Harmonic resonances and subquantization in the hydrogen emission spectrum

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Abstra c t

An alternative method for analyzing the hydrogen spectrum is presented, based on recording orbital energies as precise fractions, which allows the identification of harmonic relationships between lines not visible in standard rounded data. Among other things, an exact 3:1 relationship between the H(5→4) and H(20→10) lines is demonstrated.
The fundamental unit of photon energy ε_0 and the corresponding subquantum unit [sQ] were introduced. [1]
All analyzed lines of the Lyman , Balmer , Paschen , and Brackett series (n ≤ 7, m ≤ 4) form a discrete resonant lattice with a modulus of ~18.64 GHz , suggesting the existence of a deeper harmonic organization of the spectrum. The method provides an analytical tool allowing for more precise organization of spectroscopic data and may find applications in high-resolution spectroscopy, astrophysics, and the analysis of fundamental physical constants.

The proper examination

Part 1 – Harmonic Resonance

the Lyman , Balmer , Paschen and Bracket series , from ultraviolet to infrared, were selected for study . It was assumed that for Planck's formula E = h * f to be correct, there will be a value of λ 0 in which all the waves studied will fit within the total number of full wave periods.

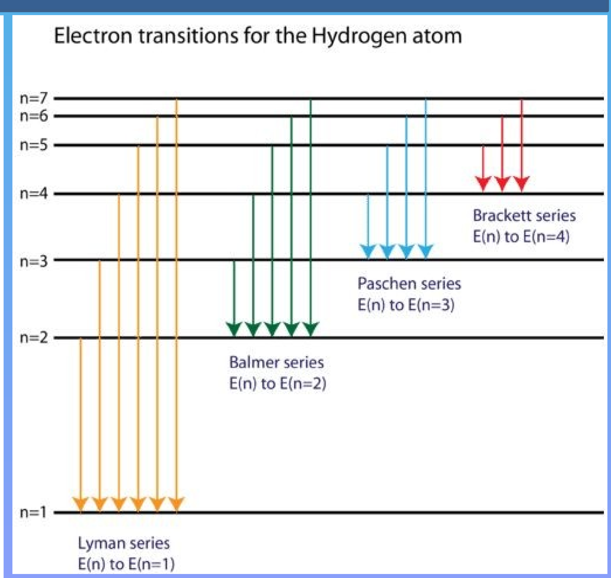

Figure 1 . Investigated electron transitions in the hydrogen atom

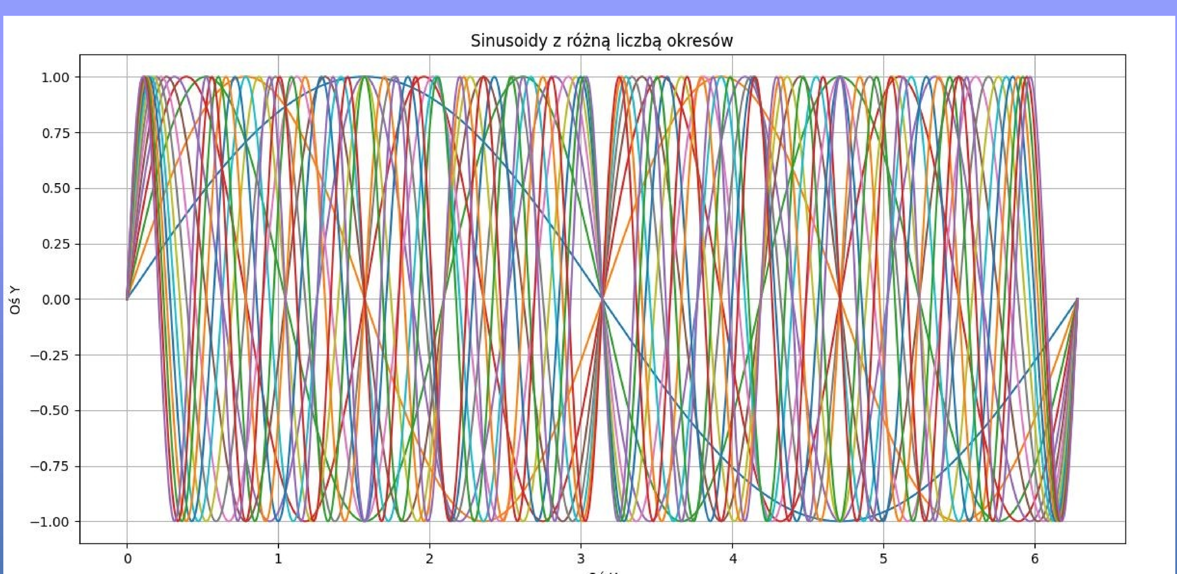

Figure 2 . Example of harmonic waves with common starting and ending nodes .

