Below the relativistic calculation of the energy levels of the hydrogen atom, viewed from the core (the proton). m_e (mass electron) is equal to the reduced mass for a correct calculation.

Now consider the bound system of the electron with the proton (hydrogen atom). Energy shells are formed by the requirement that the wave generated by the electron fits a whole number of times the wavelength on the circumference of the trajectory. The wavelength is given by:
$\lambda = h/p$ where p is the momentum. For a circular orbit the following applies: $2 \pi .r = n. \lambda$, where n is the main quantum number. Combining both formulas gives:
$2\pi.r = n.\lambda = n.h/p = n.h/(m_e.v) \rightarrow m_e.v = n.h/(2\pi.r)$ (2)

The following applies to the circular movement (balance of forces):

$m_e.v^2/r = e^2/(4\pi\varepsilon_0.r^2) \rightarrow m_e.v^2 = e^2/(4\pi\varepsilon_0.r)$ (3)

Now divide formula 3 by 2:

$v = (e^2/(2\varepsilon_0.h)).1/n$ (4)

Energy conservation (relativistic) gives: $E = E_{kin+rust} + E_{pot.} = m_e.c^2 - e^2/(4\pi.\varepsilon_0.r) = m_e.c^2 - m_e.v^2$
$= m_e.(c^2 - v^2) = m_0.c/(\checkmark(c^2 - v^2)*(c^2 - v^2) = m_0.c.\checkmark(c^2 - v^2)$

So for the energy of an electron in orbit around the proton I get:

$E = m_0.c.\checkmark(c^2 - v^2)$ (5) ,

It is seen that the energy is always positive because of the root form. Theoretically, the energy could go to zero if v approached the speed of light. The requirement that the trajectory circumference must be a whole number of times the generated wavelength prevents this.
The series development of $\checkmark(c^2 - x^2)$ is as follows:

$$\sqrt{c^2} - \frac{x^2}{2\sqrt{c^2}} - \frac{\sqrt{c^2}\,x^4}{8c^4} - \frac{\sqrt{c^2}\,x^6}{16c^6} - \frac{5\sqrt{c^2}\,x^8}{128c^8} + O(x^9)$$

(Taylor series)

Filled in (5): $E = m_0.c^2 - \frac{1}{2}m_0.v^2 - \frac{1}{8}m_0.v^4/c^2 - 1/16m_0.v^6/c^4 - 5/128.m_0.v^8/c^6$ - etc.

Now I substitute formula 4 in formula 5 and I get:

$E = m_0.c.(c^2 - e^4/(2\varepsilon_0.h)^2)*1/n^2)^{1/2}$

Now I make a series development again using formula 4:

$E = m_0.c^2 - \frac{1}{2}m_0.e^4/(2\varepsilon_0.h)^2*1/n^2$ - etc. $= m_0.c^2 - m_0.e^4/8(\varepsilon_0.h)^2*1/n^2$ - etc.

In a circular orbit, the energy is therefore purely dependent on the speed associated with the main quantum number (for a circular orbit, the absolute value of the potential energy is twice as large as the kinetic energy). So:

$v = (e^2/(2\varepsilon_0.h)).1/n$ en $E = m_0.c.\checkmark(c^2 - v^2)$

This is an important result. It appears that the total energy in each shell is constant and only depends on n. This also applies to elliptical orbits, also for these orbits the total energy is E (E_{rust} + E_{kin} + E_{pot}), constant (after all, no energy is emitted or absorbed). The orbital energy has been relativically calculated here and it appears that the ground state is reached for the largest possible electron speed at a value for n = 1.
Thereby the orbit energy becomes less and less when one goes from higher n to lower n while transmitting a photon. That is because the potential energy is so much greater than the kinetic energy and the potential energy is negative (attracting force, with a repelling force the potential energy is positive (this will play a role with atoms with several electrons, they repel each other))!
In summary: a bound electron moves in a trajectory with constant energy. The ground state is that state for which n = 1, and that also means that the orbit circumference is then 1 times the wavelength of the wave generated by the electron in the vacuum (this is in the vacuum energy space) . The electron follows the trajectory of the wave (after all, the wave moves at the speed of light). This view therefore implies that charge polarizes the vacuum, such that the wave follows a trajectory of constant energy, depending on the start conditions (after the photon is emitted).
This condition naturally also applies to molecules. See the example of the H_2 molecule.

