

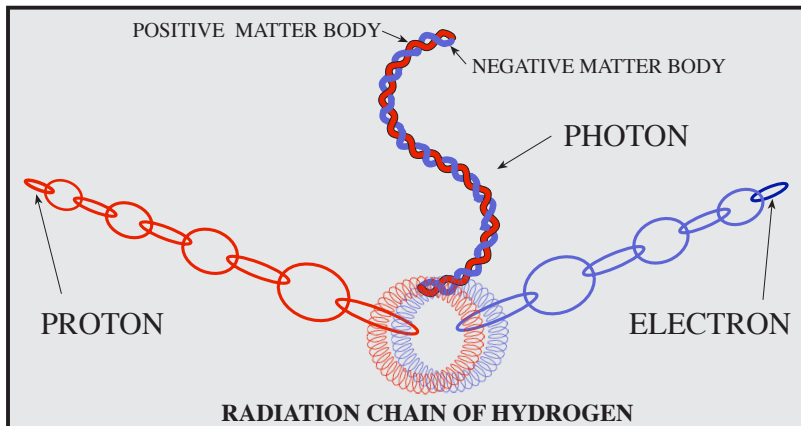
Mechanics of Hydrogen Radiation

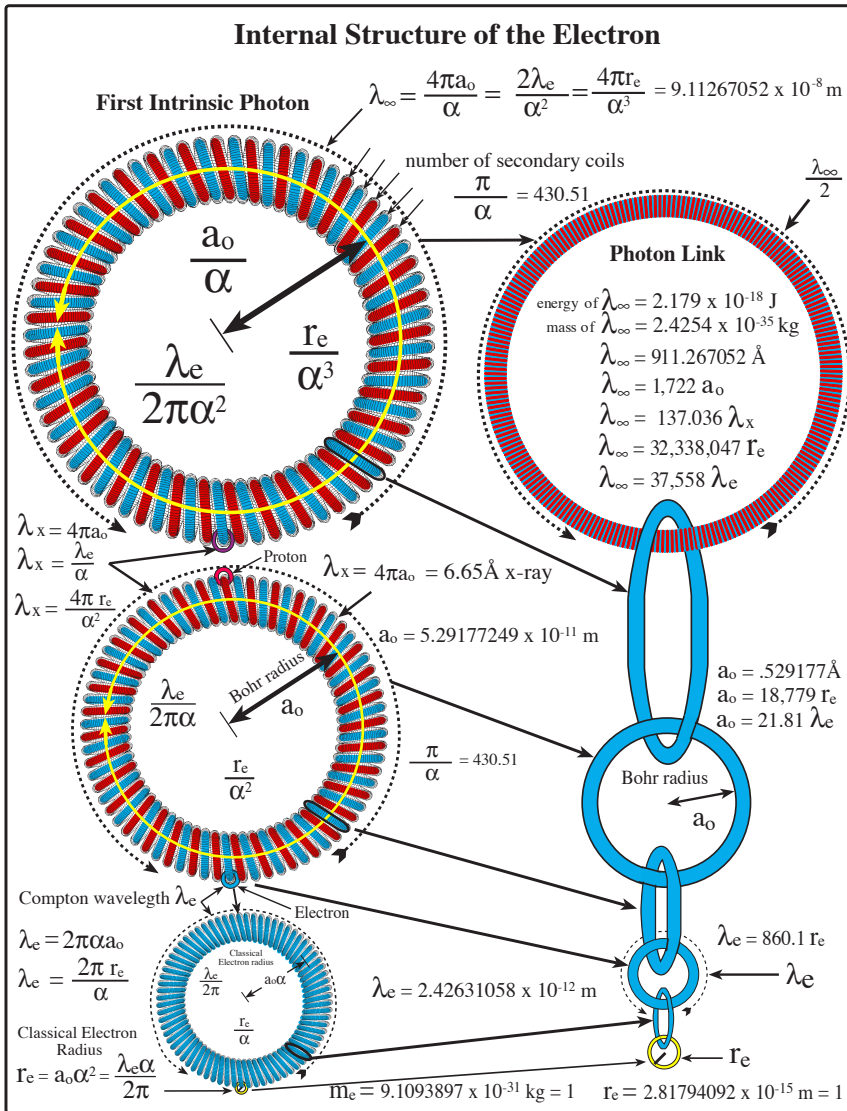
Photon Angular Momentum $YC/2\pi = 1.05457266 \times 10^{-34}$

Photon angular momentum is the unit of angular momentum possessed by all photons. A photon's angular momentum is equal to its mass times its wavelength times the speed of light divided by 2π ($I\omega = (m\lambda C/2\pi)$). It is also the unit of angular momentum of an electron at its ground state $M_e C \alpha_0 = YC/2\pi$.

The above drawing is a general schematic of how a hydrogen atom produces a photon. The proton and electron are composed of chain-like structures containing several circlon links. The largest links of each chain couple together and begin spinning in opposite directions. This photon link gets smaller and smaller as it spins faster and faster. The opposite velocities of the connecting charge chain links of an electron and proton accelerate evenly. When the opposite velocities of these two circlon shaped spinning bodies reach the speed of light they each break into two pieces. Half of the proton's positive link joins with half of the electron's negative link to emit a photon. The other two half links join together to maintain the circlon link between the atom's proton and electron. This circlon link can then gain energy from the atom's environment and increase its velocity until it too breaks into another photon.

The photon acquires its velocity of C from the two opposite circular motions of its negative and positive bodies being combined into a singular rectilinear motion. In addition to this motion at C , both bodies also spin at C in opposite directions along the axis of the photon's path. Half of a photon's energy comes from its spin and the other half comes from its velocity.





The Internal Structure of the Electron

It is quite difficult make realistic drawings depicting the mechanics of the hydrogen atom because of the vast size differences between the different links in its

radiation chain. The photon link is the largest link in the chain and is over 32,000,000 times bigger than the electron's smallest classical electron radius link.

The above drawing shows a somewhat more realistic depiction of the way that the circlon links are connected together. From the outside, the whole chain appears as just its largest link because the progressively smaller links are hidden inside of its coils.

As an electron couples together with a proton to form a hydrogen atom, it produces a photon in the process. The energy of this photon is governed by the electron's initial velocity \mathbf{v} toward the proton and the distance \mathbf{R} between their centers. The greater the angular momentum inherent in these values $\mathbf{I}\omega=\mathbf{M}\mathbf{e}\mathbf{V}\mathbf{R}$, the less the energy of the photon. The electron can only couple with a proton within a limited number of values for velocity and radii.

The angular momentum inherent in the electron's initial velocity is determined by the distance between their centers when the electron begins to pass the proton. The angular momentum at this point is the mass of the electron times its velocity times its distance from the proton ($\mathbf{I}\omega=\mathbf{M}\mathbf{V}\mathbf{R}$). The energy inherent in this velocity is equal to $\mathbf{E}=\mathbf{M}\mathbf{V}^2/2$. Since there is no angular momentum inherent in the charge energy, the size of the orbit is determined by the angular momentum of the electron's initial velocity and distance relative to the proton. As soon as the electron links to and forms an orbit with the proton, the charge energy moves it into an orbit where a photon can be emitted.

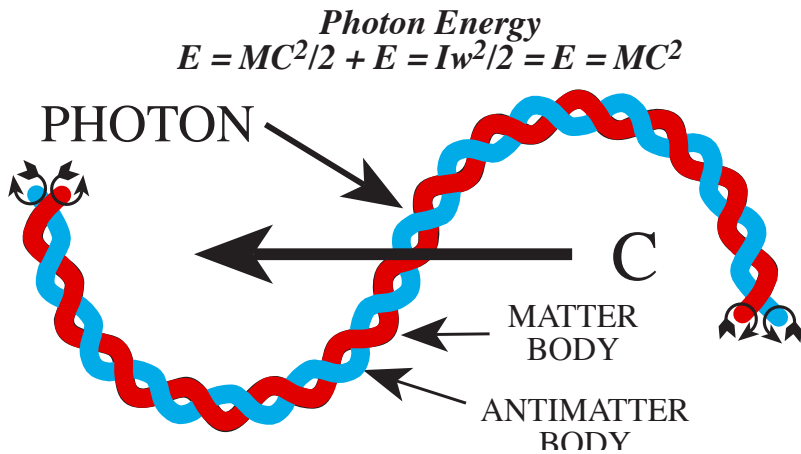
In order to conserve its fixed amount of angular momentum, the orbit must get smaller or larger as the energy inherent in the electron's initial velocity interacts with charge energy between the electron and proton. If the electron's orbital velocity is less than the equilibrium velocity, the charge energy will accelerate it to a smaller and faster orbit. If the electron's velocity is greater than equilibrium velocity, then the charge energy will decelerate it to a larger and slower orbit.

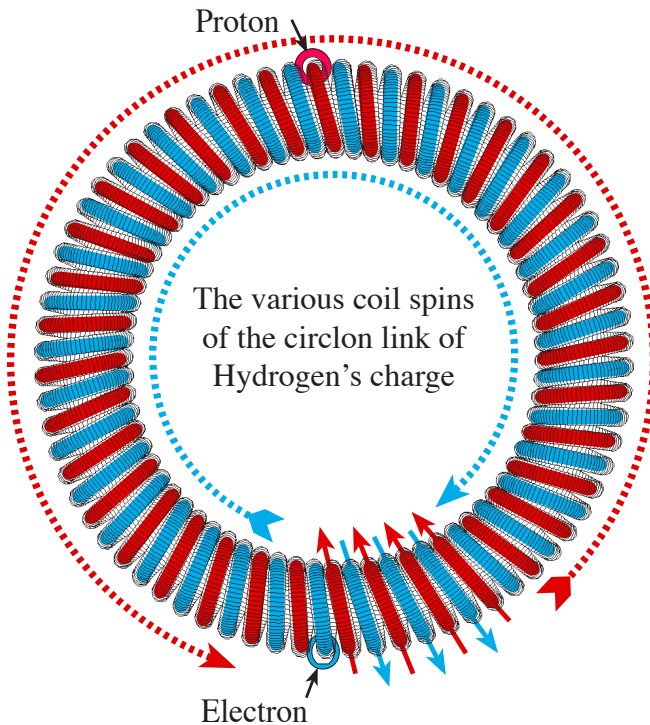
In addition to changing the electron's orbital velocity, the charge energy also increases the coil spin energy of the photon link in the charge chain. When a photon is emitted, half of its energy comes from the electron's orbital velocity and the other half is in the form of this coil spin energy.