The above diagram shows the occurrence of such a state in which all the waves studied are integer harmonics of the λ 0 wave. This also means that the energy of a single wave period at each frequency is the same and equal to the energy of a single wave period of the λ 0 wave (ε_0). The first such resonance occurred in the interval of approximately 1.608 cm . Recognizing this resonance as unique, it was proposed that this energy of a single wave period defines the unit of energy describing the granular feature of quanta and was called [sQ] – subquantum .

Subquantum [sQ] - is the postulated smallest portion of energy in photon processes, with the value ε_0 =~ 7.71 × 10^{-5} eV *, which is an elementary energy unit in quantum phenomena, defined as one 3969th part of the energy of hydrogen wave emission when an electron jumps from orbit 5 to orbit 4 (1/3969 H5>4).

n	m	λ [nm]	E [e-21 J]	E [eV]	E [cm^-1]	sQ
2	1	121,502	1634,904	10,20427	82302,975	132300,00
3	1	102,518	1937,664	12,09395	97544,26667	156800,00
4	1	97,2018	2043,63	12,75534	102878,7188	165375,00
5	1	94,9237	2092,677	13,06146	105347,808	169344,00
6	1	93,7303	2119,32	13,22776	106689,0417	171500,00
7	1	93,0252	2135,385	13,32802	107497,7633	172800,00
3	2	656,112	302,76	1,88968	15241,29167	24500,00
4	2	486,009	408,726	2,55107	20575,74375	33075,00
5	2	433,937	457,773	2,8572	23044,833	37044,00
6	2	410,07	484,416	3,02349	24386,06667	39200,00
7	2	396,907	500,481	3,12376	25194,78827	40500,00
4	3	1874,61	105,966	0,66139	5334,45208	8575,00
5	3	1281,47	155,013	0,96752	7803,54133	12544,00
6	3	1093,52	181,656	1,13381	9144,775	14700,00
7	3	1004,67	197,721	1,23408	9953,4966	16000,00
5	4	4050,08	49,047	0,30613	2469,08925	3969,00
6	4	2624,45	75,69	0,47242	3810,32292	6125,00
7	4	2164,95	91,755	0,57269	4619,04452	7425,00

Figure 3 . The table above shows the energy values of the studied waves in various units. The unit sQ precisely describes the wave energies, while also highlighting the harmonic relationships between the waves. All emission waves occur in discrete energy values [sQ]. Knowledge of this fact allows predictions to be made about the energy of emission waves that will be discovered in the future.

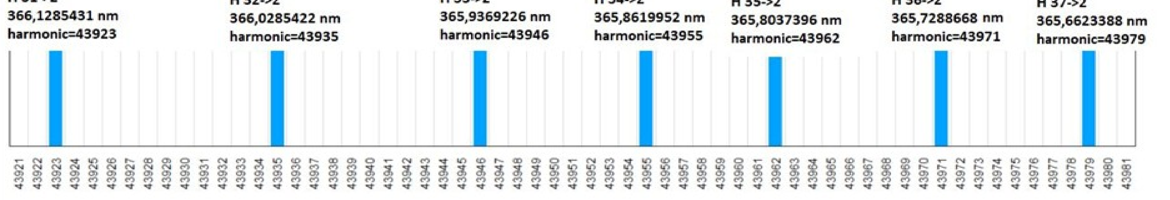

Figure 4 . Figure p shows the correspondence of the various hydrogen lines with the lattice
discrete integer values sQ

Source : " All Lyman, Balmer , Paschen and Brackett Lines a re in Superresonance .

Part 2 – Orbit Marker Algebra Orbit markers as a fingerprint of the electron orbit on the emission wave energy

Traditional formula for the emitted wavelength

$$\lambda = \frac{hc}{13.6\,\mathrm{eV}\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)}$$

does not take into account multiple corrections. It was decided not to identify correction terms using the aggregate value of known and unknown corrections as the Event Marker Mz .

$$\lambda = \frac{hc}{13.6\,\mathrm{eV}\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)} - \mathrm{Mz}$$

It turned out that in the energy units [sQ] the Event Marker (n2>n1) is equal to the difference of the Lower and Higher Orbit Markers, in the entire emission band, with an accuracy of billionths.

