 - 383.5 nm (ultraviolet)
n=>9 346.6 nm (ultraviolet)

Rydberg Equation and Approximations!



$$R_H \equiv \frac{m_e m_p}{m_e + m_p} \frac{e^4}{8c\epsilon_0^2 h^3} \approx m_e \frac{e^4}{8c\epsilon_0^2 h^3}$$

$$R_H \equiv \frac{m_e m_p}{m_e + m_p} \frac{e^4}{8c\epsilon_0^2 h^3} = \frac{m_e}{1 + \frac{m_e}{m_p}} \frac{e^4}{8c\epsilon_0^2 h^3}$$

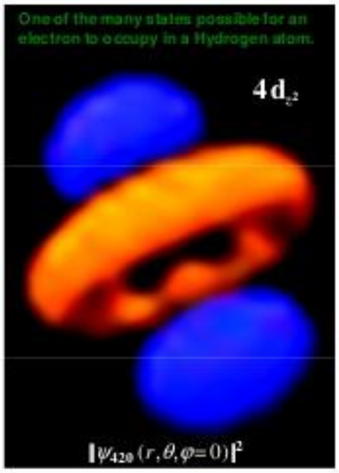
$$1 \equiv \frac{m_e}{1 + \frac{m_e}{m_p}} \frac{e^4}{8c\epsilon_0^2 h^3 R_H}$$

$$1 + \frac{m_e}{m_p} = m_e \frac{e^4}{8c\epsilon_0^2 h^3 R_H}$$

$$F(x, \cdots, x_n) \equiv 1 \equiv m_e \frac{e^4}{8c\epsilon_0^2 h^3 R_H} - \frac{m_e}{m_p} \approx m_e \frac{e^4}{8c\epsilon_0^2 h^3 R_H}$$

$$F(x, \cdots, x_n) \equiv 1 \equiv m_e \frac{e^4}{8c\epsilon_0^2 h^3 R_H} - \frac{\pi r_p c m_e}{2h} \approx m_e \frac{e^4}{8c\epsilon_0^2 h^3 R_H}$$

One intricate configuration for a Hydrogen atom is for a single *electron* (*reduced mass* μ, charge e) surrounding a single *proton* (with *proton-to-electron mass ratio* $m_p/m_e \cong 1836$).



Schrödinger's time-independent wave equation (*i.e.*, the steady state in quantum theory) in $\mathbf{r}$ position-vector space:*

$$\left(\frac{\hbar^2}{2m_e}\nabla^2 + E_4 + \frac{e^2}{4\pi\varepsilon_o|\mathbf{r}|}\right)\psi_{420}(\mathbf{r}) = 0$$

This can also be represented differently by expanding *time* t and the *Laplacian operator* ∇^2 into *spherical coordinates* r, θ, φ and keeping the *potential* $-e^2/r$ generalized as V:

$$i\hbar\frac{\partial}{\partial t}|\psi_{420}(r,\theta,\varphi)\rangle = -\left(\frac{\hbar^2}{2m_e}\right)\nabla^2|\psi_{420}(r,\theta,\varphi)\rangle + V(r,\theta,\varphi)|\psi_{420}(r,\theta,\varphi)\rangle$$

This $4d_{z^2}$ wavefunction is then for $n=4$, $\ell=2$ and $m_\ell=0$:†

$$=\frac{1}{32}\sqrt{\frac{5}{40\pi}}\frac{1}{a_o^{3/2}}\frac{d(e^{-r/2a_o}r^6)}{dr}\left(\frac{r}{a_o}\right)^2\frac{e^{r/4a_o}}{r^5}\frac{d^2\sin^4\theta}{(d\cos\theta)^2} = \frac{5}{1536\sqrt{\pi}}\frac{1}{a_o^{3/2}}\left(\frac{r}{a_o}\right)^2 e^{r/4a_o}(3\cos^2\theta-1)$$