The photon is produced from the largest link in the atom's radiation chain. This link is a circlon that combines the positive matter link of the proton and a circlon of the negative matter link of the electron. One-half of the charge energy increases the orbital velocity of these circlons in opposite directions and the other half of the

energy increases the circlon's internal coil spin velocity in opposite directions. Because these increases in coil spin velocity are in opposite directions, no net angular momentum is added to the atom by these accelerations. When a photon is emitted, it carries away equal amounts of this kinetic energy and spin energy plus one unit of the electron's initial angular momentum.

A photon's energy ($E=MC^2$) is a balance between the kinetic energy of its mass moving at the speed of light ($E=MC^2/2$) and the rotational kinetic energy of its mass spinning at the speed of light ($E=I\omega^2/2$). In the same way, when charge energy is added to the electron's orbit it is one-half kinetic energy that increases the electron's orbital velocity and one-half rotational kinetic energy that increases the opposite spins of the electron and proton.





When energy is added to the electron in a hydrogen atom, the distance between the proton and electron decreases and the spin of the circlon coils increases.

The Hydrogen atom is formed when the outer charge coils of a proton join with the charge coils of an electron to form a photon link. This link is broken and reformed every time a photon is emitted or received.

In this drawing, the red coils make up the proton and the blue coils make up the electron. The large red and blue coils form the circlon link that holds the atom together. When energy is added to this circlon link it splits into a pair of photons. Usually one photon is emitted into space and the other remains within the atom as a stationary photon to maintain the circlon link.

The hydrogen atom's 13.59 eV photon link is 32,000,000 times bigger than the electron's smallest link, the classical electron radius.

The first step in the emission of a photon is for the spinning coils of the circlon to split in half. In this process, a part of the spinning coil motion is added together and converted to the rectilinear motion of the emitted photon.

One of the positive halves of the circlon joins together with the opposite negative half. They combine their opposite circular motions into a single rectilinear motion at C and form a photon. The two other halves remain within the atom as opposite spinning circlons. The electron then settles into an equilibrium orbit with a radius determined by its remaining angular momentum $R=(I\omega)^2$.

The Photon Spectrum of the Hydrogen Atom

Calculated Values = 1215.6713Å
 Measured Values = (1215.6737)

LYMAN to #9 PHOTONS

Lyman	Balmer	Paschen	Brackett
$\lambda_{\text{Lyman}} = 911.75348$	$\lambda_{\text{Balmer}} = 3,645.982\text{Å}$	$\lambda_{\text{Paschen}} = 8,203.569\text{Å}$	$\lambda_{\text{Brackett}} = 14,584.173\text{Å}$
$\lambda_{1\gamma} = \frac{4}{2^2-1} = \frac{4}{3} = 1215.6713\text{Å}$ (1215.6737)	$\lambda_{2\gamma} = \frac{3^2}{3^2-2^2} = \frac{9}{5} = 6,562.768\text{Å}$ (6,562.772)	$\lambda_{3\gamma} = \frac{4^2}{4^2-3^2} = \frac{16}{7} = 18,751.015\text{Å}$ (18,751.015)	$\lambda_{4\gamma} = \frac{5^2}{5^2-4^2} = \frac{25}{9} = 40,511.592\text{Å}$ (40,511.579)
$\lambda_{1\gamma} = \frac{8}{3^2-1} = \frac{8}{8} = 1025.723\text{Å}$ (1025.723)	$\lambda_{2\gamma} = \frac{16}{4^2-4} = \frac{16}{4} = 4,861.309\text{Å}$ (4,861.298)	$\lambda_{3\gamma} = \frac{25}{5^2-9} = \frac{25}{16} = 12,818.077\text{Å}$ (12,818.082)	$\lambda_{4\gamma} = \frac{36}{6^2-16} = \frac{36}{20} = 26,251.512\text{Å}$ (26,251.511)
$\lambda_{1\gamma} = \frac{4^2}{4^2-1} = \frac{16}{15} = 972.571\text{Å}$ (972.571)	$\lambda_{2\gamma} = \frac{5^2}{5^2-4} = \frac{25}{21} = 4,340.458\text{Å}$ (4,340.435)	$\lambda_{3\gamma} = \frac{6^2}{6^2-9} = \frac{36}{27} = 10,938.092\text{Å}$ (10,938.095)	$\lambda_{4\gamma} = \frac{7^2}{7^2-49} = \frac{49}{33} = 21,655.287\text{Å}$ (21,655.287)
$\lambda_{1\gamma} = \frac{5^2}{5^2-1} = \frac{25}{24} = 949.7432\text{Å}$ (949.7432)	$\lambda_{2\gamma} = \frac{6^2}{6^2-4} = \frac{36}{32} = 4,101.730\text{Å}$ (4,101.711)	$\lambda_{3\gamma} = \frac{7^2}{7^2-49} = \frac{49}{40} = 10,049.372\text{Å}$ (10,049.374)	$\lambda_{4\gamma} = \frac{8^2}{8^2-64} = \frac{64}{15} = 19,445.564\text{Å}$ (19,445.564)
$\lambda_{1\gamma} = \frac{6^2}{6^2-1} = \frac{36}{35} = 937.8036\text{Å}$ (937.8035)	$\lambda_{2\gamma} = \frac{7^2}{7^2-4} = \frac{49}{45} = 3,970.069\text{Å}$ (3,970.072)	$\lambda_{3\gamma} = \frac{8^2}{8^2-64} = \frac{64}{55} = 9,545.971\text{Å}$ (9,545.972)	$\lambda_{4\gamma} = \frac{9^2}{9^2-81} = \frac{81}{65} = 18,174.123\text{Å}$ (18,174.123)
$\lambda_{1\gamma} = \frac{7^2}{7^2-1} = \frac{49}{48} = 930.7438\text{Å}$ (930.7483)	$\lambda_{2\gamma} = \frac{8^2}{8^2-4} = \frac{64}{60} = 3,889.048\text{Å}$ (3,889.049)	$\lambda_{3\gamma} = \frac{9^2}{9^2-81} = \frac{81}{72} = 9,229.015\text{Å}$ (9,229.015)	$\lambda_{4\gamma} = \frac{10^2}{10^2-100} = \frac{100}{75} = 17,362.110\text{Å}$ (17,362.110)
$\lambda_{1\gamma} = \frac{8^2}{8^2-1} = \frac{64}{63} = 926.2257\text{Å}$ (926.2257)	$\lambda_{2\gamma} = \frac{9^2}{9^2-4} = \frac{81}{77} = 3,835.384\text{Å}$ (3,835.384)	$\lambda_{3\gamma} = \frac{10^2}{10^2-90} = \frac{100}{91} = 9,014.911\text{Å}$ (9,014.911)	$\lambda_{4\gamma} = \frac{11^2}{11^2-121} = \frac{121}{105} = 16,806.523\text{Å}$ (16,806.522)
$\lambda_{1\gamma} = \frac{9^2}{9^2-1} = \frac{81}{80} = 923.1504\text{Å}$ (923.1504)	$\lambda_{2\gamma} = \frac{10^2}{10^2-4} = \frac{100}{96} = 3,797.898\text{Å}$ (3,797.898)	$\lambda_{3\gamma} = \frac{11^2}{11^2-121} = \frac{121}{112} = 8,862.784\text{Å}$ (8,862.784)	$\lambda_{4\gamma} = \frac{12^2}{12^2-144} = \frac{144}{128} = 16,407.194\text{Å}$ (16,407.193)
$\lambda_{1\gamma} = \frac{10^2}{10^2-1} = \frac{100}{99} = 909.9631\text{Å}$ (909.9631)	$\lambda_{2\gamma} = \frac{11^2}{11^2-4} = \frac{121}{117} = 3,770.631\text{Å}$ (3,770.630)	$\lambda_{3\gamma} = \frac{12^2}{12^2-144} = \frac{144}{135} = 8,750.474\text{Å}$ (8,750.473)	$\lambda_{4\gamma} = \frac{13^2}{13^2-169} = \frac{169}{147} = 16,109.315\text{Å}$ (16,109.314)
$\lambda_{1\gamma} = \frac{11^2}{11^2-1} = \frac{121}{120} = 919.3514\text{Å}$ (919.3514)	$\lambda_{2\gamma} = \frac{12^2}{12^2-4} = \frac{144}{140} = 3,750.153\text{Å}$ (3,750.152)	$\lambda_{3\gamma} = \frac{13^2}{13^2-169} = \frac{169}{180} = 8,665.020\text{Å}$ (8,665.019)	$\lambda_{4\gamma} = \frac{14^2}{14^2-196} = \frac{196}{180} = 15,880.544\text{Å}$ (15,880.543)
$\lambda_{1\gamma} = \frac{12^2}{12^2-1} = \frac{144}{143} = 918.1294\text{Å}$ (918.1294)	$\lambda_{2\gamma} = \frac{13^2}{13^2-4} = \frac{169}{165} = 3,734.3684\text{Å}$ (unknown)	$\lambda_{3\gamma} = \frac{14^2}{14^2-196} = \frac{196}{187} = 8,598.393\text{Å}$ (8,598.392)	$\lambda_{4\gamma} = \frac{15^2}{15^2-225} = \frac{225}{159} = 15,700.664\text{Å}$ (unknown)
$\lambda_{1\gamma} = \frac{13^2}{13^2-1} = \frac{169}{168} = 917.1806\text{Å}$ (917.1806)	$\lambda_{2\gamma} = \frac{14^2}{14^2-4} = \frac{196}{192} = 3,721.9389\text{Å}$ (unknown)	$\lambda_{3\gamma} = \frac{15^2}{15^2-225} = \frac{225}{216} = 8,545.384\text{Å}$ (8,545.383)	$\lambda_{4\gamma} = \frac{16^2}{16^2-256} = \frac{256}{240} = 15,556.451\text{Å}$ (unknown)
$\lambda_{1\gamma} = \frac{14^2}{14^2-1} = \frac{196}{195} = 916.4249\text{Å}$ (916.4249)	$\lambda_{2\gamma} = \frac{15^2}{15^2-4} = \frac{225}{221} = 3,711.9716\text{Å}$ (unknown)	$\lambda_{3\gamma} = \frac{16^2}{16^2-256} = \frac{256}{247} = 8,502.4845\text{Å}$ (8,502.483)	$\lambda_{4\gamma} = \frac{17^2}{17^2-289} = \frac{289}{272} = 15,438.923\text{Å}$ (unknown)
$\lambda_{1\gamma} = \frac{15^2}{15^2-1} = \frac{225}{224} = 915.8238\text{Å}$ (915.8238)	$\lambda_{2\gamma} = \frac{16^2}{16^2-4} = \frac{256}{252} = 3,703.8573\text{Å}$ (unknown)	$\lambda_{3\gamma} = \frac{17^2}{17^2-289} = \frac{289}{280} = 8,467.255\text{Å}$ (8,467.254)	$\lambda_{4\gamma} = \frac{18^2}{18^2-324} = \frac{324}{308} = 15,341.792\text{Å}$ (unknown)
$\lambda_{1\gamma} = \frac{16^2}{16^2-1} = \frac{256}{255} = 915.3290\text{Å}$ (915.3290)	$\lambda_{2\gamma} = \frac{17^2}{17^2-4} = \frac{289}{285} = 3,697.1527\text{Å}$ (unknown)	$\lambda_{3\gamma} = \frac{18^2}{18^2-324} = \frac{324}{315} = 8,437.9567\text{Å}$ (8,437.955)	$\lambda_{4\gamma} = \frac{19^2}{19^2-361} = \frac{361}{345} = 15,260.544\text{Å}$ (unknown)
$\lambda_{1\gamma} = \frac{17^2}{17^2-1} = \frac{289}{288} = 914.9192\text{Å}$ (unknown)	$\lambda_{2\gamma} = \frac{18^2}{18^2-4} = \frac{324}{320} = 3,691.5558\text{Å}$ (unknown)	$\lambda_{3\gamma} = \frac{19^2}{19^2-361} = \frac{361}{352} = 8,413.3194\text{Å}$ (unknown)	$\lambda_{4\gamma} = \frac{20^2}{20^2-400} = \frac{400}{384} = 15,191.847\text{Å}$ (unknown)