Mz = Mn - Mw

Lambda NIST	Orbita niższa	Orbita wyższa	Energia tracona przez orbity w jednostkach [Hn] E=176400*(B2^-2 - C2^-2)	Energia fali fotonu liczona jako harmoniczna fali 16081464 [nm] E=INTEGER(16081464/A2)	Energia korekcyjna	Marker orbity niższej	Marker orbity wyższej
27803,38	8	9	578,4722222	578	0,472222	-0,25	0,222222
383,5391	2	9	41922,22222	41929	-6,77778	7	0,222222
388,9056	2	8	41343,75	41351	-7,25	7	-0,25

Figure 5 . The balance of energy lost by orbits and emission energy is shown. The event marker is called the correction energy, and the Orbit Markers (table below) precisely indicate which orbits participated in the emission process.

conf_i	conf_k	Lambda	number harmonic resonance	frequency [GHz]	divide harmonic number	frequency module [GHz]
10	14	18615,14	4,0000	16104,76515	864	18,6398
5	7	4653,78		64419,12983	3456	18,6398
12	14	49487,6	4,0000	6057,930835	325	18,6398
6	7	12371,912		24231,69984	1300	18,6398
12	20	20514,64	4,0000	14613,5861	784	18,6398
6	10	5128,65		58454,45839	3136	18,6398
14	20	35040,27	4,0000	8555,654908	459	18,6398
7	10	8760,064		34222,6333	1836	18,6398
12	15	36470,46	3,0000	8220,144687	441	18,6398
10	20	12156,826		24660,42189	1323	18,6398
10	20	12156,826	3,0000	24660,42189	1323	18,6398
4	5	4052,279		73981,19873	3969	18,6398
12	15	36470,46	9,0000	8220,144687	441	18,6398
4	5	4052,279		73981,19873	3969	18,6398
10	12	29839,49	4,0000	10046,83585	539	18,6398
5	6	7459,84		40187,19527	2156	18,6398

Orbita	Marker orbity zaokrąglony	Marker orbity wartość ułamkowa
1	-20	-20
2	7	7
3	3	3
4	0	0
5	0	0
6	0	0
7	0	0
8	-0,25	-1/4
9	0,222222222	2/9
10	0	0
11	0,148760331	2*9/11^2
12	0	0
13	0,213017751	6^2/13^2
14	0	0
15	0	0
16	-0,0625	-1/16
17	-0,380622837	179/17^2
18	0,555555556	5/9
19	0,35734072	3*43/19^2
20	0	0
21	0	0
22	0,537190083	65/11^2
23	0,540642722	2*11*13/23^2
24	0,75	3/4
25	0,76	19/5^2
26	0,053254438	9/13^2
27	0,024691358	18/27^2
28	0	0
29	0,249702735	2*3*5*7/29^2
30	0	0
31	0,441207076	424/31^2
32	0,734375	47/64
33	0,016528926	2/11^2
34	0,404844291	117/17^2
35	0	0
36	0,888888889	8/9
37	0,146822498	3*67/37^2
38	0,83933518	3*101/19^2
39	0,023668639	4/13^2

Figure 6 . A table is shown revealing the harmonic resonances of waves knowing the harmonic numbers of waves and their energies [sQ[.

Source: Systematic Deviations in Atomic Spectra: A New Analysis Method Based on the Harmonic Number Unit

Part 3 – Integer Emission Energy Values as a Path to Identifying Wave Harmonic Resonances

The integer energy value E0 was estimated to the value:
E0 = 2*2*2*2*5*5*5 / 3*7*7 = **2000 /147 eV**

Orbita początkowa	*Docelowa orbita*	*Algorytm: 2000/147 * (1/Fo^2 – 1/Io^2)*	*Forma ułamkowa (eV)*
5	4	3*5/(7^2)	15/49
6	5	2^2*11*5/(3^3*7^2)	220/1323
7	5	2^7*5/(7^4)	640/2401
7	6	2^2*5^3*13/(3^4*7^4)	6500/64827
10	6	2^6*5/(3^3*7^2)	320/1323
10	7	2^2*17*5/(7^4)	340/2401
12	6	5^3/(3^2*7^2)	125/441
12	7	5^4*19/(3^3*7^4)	11875/64827
12	10	11*5/(3^3*7^2)	55/1323
14	7	2^2*5^3/(7^4)	500/2401
14	10	2^5*5/(7^4)	160/2401
14	12	5^3*13/(3^3*7^4)	1625/64827
15	7	2^8*11*5/(3^3*7^4)	14080/64827
15	10	2^2*5^2/(3^3*7^2)	100/1323
15	12	5/(3*7^2)	5/147
15	14	2^4*29*5/(3^3*7^4)	580/64827
20	7	3^2*13*5/(7^4)	585/2401
20	10	5/(7^2)	5/49

Figure 7. The table shows the energy values of emission waves described by integer quotients, which reveals previously hidden emission wave resonances .