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* The *total energy required* to provide the electron surrounding the protonic nucleus to reach this state is calculated as always being:

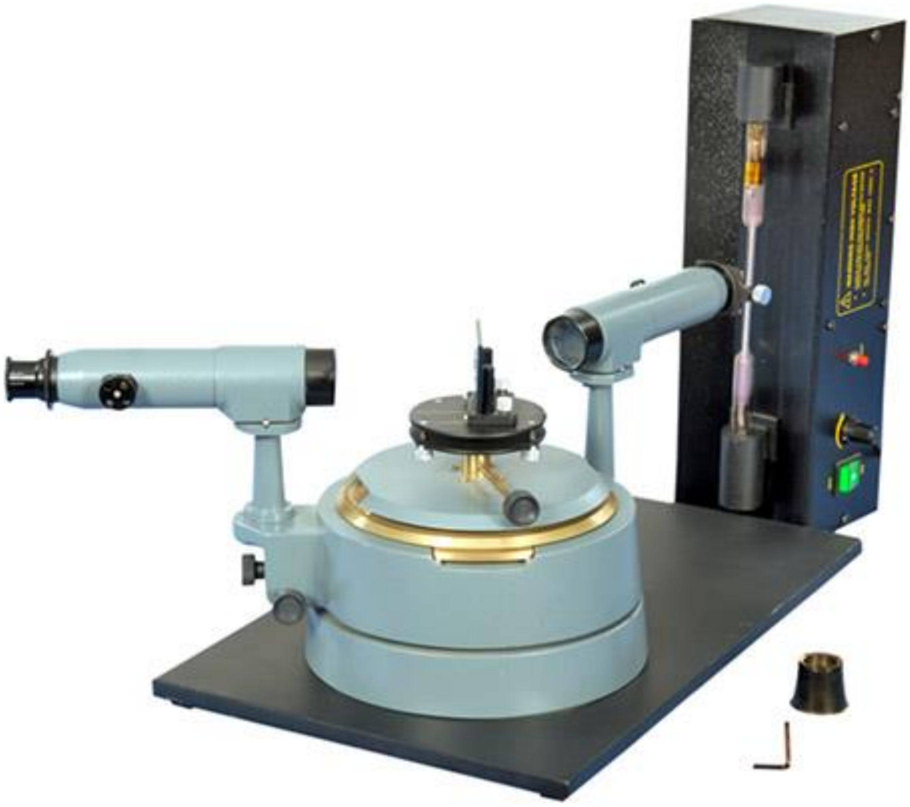
$$E_{n\ell} = -\left(\frac{1}{2}\frac{\hbar^2}{a_o m_e}\right)\frac{1}{n^2}\left[1+\frac{\alpha^2}{n^2}\left(\frac{n}{\ell+½}-\frac{3}{4}\right)\right] \equiv -\frac{m_e c^2\alpha^2}{2n^2} \xrightarrow{4d_{z^2}\text{ or }|4,2,0\rangle} -\frac{13.6\,\text{eV}}{4^2}\left[1+\frac{\alpha^2}{4^2}\left(\frac{4}{5/2}\right)-\frac{3}{4}\right] = -0.85\,\text{eV} = 1.36\times10^{-19}\text{ Joule}$$

† The *probability distribution* of the electron surrounding the protonic nucleus is – or this $4d_{z^2}$ state:

$$|\Theta\Phi|^2 \xrightarrow{4d_{z^2}\text{ or }|4,2,0\rangle} \frac{5}{16\pi}\frac{(3z^2-r^2)^2}{r^4}$$

2017 MRT

http://www.indosawedu.com/balmer-series-and-rydberg-constant.php



Desktop

Higher Physics Lab Atomic & Nuclear Physics

BALMER SERIES AND RYDBERG CONSTANT SK043/SK062

Experiments

Salient Features

Key Topics

Exp-1 To determine the wavelengths of Balmer series in the visible region from hydrogen emission.