#6 Orbit 911.51210	#7 Orbit 911.51333	#8 Orbit 911.51366	#9 Orbit 911.51391
$\lambda_{\text{Lyman}} = 22,787.8025\text{Å}$	$\lambda_{\text{Lyman}} = 32,814.463$	$\lambda_{\text{Lyman}} = 44,664.153$	$\lambda_{\text{Lyman}} = 58,336.874$
$\lambda_{1\gamma} = \frac{36}{6^2-1} = \frac{36}{35} = 1,028.571\text{Å}$ (1,028.571)	$\lambda_{1\gamma} = \frac{42}{7^2-1} = \frac{42}{48} = 875.000\text{Å}$ (875.000)	$\lambda_{1\gamma} = \frac{48}{8^2-1} = \frac{48}{63} = 761.904\text{Å}$ (761.904)	$\lambda_{1\gamma} = \frac{54}{9^2-1} = \frac{54}{80} = 675.000\text{Å}$ (675.000)
$\lambda_{1\gamma} = \frac{42}{7^2-1} = \frac{42}{48} = 875.000\text{Å}$ (875.000)	$\lambda_{1\gamma} = \frac{48}{8^2-1} = \frac{48}{63} = 761.904\text{Å}$ (761.904)	$\lambda_{1\gamma} = \frac{54}{9^2-1} = \frac{54}{80} = 675.000\text{Å}$ (675.000)	$\lambda_{1\gamma} = \frac{60}{10^2-1} = \frac{60}{99} = 606.060\text{Å}$ (606.060)
$\lambda_{1\gamma} = \frac{48}{8^2-1} = \frac{48}{63} = 761.904\text{Å}$ (761.904)	$\lambda_{1\gamma} = \frac{54}{9^2-1} = \frac{54}{80} = 675.000\text{Å}$ (675.000)	$\lambda_{1\gamma} = \frac{60}{10^2-1} = \frac{60}{99} = 606.060\text{Å}$ (606.060)	$\lambda_{1\gamma} = \frac{66}{11^2-1} = \frac{66}{120} = 550.000\text{Å}$ (550.000)
$\lambda_{1\gamma} = \frac{54}{9^2-1} = \frac{54}{80} = 675.000\text{Å}$ (675.000)	$\lambda_{1\gamma} = \frac{60}{10^2-1} = \frac{60}{99} = 606.060\text{Å}$ (606.060)	$\lambda_{1\gamma} = \frac{66}{11^2-1} = \frac{66}{120} = 550.000\text{Å}$ (550.000)	$\lambda_{1\gamma} = \frac{72}{12^2-1} = \frac{72}{143} = 503.503\text{Å}$ (503.503)
$\lambda_{1\gamma} = \frac{60}{10^2-1} = \frac{60}{99} = 606.060\text{Å}$ (606.060)	$\lambda_{1\gamma} = \frac{66}{11^2-1} = \frac{66}{120} = 550.000\text{Å}$ (550.000)	$\lambda_{1\gamma} = \frac{72}{12^2-1} = \frac{72}{143} = 503.503\text{Å}$ (503.503)	$\lambda_{1\gamma} = \frac{78}{13^2-1} = \frac{78}{168} = 463.714\text{Å}$ (463.714)
$\lambda_{1\gamma} = \frac{66}{11^2-1} = \frac{66}{120} = 550.000\text{Å}$ (550.000)	$\lambda_{1\gamma} = \frac{72}{12^2-1} = \frac{72}{143} = 503.503\text{Å}$ (503.503)	$\lambda_{1\gamma} = \frac{78}{13^2-1} = \frac{78}{168} = 463.714\text{Å}$ (463.714)	$\lambda_{1\gamma} = \frac{84}{14^2-1} = \frac{84}{195} = 425.638\text{Å}$ (425.638)
$\lambda_{1\gamma} = \frac{72}{12^2-1} = \frac{72}{143} = 503.503\text{Å}$ (503.503)	$\lambda_{1\gamma} = \frac{78}{13^2-1} = \frac{78}{168} = 463.714\text{Å}$ (463.714)	$\lambda_{1\gamma} = \frac{84}{14^2-1} = \frac{84}{195} = 425.638\text{Å}$ (425.638)	$\lambda_{1\gamma} = \frac{90}{15^2-1} = \frac{90}{224} = 401.786\text{Å}$ (401.786)
$\lambda_{1\gamma} = \frac{78}{13^2-1} = \frac{78}{168} = 463.714\text{Å}$ (463.714)	$\lambda_{1\gamma} = \frac{84}{14^2-1} = \frac{84}{195} = 425.638\text{Å}$ (425.638)	$\lambda_{1\gamma} = \frac{90}{15^2-1} = \frac{90}{224} = 401.786\text{Å}$ (401.786)	$\lambda_{1\gamma} = \frac{96}{16^2-1} = \frac{96}{255} = 376.471\text{Å}$ (376.471)
$\lambda_{1\gamma} = \frac{84}{14^2-1} = \frac{84}{195} = 425.638\text{Å}$ (425.638)	$\lambda_{1\gamma} = \frac{90}{15^2-1} = \frac{90}{224} = 401.786\text{Å}$ (401.786)	$\lambda_{1\gamma} = \frac{96}{16^2-1} = \frac{96}{255} = 376.471\text{Å}$ (376.471)	$\lambda_{1\gamma} = \frac{102}{17^2-1} = \frac{102}{288} = 354.167\text{Å}$ (354.167)
$\lambda_{1\gamma} = \frac{90}{15^2-1} = \frac{90}{224} = 401.786\text{Å}$ (401.786)	$\lambda_{1\gamma} = \frac{96}{16^2-1} = \frac{96}{255} = 376.471\text{Å}$ (376.471)	$\lambda_{1\gamma} = \frac{102}{17^2-1} = \frac{102}{288} = 354.167\text{Å}$ (354.167)	$\lambda_{1\gamma} = \frac{108}{18^2-1} = \frac{108}{323} = 337.461\text{Å}$ (337.461)
$\lambda_{1\gamma} = \frac{96}{16^2-1} = \frac{96}{255} = 376.471\text{Å}$ (376.471)	$\lambda_{1\gamma} = \frac{102}{17^2-1} = \frac{102}{288} = 354.167\text{Å}$ (354.167)	$\lambda_{1\gamma} = \frac{108}{18^2-1} = \frac{108}{323} = 337.461\text{Å}$ (337.461)	$\lambda_{1\gamma} = \frac{114}{19^2-1} = \frac{114}{360} = 316.667\text{Å}$ (316.667)
$\lambda_{1\gamma} = \frac{102}{17^2-1} = \frac{102}{288} = 354.167\text{Å}$ (354.167)	$\lambda_{1\gamma} = \frac{108}{18^2-1} = \frac{108}{323} = 337.461\text{Å}$ (337.461)	$\lambda_{1\gamma} = \frac{114}{19^2-1} = \frac{114}{360} = 316.667\text{Å}$ (316.667)	$\lambda_{1\gamma} = \frac{120}{20^2-1} = \frac{120}{399} = 300.752\text{Å}$ (300.752)
$\lambda_{1\gamma} = \frac{108}{18^2-1} = \frac{108}{323} = 337.461\text{Å}$ (337.461)	$\lambda_{1\gamma} = \frac{114}{19^2-1} = \frac{114}{360} = 316.667\text{Å}$ (316.667)	$\lambda_{1\gamma} = \frac{120}{20^2-1} = \frac{120}{399} = 300.752\text{Å}$ (300.752)	$\lambda_{1\gamma} = \frac{126}{21^2-1} = \frac{126}{440} = 286.364\text{Å}$ (286.364)
$\lambda_{1\gamma} = \frac{114}{19^2-1} = \frac{114}{360} = 316.667\text{Å}$ (316.667)	$\lambda_{1\gamma} = \frac{120}{20^2-1} = \frac{120}{399} = 300.752\text{Å}$ (300.752)	$\lambda_{1\gamma} = \frac{126}{21^2-1} = \frac{126}{440} = 286.364\text{Å}$ (286.364)	$\lambda_{1\gamma} = \frac{132}{22^2-1} = \frac{132}{483} = 273.292\text{Å}$ (273.292)
$\lambda_{1\gamma} = \frac{120}{20^2-1} = \frac{120}{399} = 300.752\text{Å}$ (300.752)	$\lambda_{1\gamma} = \frac{126}{21^2-1} = \frac{126}{440} = 286.364\text{Å}$ (286.364)	$\lambda_{1\gamma} = \frac{132}{22^2-1} = \frac{132}{483} = 273.292\text{Å}$ (273.292)	$\lambda_{1\gamma} = \frac{138}{23^2-1} = \frac{138}{528} = 261.364\text{Å}$ (261.364)
$\lambda_{1\gamma} = \frac{126}{21^2-1} = \frac{126}{440} = 286.364\text{Å}$ (286.364)	$\lambda_{1\gamma} = \frac{132}{22^2-1} = \frac{132}{483} = 273.292\text{Å}$ (273.292)	$\lambda_{1\gamma} = \frac{138}{23^2-1} = \frac{138}{528} = 261.364\text{Å}$ (261.364)	$\lambda_{1\gamma} = \frac{144}{24^2-1} = \frac{144}{575} = 250.261\text{Å}$ (250.261)
$\lambda_{1\gamma} = \frac{132}{22^2-1} = \frac{132}{483} = 273.292\text{Å}$ (273.292)	$\lambda_{1\gamma} = \frac{138}{23^2-1} = \frac{138}{528} = 261.364\text{Å}$ (261.364)	$\lambda_{1\gamma} = \frac{144}{24^2-1} = \frac{144}{575} = 250.261\text{Å}$ (250.261)	$\lambda_{1\gamma} = \frac{150}{25^2-1} = \frac{150}{624} = 238.781\text{Å}$ (238.781)
$\lambda_{1\gamma} = \frac{138}{23^2-1} = \frac{138}{528} = 261.364\text{Å}$ (261.364)	$\lambda_{1\gamma} = \frac{144}{24^2-1} = \frac{144}{575} = 250.261\text{Å}$ (250.261)	$\lambda_{1\gamma} = \frac{150}{25^2-1} = \frac{150}{624} = 238.781\text{Å}$ (238.781)	$\lambda_{1\gamma} = \frac{156}{26^2-1} = \frac{156}{675} = 228.148\text{Å}$ (228.148)
$\lambda_{1\gamma} = \frac{144}{24^2-1} = \frac{144}{575} = 250.261\text{Å}$ (250.261)	$\lambda_{1\gamma} = \frac{150}{25^2-1} = \frac{150}{624} = 238.781\text{Å}$ (238.781)	$\lambda_{1\gamma} = \frac{156}{26^2-1} = \frac{156}{675} = 228.148\text{Å}$ (228.148)	$\lambda_{1\gamma} = \frac{162}{27^2-1} = \frac{162}{728} = 219.766\text{Å}$ (219.766)
$\lambda_{1\gamma} = \frac{150}{25^2-1} = \frac{150}{624} = 238.781\text{Å}$ (238.781)	$\lambda_{1\gamma} = \frac{156}{26^2-1} = \frac{156}{675} = 228.148\text{Å}$ (228.148)	$\lambda_{1\gamma} = \frac{162}{27^2-1} = \frac{162}{728} = 219.766\text{Å}$ (219.766)	$\lambda_{1\gamma} = \frac{168}{28^2-1} = \frac{168}{783} = 211.877\text{Å}$ (211.877)
$\lambda_{1\gamma} = \frac{156}{26^2-1} = \frac{156}{675} = 228.148\text{Å}$ (228.148)	$\lambda_{1\gamma} = \frac{162}{27^2-1} = \frac{162}{728} = 219.766\text{Å}$ (219.766)	$\lambda_{1\gamma} = \frac{168}{28^2-1} = \frac{168}{783} = 211.877\text{Å}$ (211.877)	$\lambda_{1\gamma} = \frac{174}{29^2-1} = \frac{174}{840} = 204.762\text{Å}$ (204.762)
$\lambda_{1\gamma} = \frac{162}{27^2-1} = \frac{162}{728} = 219.766\text{Å}$ (219.766)	$\lambda_{1\gamma} = \frac{168}{28^2-1} = \frac{168}{783} = 211.877\text{Å}$ (211.877)	$\lambda_{1\gamma} = \frac{174}{29^2-1} = \frac{174}{840} = 204.762\text{Å}$ (204.762)	$\lambda_{1\gamma} = \frac{180}{30^2-1} = \frac{180}{899} = 199.110\text{Å}$ (199.110)
$\lambda_{1\gamma} = \frac{168}{28^2-1} = \frac{168}{783} = 211.877\text{Å}$ (211.877)	$\lambda_{1\gamma} = \frac{174}{29^2-1} = \frac{174}{840} = 204.762\text{Å}$ (204.762)	$\lambda_{1\gamma} = \frac{180}{30^2-1} = \frac{180}{899} = 199.110\text{Å}$ (199.110)	$\lambda_{1\gamma} = \frac{186}{31^2-1} = \frac{186}{960} = 193.750\text{Å}$ (193.750)
$\lambda_{1\gamma} = \frac{174}{29^2-1} = \frac{174}{840} = 204.762\text{Å}$ (204.762)	$\lambda_{1\gamma} = \frac{180}{30^2-1} = \frac{180}{899} = 199.110\text{Å}$ (199.110)	$\lambda_{1\gamma} = \frac{186}{31^2-1} = \frac{186}{960} = 193.750\text{Å}$ (193.750)	$\lambda_{1\gamma} = \frac{192}{32^2-1} = \frac{192}{1023} = 188.172\text{Å}$ (188.172)
$\lambda_{1\gamma} = \frac{180}{30^2-1} = \frac{180}{899} = 199.110\text{Å}$ (199.110)	$\lambda_{1\gamma} = \frac{186}{31^2-1} = \frac{186}{960} = 193.750\text{Å}$ (193.750)	$\lambda_{1\gamma} = \frac{192}{32^2-1} = \frac{192}{1023} = 188.172\text{Å}$ (188.172)	$\lambda_{1\gamma} = \frac{198}{33^2-1} = \frac{198}{1088} = 182.812\text{Å}$ (182.812)
$\lambda_{1\gamma} = \frac{186}{31^2-1} = \frac{186}{960} = 193.750\text{Å}$ (193.750)	$\lambda_{1\gamma} = \frac{192}{32^2-1} = \frac{192}{1023} = 188.172\text{Å}$ (188.172)	$\lambda_{1\gamma} = \frac{198}{33^2-1} = \frac{198}{1088} = 182.812\text{Å}$ (182.812)	$\lambda_{1\gamma} = \frac{204}{34^2-1} = \frac{204}{1155} = 177.402\text{Å}$ (177.402)
$\lambda_{1\gamma} = \frac{19$			