The corresponding radius follows from formula 2:

$r = n^2.(h^2.\varepsilon_0).(\pi.e^2.m_0.c)^{-1}.\checkmark(c^2 - v^2)$

Where r is therefore approximately proportional to n^2. $v^2$is after all also dependent on n. Only if v << c, then the following applies:

$r = n^2.(h^2.\varepsilon_0)/(\pi.e^2.m_0)$

The momentum p is related to the generated wavelength through the relation $p = h/\lambda$. In a circle movement the speed is constant and therefore also the wavelength. The generated wave moves at the speed of light and catches up with the electron at a given moment, after which the wave is reflected at the back of the electron and then returns to the approaching electron. O ecause there are an integer number of the wavelength, the wave goes out upon arrival. The wave has traveled exactly twice the wavelength and then goes out. The front of the electron is then actually a kind of node.
This is an important result because it causes the electron can continue his movement undisturbed without being hindered by oncoming waves.
The same kind of reasoning applies to elliptical orbits , the only condition being that the orbit perimeter must be a whole number of times the wavelength.
It is known that a maximum of 2 electrons can be in orbit with opposite spins. The opposite spins ensure that the 2 electrons are driven apart together with the repulsive electrical charges. They will move at a orbit distance of ½λ as the outgoing wave of the posterior electron is reflected on the previous electron and then goes out at the front of the posterior electron (for n = 1) . The wave has traveled exactly 1 time the wavelength.
The electron then moves in an orbit without golf trill provided on the front.

This perfectly explains why there can only be 2 electrons per orbit at a mutual distance, via the orbit, of a ½λ, stabilized via the opposite spins and repulsive mutual charges.

Also remember that the main quantum number only indicates that a shell contains electrons for which it holds that the orbit circumference is a whole number of times the generated wavelength. So:

Orbit circumference = n.λ

This also means that each sub-shell does not have the same wavelength per shell ! The circle and elliptical paths each have their own wavelength! For a circle, the wavelength is the same at any time during a cycle, this does not apply to an ellipse, but the phases of a wave are opposite in half an elliptical orbit and then extinguish each other. In an elliptical orbit, both electrons are then at a orbit distance of half a circumference. With an elliptical orbit there is then a wave package (there are beats due to the non-constant web speed) that has a basic wave frequency and extinguishes itself at the electron. The electron then moves at a point that has a vibration deviation from zero (a node) .
This is important with a single bond (2 electrons in the common roller coaster) but also with a double bond (4 electrons in a common roller coaster) and a triple bond (6 electrons in a common roller coaster). The mutual distances are then equal to a ½λ.
The wavelength associated with this depends on the shell to which the electrons of the individual atoms belong. For carbon this is n = 2 and the double bond, for example, ensures that the electrons have a higher speed, are closer to the 2 nuclei and therefore the wavelength will be smaller. However, the total energy has increased due to the positive potential energy of the electrons themselves! Reason why there is so much energy in a double and triple bond.
See for this the hydrogen molecule that will be treated separately.
See also Figure 1 of the hydrogen molecule for clarification of the above.

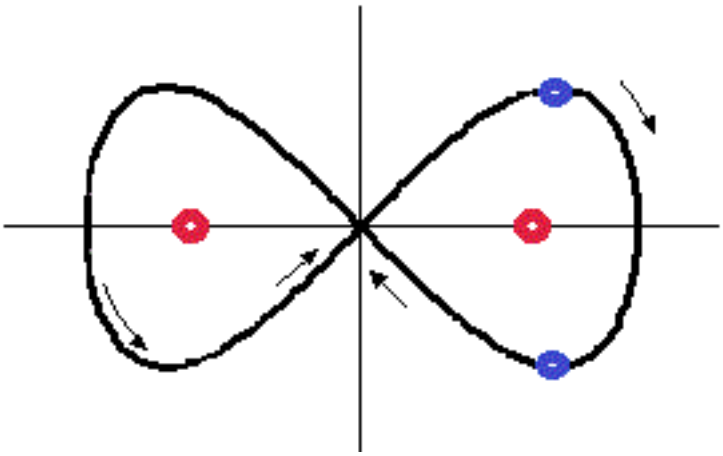

Figure 1, model hydrogen molecule.

Here the orbit circumference is 2λ and the shortest mutual distance is ½λ and largest mutual distance 3/2 λ. Reflected waves travel, respectively, than a total of a distance of λ and 3 λ.
It is clear that the electron pair provides the bond wherever they are in the orbit.
With a double bond, the 2nd electron pair is in the other loop, with the 4 electrons separated from each other at a mutual distance of ½ λ, at a trajectory circumference of 2λ.
In the case of a triple bond, the orbit trajectory must then be 3λ, because there are then 3 electron pairs involved, a total of 6 electrons, at a mutual distance of ½ λ . This means a substantially higher orbit speed of the six electrons in comparison with the double bond and single bond, e.

This provides, for instance, a very good e explanation for the construction of the CO (carbon monoxide) molecule.
The mass center of the roller coaster is closer to the oxygen nucleus than the carbon nucleus. At the same time, this means that there are more electrons on the carbon side than on the oxygen side (averaged in time): there is a dipole, negative on the carbon side, positive on the oxygen side.
The nitrogen molecule has a similar structure, but the two atomic nuclei are identical and the mass center of the roller coaster (origin of the coordinate system) lies exactly in between the two nuclei.