Knowledge of atomic energy algebra allows us to improve NIST's results by reducing the uncertainty factor. Adopting this theory would enable more accurate calibration of hydrogen emission line data.
Based on fractional analysis, numerous simple 3:1, 4:1, 9:1 resonances have been identified, as well as more complex resonances such as 5:3. Fractional energy values should not be converted to real numbers, as this would irretrievably lose some information.

Source: **The key to the harmony of the atom**

Discussion

We can now count with full accuracy, without rounding, for example: How many times higher is the frequency of the hydrogen emission wave H 5->4 than that of the H 20->10 emission?
We know that the frequency is proportional to the emission energy, so we calculate the quotient c

z orbity	na orbitę	algorytm	energia w eV
5	4	3*5/(7^2)	15/49
20	10	5/(7^2)	5/49

The quotient is 15/5 = 3, which means that the emission wave H5->4 is exactly the third harmonic of the wave H 20->10.

By examining the resonances using the previously presented harmonic resonance method, we obtain:

Initial orbit	*Final orbit*	*Harmonic number*
5	4	3969
20	10	1323

The quotient is 3969 / 1323 = 3, which means that the emission wave H5->4 is also exactly the third harmonic of the wave H 20->10.

Let's calculate the same using data available so far, e.g. from the NIST website.
The quotient is 3.00000460841653, which means that the waves are not harmonic!!! .

z orbity	na orbitę	algorytm	energia w eV
5	4	13,0545017 - 12,74854	0,3059624000000000
20	10	13,56443886 - 13,46245155	0,1019873099999980

For the values to indicate wave resonance, it would be necessary, for example, to correct the energy of the 20th wave of hydrogen orbit from 13.46245155 eV to 13.46245139 – a correction of 0.00000016 eV .
Knowing **the energy algebra of the atom, we can improve NIST results by reducing the uncertainty factor.**

Source: Lost Resonances in NIST Tables

Conclusions

Research has shown that harmonic relations are a common phenomenon, and even allows us to put forward the thesis that each pair of emission waves is in an intermediate relation that can be described as the quotient of two natural numbers, i.e. with an accuracy of 1/ infinity .
Although the research was conducted on hydrogen emission waves, preliminary tests indicate that hundreds of elements also obey this rule.
Knowledge of atomic energy algebra allows us to improve NIST's results by reducing the uncertainty factor.
Systematic correction of energy values—not just for individual lines but simultaneously for the entire network, taking into account harmonic connections—could significantly improve the accuracy of the results .
Improved calibration methods can reduce the uncertainty in frequency measurements by orders of magnitude.
The presented Atomic Harmony Model reveals deep mathematical symmetry and allows lossless calculations of transition energies. These results have the potential to exceed the precision of experimental data (e.g., NIST) by correcting measurement uncertainty (uncertainty factor).
The classical units nm and cm^{-1} mask the harmonic structure of the waves, while the unit sQ – related to the energy of a full period – reveals the discrete structure of the spectral lines and leads naturally to digital spectroscopy , in which the spectrum is described as a set of integers.
Therefore, the repetition of the same unit (1sQ) in different transitions and different series is not a mathematical artifact, but a physical property of the hydrogen spectrum.
The revealed relationships will allow for increased accuracy of cosmological research as well as precision in identifying the components of substances.

Control question

The task is: Given: For the hydrogen emission wave at the transition from the orbit (m->n) we calculate "Marker(m->n)"
defined by the formula:
Marker(m->n) = 176400*(n^-2 - m^-2) – INTEGER(16081464/lambda(m->n))
For the specific case (m->n) the Marker value = -7.25 was calculated .
Wanted: Based solely on the value of -7.25, please calculate the values of m, n, and the wavelength of hydrogen emission upon transition from orbit (m->n). You can use the Orbit Marker Table.

1 The subject of the study was the emission lines of hydrogen emitted during transmission between integer s<>s orbits . Additionally, the study was limited to the emission of a photon wave containing integer numbers of full sine periods, starting and ending at the zero node.