144 Photon Fractions

Lyman	Balmer	Paschen	Brackett	Pfund	#6 Orbit	#7 Orbit	#8 Orbit	#9 Orbit
$\lambda_{\infty} = \frac{4\pi a_0}{\alpha}$	$2\lambda_{\infty} = \frac{16\pi a_0}{\alpha}$	$3\lambda_{\infty} = \frac{27\pi a_0}{\alpha}$	$4\lambda_{\infty} = \frac{64\pi a_0}{\alpha}$	$5\lambda_{\infty} = \frac{100\pi a_0}{\alpha}$	$6\lambda_{\infty} = \frac{144\pi a_0}{\alpha}$	$7\lambda_{\infty} = \frac{196\pi a_0}{\alpha}$	$8\lambda_{\infty} = \frac{256\pi a_0}{\alpha}$	$9\lambda_{\infty} = \frac{324\pi a_0}{\alpha}$
911.267052Å	3,645.06821Å	8,201.40347Å	14,580.2728Å	22,781.6763Å	32,805.6139Å	44,652.0856Å	58,321.0914Å	73,812.6312Å
$\lambda_{\infty} = \lambda_{\infty} \left(\frac{M_{\odot}}{2M_{\oplus}} + 1\right)$	$2\lambda_{\infty} = 2\lambda_{\infty} \left(\frac{M_{\odot}}{2M_{\oplus}} + 1\right)$	$3\lambda_{\infty} = 3\lambda_{\infty} \left(\frac{M_{\odot}}{2M_{\oplus}} + 1\right)$	$4\lambda_{\infty} = 4\lambda_{\infty} \left(\frac{M_{\odot}}{2M_{\oplus}} + 1\right)$	$5\lambda_{\infty} = 5\lambda_{\infty} \left(\frac{M_{\odot}}{2M_{\oplus}} + 1\right)$	$6\lambda_{\infty} = 6\lambda_{\infty} \left(\frac{M_{\odot}}{2M_{\oplus}} + 1\right)$	$7\lambda_{\infty} = 7\lambda_{\infty} \left(\frac{M_{\odot}}{2M_{\oplus}} + 1\right)$	$8\lambda_{\infty} = 8\lambda_{\infty} \left(\frac{M_{\odot}}{2M_{\oplus}} + 1\right)$	$9\lambda_{\infty} = 9\lambda_{\infty} \left(\frac{M_{\odot}}{2M_{\oplus}} + 1\right)$
$\lambda_{\infty} = 911.76334\text{Å}$ obs (911.75348Å) 1.0000108143 1/1=13.5983175 eV	$2\lambda_{\infty} = 3,646.016\text{Å}$ obs (3,645.982Å) 1.0000216677 1/4=3.3995794 eV	$3\lambda_{\infty} = 8,203.637\text{Å}$ obs (8,203.569Å) 1.0000047997 1/9=1.5109242 eV	$4\lambda_{\infty} = 14,584.243\text{Å}$ obs (14,584.173Å) 1.0000047997 1/16=8.4989484 eV	$5\lambda_{\infty} = 22,787.880\text{Å}$ obs (22,787.803Å) 1.000003379 1/25=5.439327 eV	$6\lambda_{\infty} = 32,814.547\text{Å}$ obs (32,814.463Å) 1.0000025895 1/36=3.7773141 eV	$7\lambda_{\infty} = 44,664.245\text{Å}$ obs (44,664.153Å) 1.0000020598 1/49=2.77516683 eV	$8\lambda_{\infty} = 58,336.972\text{Å}$ obs (58,336.874Å) 1.0000016799 1/64=1.2147311 eV	$9\lambda_{\infty} = 73,832.731\text{Å}$ obs (73,832.627Å) 1.0000014086 1/81=1.6788046 eV
$\lambda_{1/3} = \frac{2^2 - 1}{3} = \frac{3}{3}$	$2\lambda_{1/5} = \frac{3^2 - 4}{5} = \frac{5}{5}$	$3\lambda_{1/7} = \frac{4^2 - 9}{7} = \frac{7}{7}$	$4\lambda_{1/9} = \frac{5^2 - 16}{9} = \frac{9}{9}$	$5\lambda_{1/11} = \frac{6^2 - 25}{11} = \frac{11}{11}$	$6\lambda_{1/13} = \frac{7^2 - 36}{13} = \frac{13}{13}$	$7\lambda_{1/15} = \frac{8^2 - 49}{15} = \frac{15}{15}$	$8\lambda_{1/17} = \frac{9^2 - 64}{17} = \frac{17}{17}$	$9\lambda_{1/19} = \frac{10^2 - 81}{19} = \frac{19}{19}$
$\lambda_{2/5} = \frac{3^2 - 4}{5} = \frac{5}{5}$	$2\lambda_{2/7} = \frac{4^2 - 9}{7} = \frac{7}{7}$	$3\lambda_{2/9} = \frac{5^2 - 16}{9} = \frac{9}{9}$	$4\lambda_{2/11} = \frac{6^2 - 25}{11} = \frac{11}{11}$	$5\lambda_{2/13} = \frac{7^2 - 36}{13} = \frac{13}{13}$	$6\lambda_{2/15} = \frac{8^2 - 49}{15} = \frac{15}{15}$	$7\lambda_{2/17} = \frac{9^2 - 64}{17} = \frac{17}{17}$	$8\lambda_{2/19} = \frac{10^2 - 81}{19} = \frac{19}{19}$	$9\lambda_{2/21} = \frac{11^2 - 121}{21} = \frac{21}{21}$
$\lambda_{3/7} = \frac{4^2 - 9}{7} = \frac{7}{7}$	$2\lambda_{3/9} = \frac{5^2 - 16}{9} = \frac{9}{9}$	$3\lambda_{3/11} = \frac{6^2 - 25}{11} = \frac{11}{11}$	$4\lambda_{3/13} = \frac{7^2 - 36}{13} = \frac{13}{13}$	$5\lambda_{3/15} = \frac{8^2 - 49}{15} = \frac{15}{15}$	$6\lambda_{3/17} = \frac{9^2 - 64}{17} = \frac{17}{17}$	$7\lambda_{3/19} = \frac{10^2 - 81}{19} = \frac{19}{19}$	$8\lambda_{3/21} = \frac{11^2 - 121}{21} = \frac{21}{21}$	$9\lambda_{3/23} = \frac{12^2 - 144}{23} = \frac{23}{23}$
$\lambda_{4/9} = \frac{5^2 - 16}{9} = \frac{9}{9}$	$2\lambda_{4/11} = \frac{6^2 - 25}{11} = \frac{11}{11}$	$3\lambda_{4/13} = \frac{7^2 - 36}{13} = \frac{13}{13}$	$4\lambda_{4/15} = \frac{8^2 - 49}{15} = \frac{15}{15}$	$5\lambda_{4/17} = \frac{9^2 - 64}{17} = \frac{17}{17}$	$6\lambda_{4/19} = \frac{10^2 - 81}{19} = \frac{19}{19}$	$7\lambda_{4/21} = \frac{11^2 - 121}{21} = \frac{21}{21}$	$8\lambda_{4/23} = \frac{12^2 - 144}{23} = \frac{23}{23}$	$9\lambda_{4/25} = \frac{13^2 - 169}{25} = \frac{25}{25}$
$\lambda_{5/11} = \frac{6^2 - 25}{11} = \frac{11}{11}$	$2\lambda_{5/13} = \frac{7^2 - 36}{13} = \frac{13}{13}$	$3\lambda_{5/15} = \frac{8^2 - 49}{15} = \frac{15}{15}$	$4\lambda_{5/17} = \frac{9^2 - 64}{17} = \frac{17}{17}$	$5\lambda_{5/19} = \frac{10^2 - 81}{19} = \frac{19}{19}$	$6\lambda_{5/21} = \frac{11^2 - 121}{21} = \frac{21}{21}$	$7\lambda_{5/23} = \frac{12^2 - 144}{23} = \frac{23}{23}$	$8\lambda_{5/25} = \frac{13^2 - 169}{25} = \frac{25}{25}$	$9\lambda_{5/27} = \frac{14^2 - 196}{27} = \frac{27}{27}$
$\lambda_{6/13} = \frac{7^2 - 36}{13} = \frac{13}{13}$	$2\lambda_{6/15} = \frac{8^2 - 49}{15} = \frac{15}{15}$	$3\lambda_{6/17} = \frac{9^2 - 64}{17} = \frac{17}{17}$	$4\lambda_{6/19} = \frac{10^2 - 81}{19} = \frac{19}{19}$	$5\lambda_{6/21} = \frac{11^2 - 121}{21} = \frac{21}{21}$	$6\lambda_{6/23} = \frac{12^2 - 144}{23} = \frac{23}{23}$	$7\lambda_{6/25} = \frac{13^2 - 169}{25} = \frac{25}{25}$	$8\lambda_{6/27} = \frac{14^2 - 196}{27} = \frac{27}{27}$	$9\lambda_{6/29} = \frac{15^2 - 225}{29} = \frac{29}{29}$