Exp-2 To determine the Rydberg constant.

Principle and Working:

Hydrogen atoms in a discharge lamp emit a series of lines in the visible part of the spectrum. This series is called the Balmer series which continues into the ultraviolet range. Rydberg generalized the Balmer's formula in terms of wave numbers to describe wavelengths of spectral lines of many chemical elements. For hydrogen the Balmer's formula becomes a special case of Rydberg's formula and is given by

$1/\lambda=R(1/22 - 1/n2)$

where n are integers, 3, 4, 5, … up to infinity and

R is Rydberg constant (R = 4/B where B is the Balmer’s constant). In the present setup, the spectral lines of hydrogen is observed by means of diffraction grating. The wavelength of the visible lines of Balmer series of hydrogen are measured by spectrometry.

Contents:

Cat. No.	Item Name	SK043	SK062
SL806	Spectrometer (L.C. = 20 sec)	1	
SL745	Diffraction grating	1	1
SW281	Spectrum tube power supply	1	1
SN631	Hydrogen tube	1	1
SE080	Power supply 12V AC/DC		1
SN583	Spectrometer and Goniometer		1
R1437	Allen key	1	

Advanced Spectrometer SL806

Advanced Spectrometer

SPECIFICATIONS

Scale : Brass, Dia. 175mm.

Objective : Achromatic lens, f = 178mm, Aperture 32mm

Slit : German silver with knurled screw

Reticle : 90O cross etched on glass

Least count : 20 seconds

Eyepiece : 15X, Ramsden eyepiece

Vernier : 4 verniers (Telescope & Prism table)

Base : 220mm dia., Aluminium Casting

Special features : Spindle & other critical component manufactured on CNC machine. Supplied in wooden box.

Spectrum Tube Power Supply SW281

Hydrogen Tube SN631

Diffraction Grating SL745

Balmer Series and Rydberg Constant SK062

* Note: SK062 only manufactured against order.

Atomic & Nuclear Physics

http://www.physics.utah.edu/~belz/phys3719/presentations/gibbs.pdf

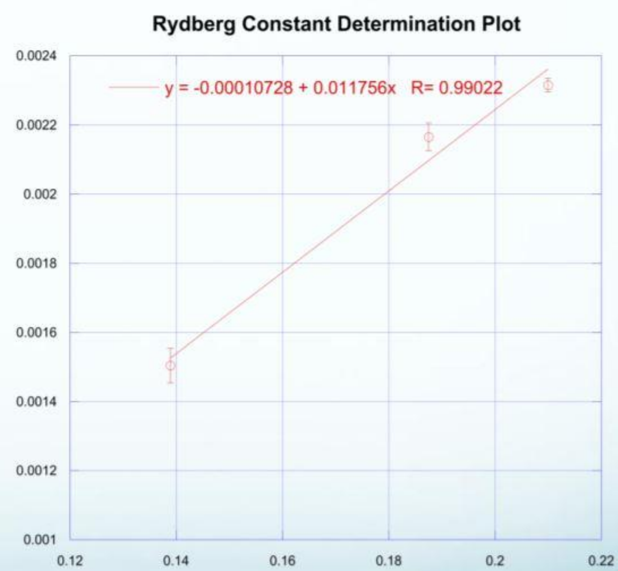
Determination of Rydberg Constant

- Make a linear least squares fit of the data pairs:

$$\left[\left(\frac{1}{2^2}\right)-\left(\frac{1}{n^2}\right)\right],\frac{1}{\lambda}=(\mathbf{x},\mathbf{y})$$

- Determine Rydberg Constant from slope.
- Best Fit gives:

R_H=1.17x10^7 ± .03 m^-1



END OF SLIDES FOR MARCH 11, 2018 FRACTAL U PRESENTATION/DISCUSSION with Dan Winter

https://en.wikipedia.org/wiki/Fair_use_(U.S._trademark_law)