$\lambda_{7/15} = \frac{8^2 - 49}{15} = \frac{15}{15}$	$2\lambda_{7/17} = \frac{9^2 - 64}{17} = \frac{17}{17}$	$3\lambda_{7/19} = \frac{10^2 - 81}{19} = \frac{19}{19}$	$4\lambda_{7/21} = \frac{11^2 - 121}{21} = \frac{21}{21}$	$5\lambda_{7/23} = \frac{12^2 - 144}{23} = \frac{23}{23}$	$6\lambda_{7/25} = \frac{13^2 - 169}{25} = \frac{25}{25}$	$7\lambda_{7/27} = \frac{14^2 - 196}{27} = \frac{27}{27}$	$8\lambda_{7/29} = \frac{15^2 - 225}{29} = \frac{29}{29}$	$9\lambda_{7/31} = \frac{16^2 - 256}{31} = \frac{31}{31}$
$\lambda_{8/17} = \frac{9^2 - 64}{17} = \frac{17}{17}$	$2\lambda_{8/19} = \frac{10^2 - 81}{19} = \frac{19}{19}$	$3\lambda_{8/21} = \frac{11^2 - 121}{21} = \frac{21}{21}$	$4\lambda_{8/23} = \frac{12^2 - 144}{23} = \frac{23}{23}$	$5\lambda_{8/25} = \frac{13^2 - 169}{25} = \frac{25}{25}$	$6\lambda_{8/27} = \frac{14^2 - 196}{27} = \frac{27}{27}$	$7\lambda_{8/29} = \frac{15^2 - 225}{29} = \frac{29}{29}$	$8\lambda_{8/31} = \frac{16^2 - 256}{31} = \frac{31}{31}$	$9\lambda_{8/33} = \frac{17^2 - 289}{33} = \frac{33}{33}$
$\lambda_{9/19} = \frac{10^2 - 81}{19} = \frac{19}{19}$	$2\lambda_{9/21} = \frac{11^2 - 121}{21} = \frac{21}{21}$	$3\lambda_{9/23} = \frac{12^2 - 144}{23} = \frac{23}{23}$	$4\lambda_{9/25} = \frac{13^2 - 169}{25} = \frac{25}{25}$	$5\lambda_{9/27} = \frac{14^2 - 196}{27} = \frac{27}{27}$	$6\lambda_{9/29} = \frac{15^2 - 225}{29} = \frac{29}{29}$	$7\lambda_{9/31} = \frac{16^2 - 256}{31} = \frac{31}{31}$	$8\lambda_{9/33} = \frac{17^2 - 289}{33} = \frac{33}{33}$	$9\lambda_{9/35} = \frac{18^2 - 324}{35} = \frac{35}{35}$
$\lambda_{10/21} = \frac{11^2 - 121}{21} = \frac{21}{21}$	$2\lambda_{10/23} = \frac{12^2 - 144}{23} = \frac{23}{23}$	$3\lambda_{10/25} = \frac{13^2 - 169}{25} = \frac{25}{25}$	$4\lambda_{10/27} = \frac{14^2 - 196}{27} = \frac{27}{27}$	$5\lambda_{10/29} = \frac{15^2 - 225}{29} = \frac{29}{29}$	$6\lambda_{10/31} = \frac{16^2 - 256}{31} = \frac{31}{31}$	$7\lambda_{10/33} = \frac{17^2 - 289}{33} = \frac{33}{33}$	$8\lambda_{10/35} = \frac{18^2 - 324}{35} = \frac{35}{35}$	$9\lambda_{10/37} = \frac{19^2 - 361}{37} = \frac{37}{37}$
$\lambda_{11/23} = \frac{12^2 - 144}{23} = \frac{23}{23}$	$2\lambda_{11/25} = \frac{13^2 - 169}{25} = \frac{25}{25}$	$3\lambda_{11/27} = \frac{14^2 - 196}{27} = \frac{27}{27}$	$4\lambda_{11/29} = \frac{15^2 - 225}{29} = \frac{29}{29}$	$5\lambda_{11/31} = \frac{16^2 - 256}{31} = \frac{31}{31}$	$6\lambda_{11/33} = \frac{17^2 - 289}{33} = \frac{33}{33}$	$7\lambda_{11/35} = \frac{18^2 - 324}{35} = \frac{35}{35}$	$8\lambda_{11/37} = \frac{19^2 - 361}{37} = \frac{37}{37}$	$9\lambda_{11/39} = \frac{20^2 - 400}{39} = \frac{39}{39}$
$\lambda_{12/25} = \frac{13^2 - 169}{25} = \frac{25}{25}$	$2\lambda_{12/27} = \frac{14^2 - 196}{27} = \frac{27}{27}$	$3\lambda_{12/29} = \frac{15^2 - 225}{29} = \frac{29}{29}$	$4\lambda_{12/31} = \frac{16^2 - 256}{31} = \frac{31}{31}$	$5\lambda_{12/33} = \frac{17^2 - 289}{33} = \frac{33}{33}$	$6\lambda_{12/35} = \frac{18^2 - 324}{35} = \frac{35}{35}$	$7\lambda_{12/37} = \frac{19^2 - 361}{37} = \frac{37}{37}$	$8\lambda_{12/39} = \frac{20^2 - 400}{39} = \frac{39}{39}$	$9\lambda_{12/41} = \frac{21^2 - 441}{41} = \frac{41}{41}$
$\lambda_{13/27} = \frac{14^2 - 196}{27} = \frac{27}{27}$	$2\lambda_{13/29} = \frac{15^2 - 225}{29} = \frac{29}{29}$	$3\lambda_{13/31} = \frac{16^2 - 256}{31} = \frac{31}{31}$	$4\lambda_{13/33} = \frac{17^2 - 289}{33} = \frac{33}{33}$	$5\lambda_{13/35} = \frac{18^2 - 324}{35} = \frac{35}{35}$	$6\lambda_{13/37} = \frac{19^2 - 361}{37} = \frac{37}{37}$	$7\lambda_{13/39} = \frac{20^2 - 400}{39} = \frac{39}{39}$	$8\lambda_{13/41} = \frac{21^2 - 441}{41} = \frac{41}{41}$	$9\lambda_{13/43} = \frac{22^2 - 484}{43} = \frac{43}{43}$
$\lambda_{14/29} = \frac{15^2 - 225}{29} = \frac{29}{29}$	$2\lambda_{14/31} = \frac{16^2 - 256}{31} = \frac{31}{31}$	$3\lambda_{14/33} = \frac{17^2 - 289}{33} = \frac{33}{33}$	$4\lambda_{14/35} = \frac{18^2 - 324}{35} = \frac{35}{35}$	$5\lambda_{14/37} = \frac{19^2 - 361}{37} = \frac{37}{37}$	$6\lambda_{14/39} = \frac{20^2 - 400}{39} = \frac{39}{39}$	$7\lambda_{14/41} = \frac{21^2 - 441}{41} = \frac{41}{41}$	$8\lambda_{14/43} = \frac{22^2 - 484}{43} = \frac{43}{43}$	$9\lambda_{14/45} = \frac{23^2 - 529}{45} = \frac{45}{45}$
$\lambda_{15/31} = \frac{16^2 - 256}{31} = \frac{31}{31}$	$2\lambda_{15/33} = \frac{17^2 - 289}{33} = \frac{33}{33}$	$3\lambda_{15/35} = \frac{18^2 - 324}{35} = \frac{35}{35}$	$4\lambda_{15/37} = \frac{19^2 - 361}{37} = \frac{37}{37}$	$5\lambda_{15/39} = \frac{20^2 - 400}{39} = \frac{39}{39}$	$6\lambda_{15/41} = \frac{21^2 - 441}{41} = \frac{41}{41}$	$7\lambda_{15/43} = \frac{22^2 - 484}{43} = \frac{43}{43}$	$8\lambda_{15/45} = \frac{23^2 - 529}{45} = \frac{45}{45}$	$9\lambda_{15/47} = \frac{24^2 - 576}{47} = \frac{47}{47}$
$\lambda_{16/33} = \frac{17^2 - 289}{33} = \frac{33}{33}$	$2\lambda_{16/35} = \frac{18^2 - 324}{35} = \frac{35}{35}$	$3\lambda_{16/37} = \frac{19^2 - 361}{37} = \frac{37}{37}$	$4\lambda_{16/39} = \frac{20^2 - 400}{39} = \frac{39}{39}$	$5\lambda_{16/41} = \frac{21^2 - 441}{41} = \frac{41}{41}$	$6\lambda_{16/43} = \frac{22^2 - 484}{43} = \frac{43}{43}$	$7\lambda_{16/45} = \frac{23^2 - 529}{45} = \frac{45}{45}$	$8\lambda_{16/47} = \frac{24^2 - 576}{47} = \frac{47}{47}$	$9\lambda_{16/49} = \frac{25^2 - 625}{49} = \frac{49}{49}$

$$\lambda_{\infty} = \frac{4\pi a_0}{\alpha} = 9.11267052 \times 10^8 \text{ m} \quad \frac{M_{\odot}}{M_{\oplus}} = 0.000544617 \quad \left(\frac{M_{\odot}}{2M_{\oplus}} + 1\right) = 1.0002723085 \quad \frac{M_{\oplus}}{M_{\odot}} = 0.0002661124 \quad \frac{\lambda_{\infty}}{M_{\oplus}} = 0.00000014492933$$

$$\lambda_{\infty} = \text{photon mass} = 13.5983175 \text{ eV} \\ M_{\oplus} = \text{electron mass} = 510.99906 \text{ eV} \\ M_{\oplus} = \text{proton mass} = 938.272.310 \text{ eV}$$

144 Photon Fractions

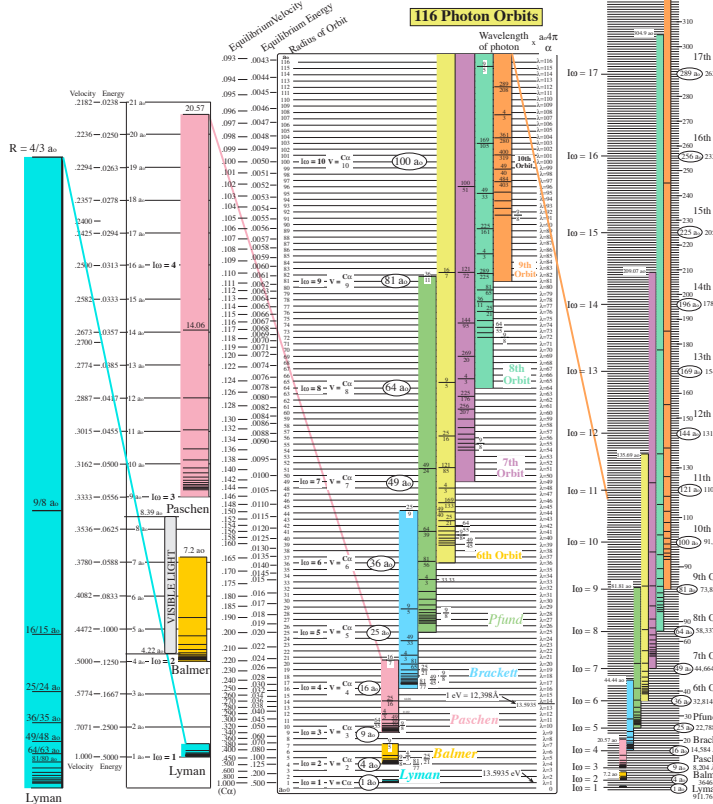
In the chart 144 Photon Fractions, the first 16 fractions of the first 9 of hydrogen's radiation orbits are shown. In the Lyman orbit, the photons have wavelengths of 4/3, 9/8, 16/15, 25/24, 36/35, etc. times λ_{∞} . In each fraction the numerator is the square of consecutive whole numbers and the denominator is the square of the same number minus the orbit number. In the Balmer orbit, the photons have wavelengths of 9/5, 16/12, 25/21, 36/32, etc. times λ_{∞} ($\lambda_{\text{Ba}} \lambda_{\infty} = 4 \lambda_{\text{Ly}} \lambda_{\infty} = 3,645.982\text{Å}$). The same pattern of fraction building continues through all successive orbits so that each photon that a hydrogen atom can produce has a wavelength that is a whole fraction of λ_{∞} with the numerator of all fractions being the square of a whole number.

Each orbit above the Lyman orbit has the same fractions as the Lyman photons in addition to new fractions for each orbit. For example, every other Balmer photon has a Lyman fraction while the rest begin in the Balmer orbit and then repeat in every other orbit above it. Every third Paschen photon has a Lyman fraction with the rest appearing first in the Paschen orbit and then repeating in every third orbit above. This same pattern continues through all orbits.

Equilibrium Orbits of the first 9 series of Hydrogen Photons

This drawing depicts scale models the electron equilibrium orbits with the 144 photons that make up the of the first 16 photons in each of hydrogen's first 9 emission series. They are presented on four different levels of scale. The first shows the Lyman series photons over a range of just 1/3 of a Bohr Radius a_0 . The second shows the Lyman, Balmer, and Paschen series within their range of $21a_0$. The third goes to $116a_0$, and the fourth contains the spectrum of all nine series and extends to the radius of $426a_0$. The radius (R), velocity (V), energy (E), angular momentum ($I\omega$) and Photon wavelength (λ) of these orbits is determined by the series of equations below.

An electron orbiting at any position on this scale is stable and will not produce a photon. A balance exists between the charge energy accelerating it inward and the centrifugal force decelerating it outward.



The Hydrogen Rules of Photon Creation

When an electron approaches a proton with a relative velocity of less than $C\alpha$ they can couple together to form a hydrogen atom and then emit a photon in the process of moving into an equilibrium orbit. The particular wavelength of the photon produced by this union is determined by the electron's initial velocity V and the distance R of its trajectory from the proton. This initial electron orbit has an angular momentum of $I\omega = VR$.

1. All photons have exactly one unit of **angular momentum** $I\omega = 1$.
2. Any electron that has a **velocity of less than** $V = C\alpha$ and an angular momentum greater than $I\omega = 2$ will couple to a proton, emit a photon and form a stable equilibrium orbit. The photon produced by any particular random coupling is determined by the relationship between these two values.
3. If the electron has an **angular momentum of between** $I\omega = 2$ and $I\omega = 3$ it can only produce a #1 Lyman photon. If it is between $I\omega = 3$ and $I\omega = 4$, it can produce either a #1 Balmer photon or a #2 Lyman photon. If it is between $I\omega = 4$ and $I\omega = 5$ it can produce a #1 Paschen, a #2 Balmer or a #3 Lyman photon.
4. If the electron has an initial **velocity of between** $V = 1.0$ and $V = .5$ it will produce an a Lyman series photon. If its velocity is between $V = .5$ and $V = .3333$ it will produce one of the Balmer photons and if it is between $V = .33333$ and $V = .25$ a Paschen photon will be emitted.
5. The spectrum of each emission series contains a potentially infinite number of lines that merge with an equilibrium orbit that has an integer quantity of angular momentum. $I\omega = 1, I\omega = 2, I\omega = 3, I\omega = 4, I\omega = 5$, etc. These are called **square orbits** because their radii are the square of an integer number of Bohr radii. $R = 1 a_0, 4 a_0, 9 a_0, 16 a_0, 25 a_0$, etc.
6. An electron's initial velocity and angular momentum determine which particular photon will be emitted. As an electron couples to a proton, the charge energy accelerates it to a smaller orbit with more velocity but its angular momentum remains constant. The electron will move down to the first square orbit that has an equilibrium velocity greater than the electron's initial coupling velocity and an

angular momentum that is one or more units less than that of the electron. If the electron's angular momentum is between one and two units greater than that of the square orbit, a #1 photon from that series will be emitted. If its angular momentum is between two and three units greater than that of the square orbit, then a #2 photon from the series will be emitted. The series number of the emitted photon is determined by subtracting the square orbit's equilibrium angular momentum from the electron's angular momentum. For example, an electron that drops to the 3rd square orbit (Paschen series) with an angular momentum of $I\omega=8.3$ will emit a #5 Paschen photon ($8.3-3=5.3=\#5$ photon).

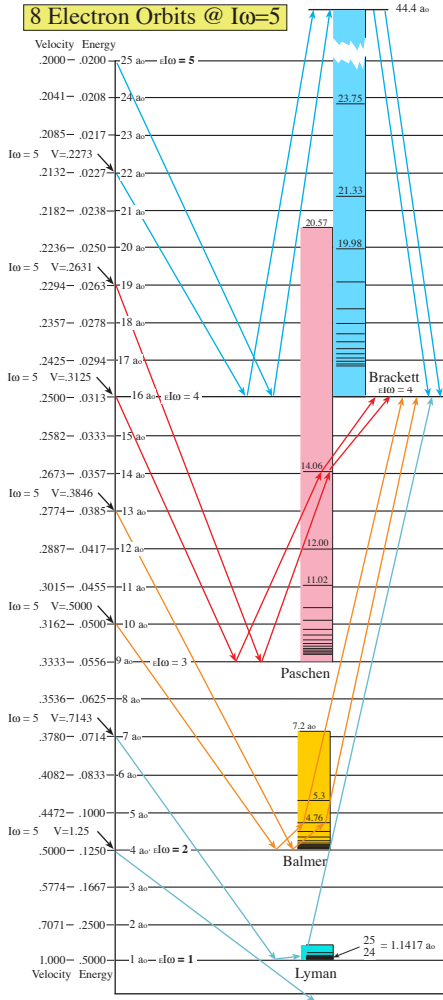
7. After giving up one unit of angular momentum to the emitted photon, the electron moves to an equilibrium orbit that is determined by its remaining angular momentum. The electron in the above example with an angular momentum of $I\omega=8.3$ would emit a #5 Paschen photon and then find its equilibrium at radius = $53.29a_0$ where the equilibrium angular momentum is $I\omega=7.3$. The electron will remain in this stable orbit until its angular momentum is altered either by the absorption of a photon or by a collision with another atom or particle.

To **calculate a photon's wavelength and energy**, take the equilibrium energy of the first square orbit with less angular momentum than the electron and then subtract it from the equilibrium energy of the first square orbit with more velocity than the electron. The remaining energy **E** is used in emitting a photon that has a wavelength of $\lambda = 2\pi/E\alpha$. For example, if a random electron with a velocity of $.04C\alpha$ couples to a proton at a radius of $207.5a_0$ it will have an angular momentum of $I\omega=8.3$. The equilibrium energy of the 8th square orbit minus the equilibrium energy of the 3rd square orbit (Paschen) equals the energy of the #5 Paschen photon ($.0556-.0078=.0478 M_e C^2 \alpha^2/2$).

Random Electron orbits

To better understand the relationship between the electron and proton in the production of photons, we will examine four different groups of random electron orbits that share a common parameter. In the first group, each of 8 electrons has an angular momentum of $I\omega= 5 YC/2\pi$. In the second group of 9 electrons, each has a velocity of $.3 C\alpha$. In the third group, each of 19 electrons has the same initial orbital radius of $100a_0$. In the fourth group, 6 electrons with widely different initial orbits produce both identical and nearly identical photons from five different photon emission series.

8 Electron Orbits @ $l\omega=5$



8 Electron Orbits @ $l\omega=5$

As an example of how specific photons are produced, we will first consider 8 different electrons that are moving at different velocities but make their initial contact with the proton at a radius where their angular momentum is exactly $l\omega=5$.

The initial electron orbit's angular momentum is determined by the trajectory of the electron's velocity relative to the proton. The initial radius is the closest point on the electron's trajectory to the proton. Angular momentum is not an intrinsic quantity to either the electron or proton but is rather the spatial relationship between the random coupling of the two particles.

As they couple, the electron is accelerated out of its initial intrinsic orbit and down into a smaller orbit. The orbit's $l\omega$ remains constant through this proportional increase in velocity and decrease in radius. While the electric charge can increase the electron's velocity and energy, the atom's angular momentum can only be reduced by emitting of a photon with exactly one unit of $l\omega=1$.

The electron cannot form a stable equilibrium orbit until it first emits a photon that removes one unit of angular momentum. Both the electron's angular momentum and

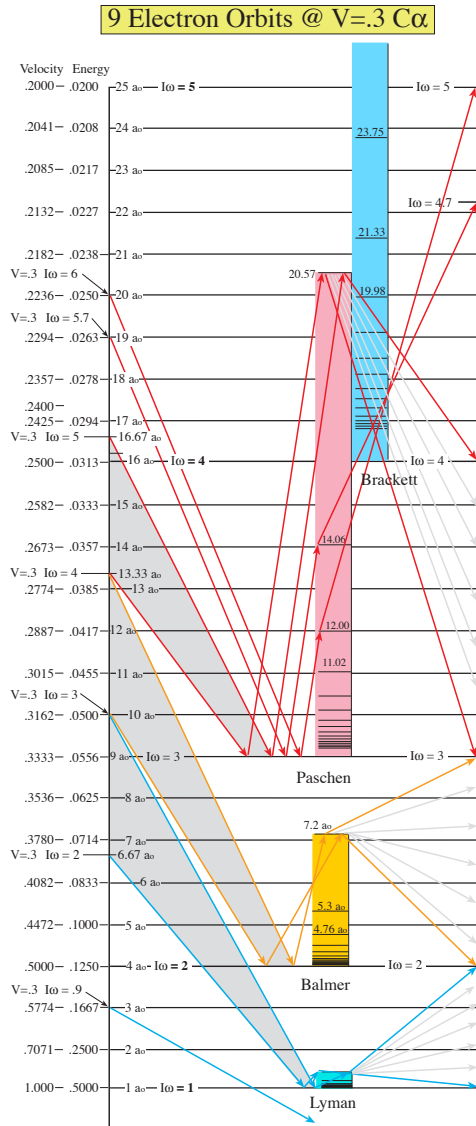
initial velocity combine to determine which photon will be emitted when an atom is formed. An electron with an angular momentum of $l\omega=5$ can only emit photons from the Brackett, Paschen, Balmer, and Lyman series. Since each line in a photon series represents a different whole integer of angular momentum, #1 photons are emitted from the Brackett, #2 photons from the Paschen, #3 from the Balmer and #4 from the Lyman series.

After the photons are emitted all of the electrons in this example will have an angular momentum of $l\omega=4$ and move into an equilibrium orbit of 16a₀.

9 Electron Orbits @ $V=.3C\alpha$

An electron with a given velocity will produce different photons depending on its distance from the proton's center. For example, an electron moving at $.3C\alpha$ at a distance greater than $13.333a_0$ from the proton will have an angular momentum greater than $I\omega=4$ $YC/2\pi$ and will emit a photon from the Paschen series. If it is at a distance of between $13.333a_0$ and $10a_0$ it will have an angular momentum of between $I\omega=3$ and $I\omega=4$ and will emit the #1 photon in the Balmer series. If it is at a distance of between $10a_0$ and $6.67a_0$ it will emit the #2 photon in the Lyman series. If it is at a distance of less than $6.66a_0$ it will have an angular momentum of less than $I\omega=2$ and will not be able to emit a photon because it needs one unit of angular momentum for the photon and a minimum of one unit for the ground state equilibrium orbit. In this case the electron accelerates toward the proton to a velocity of greater than $C\alpha$ and "tunnels through" the proton without emitting a photon or forming a hydrogen atom.

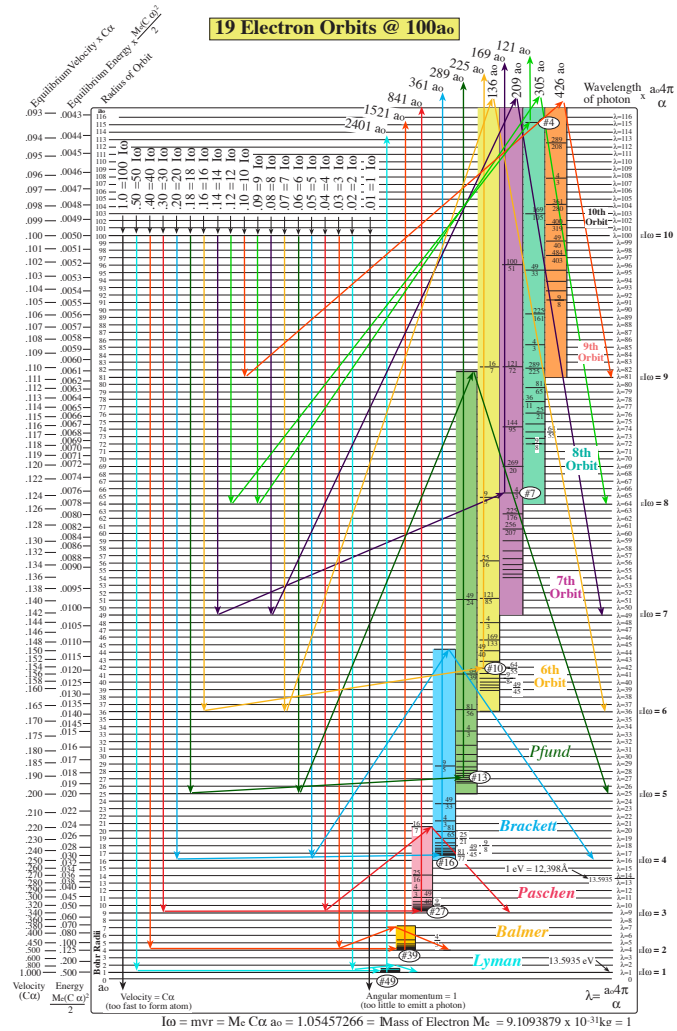
After emitting a photon with one unit of angular momentum, an electron moves into an equilibrium orbit with a radius determined by its remaining angular momentum $R=(I\omega)^2$. For example, if its initial $I\omega=5.7$ it will emit a photon and then move to radius of $R=(5.7-1)^2=22.09a_0$. It remains in this stable orbit until it either absorbs a photon or its angular momentum is changed by the collision with another atom.

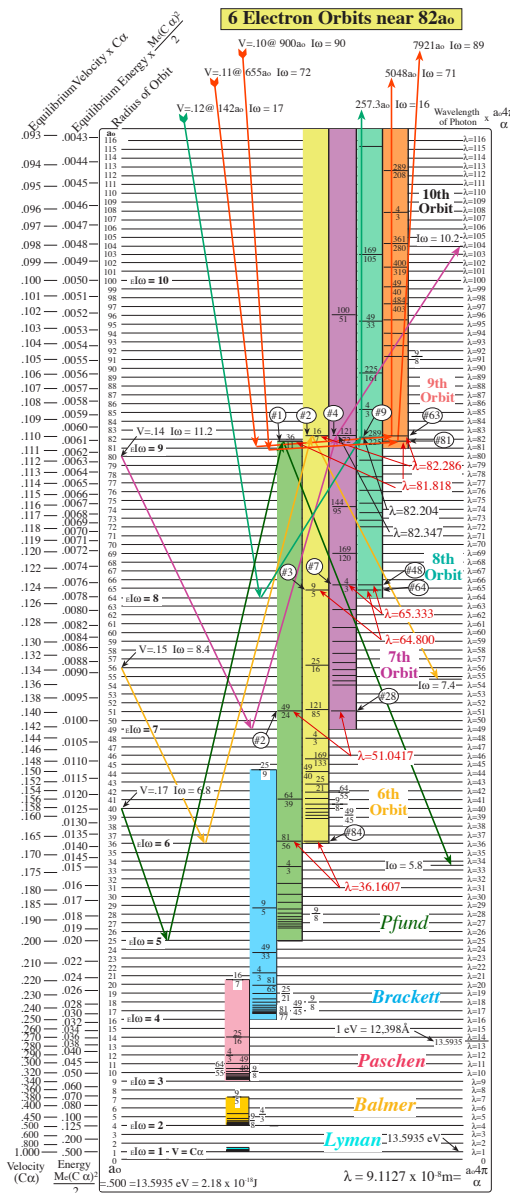


19 Electron Orbits @ 100a₀

In this illustration, nineteen electrons with different velocities are shown at an initial intrinsic orbit of 100a₀. Their velocities range from 1.0 to .01 Cα and their angular momentum varies from Iω=100 to Iω=1.

The first photon with a velocity of Cα has too much energy to form an atom and passes by the proton without coupling to it. The next 8 electrons with velocities from .5 to .12 Cα emit photons that are near the intrinsic orbit of each photon series. The next 9 electrons with velocities from .10 to .02 Cα emit photons that are the #1 photons for each series. The last electron, with V=.01 has too little angular momentum to form a photon. The charge energy accelerates it towards the proton but it passes by without interacting.





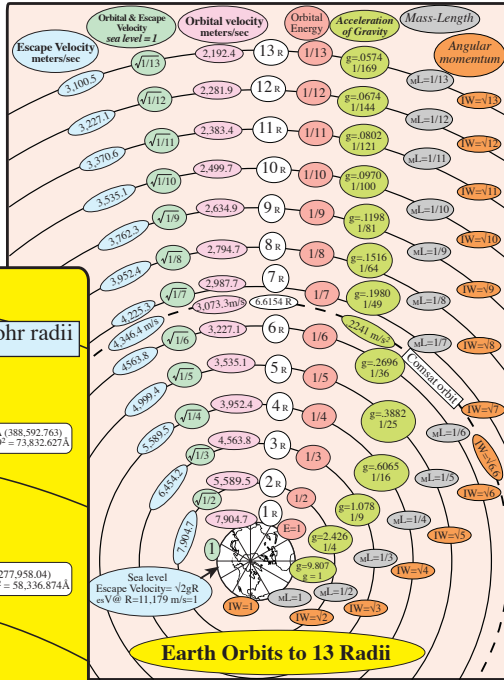
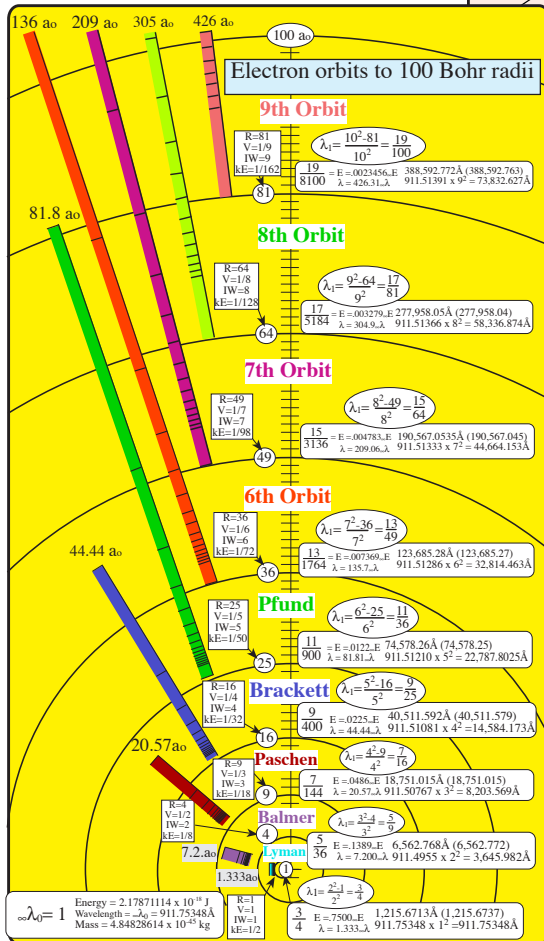
6 Electron Orbits near 82a,

In this illustration, six electrons with greatly different angular momentum and initial orbits are shown that produce identical and nearly identical photons from five different series of photons. Of the 144 photons (the first 16 of each series) initially shown in this series of drawings, all have different wavelengths. However, beginning with the Pfund series they begin to produce some photons that have identical wavelengths with photons in other series. For example, the #1 photon in the Pfund series has an identical wavelength ($\lambda=81.818$) with the #81 photon in the 9th Orbit series. Also, the #2 Pfund photon is the same as the #28 photon in 7th Orbit series and the #4 Pfund photon is the same as the #84 photon in the 6th Orbit series. Additionally, the #2 and #3 6th Orbit photons are identical to the #63 9th Orbit photon and the #48 8th Orbit photon respectively. Finally, the #7 7th Orbit photon is the same as the # 48 photon in the 8th Orbit series.

These six are the only duplicate sets of photons to occur within the first 9 series of spectral lines. I am not sure that these duplicate photons have any real significance, but since I discovered them somewhat unexpectedly, I felt that I should include them in this explanation of the radiation of the hydrogen atom.

Electron vs Earth Orbits

In these drawings, some circular orbits of satellites around the earth are compared with the electron orbits within the hydrogen atom. In all cases equilibrium orbits are shown in which the centripetal acceleration is equal to the gravity or electrical force pulling the satellite or electron toward the center.



Both illustrations are drawn to the scales of the earth and the Bohr radius. Despite the great difference in size of approximately 20 orders of magnitude these orbits are identical in their mathematical descriptions.