An easy understandable explanation of Q(uantum)M(echanics) as it should be used in any description of physics.

The only correct description of physics must be relativistic, i.e. assume a constant maximum speed, equal to the so-called lightspeed c (almost equal to 3 10^8 m/s). This characteristic is described most easily using Albert Einstein's S(pecial theory of)R(elativity) and G(eneral theory of)R(elativity). To explain this fact, a so-called massless particle (photon or graviton) will have the same speed for all possible observers. So, two different observers moving with different speeds, still always experience the same maximum lightspeed, which is only possible in the case of massless particles, i.e. particles that can't interact with the gravitational field. Mathematically SR is easy. However, GR is difficult, and as a result of that fact not well understood by most (almost all!) theoretical physicists. The reason is curvature of space-time in any GR description. This results into singularities (dividing by zero) in all well-known mathematical descriptions (in linear mathematical spaces, such that differentiating and integrating are possible). In GR singularities occur in the description of so-called black-holes and the source of any possible universe, like our so-called Big Bang, at which point all energy attracted into a black-hole comes to life again after the singularity. This can be described mathematically by an harmonic process, which results into a new universe with it's own elementary particles with characteristics, like for example the maximum speed, a gravitational constant and a so-called Planck constant. All elementary particles come to life in a dynamical process which at once obtains constants, like lightspeed and so forth. All these constants depend on the total energy, momentum, angular momentum, mass and charge of all elementary particles which were sucked into the black-hole of another (more energetic) universe, and obtains fixed constant values at the time the black-hole evaporates into our universe by a so-called Big Bang.
I.e. all possible mathematical non-reducible (mathematical not possible to be described with less degrees of freedom) descriptions use fixed constants, which remain unchanged constants during the time of existence of this universe.

Some people assume that these constants aren't constants. For example some people assume the fine structure constant $\alpha = e^2/2hc\epsilon_0 \approx 1/137.04$ (with e the electrical charge of every stable elementary particle, h Planck's constant, c the lightspeed and ϵ_0 the electrical permittivity of free space) isn't a constant. In string theories some people assume α is not a constant.

A mathematical description of the start of our universe as a result of the Big Bang must be possible but to me this is extremely difficult, because this description cannot be verified experimentally. However, it's easy to analyze mathematically which elementary particles are possible, i.e. to describe the mathematical non-reducible representations of the complete symmetry group of our universe. In this description many constants are needed, which mathematically really are fixed constants! For example, the EM-field is related mathematically completely to just one constant elementary charge (in most cases this charge is called the electron charge). This mathematical constant in this description really is a constant that cannot ever change! The same constancy is valid in the case of all basic constants, which give the fine structure constant.
The fine structure constant can also be given as the squared ratio of the elementary charge and the so-called Planck-charge ($\alpha = (e/q_p)^2$). The Planck-charge depends on Planck's constant.
In other words, a variable fine structure constant implies a variable constant of Planck.
In any mathematical description of physics one analyzes conservation laws. I.e. conservation of the relativistic total energy-momentum 4-vector in our universe is assumed valid in any description. This conservation law is often used in any description of a spacelike area with surrounding surface through which no (net) flux passes. Einstein proved SR that the energy of a photon, observed as elementary particle that represents the EM-field, has energy proportional to the frequency of the EM-field represented by this photon. The proportionality constant just is the well-known constant of Planck. I.e. if the fine structure constant isn't a constant, also Planck's constant becomes variable and conservation of energy won't be valid any more.

According to general logic, conservation of energy is always valid. In the description of our universe conservation of total energy is in fact not valid, due to possible loss of energy after enough energy is collected into a black hole to enable it to evaporate through a singularity. I never analyzed this description mathematically, because it doesn't really interest me. Besides that, this description is very difficult, comparable to the description of the Big Bang itself, i.e. describing the termination of a mathematical singularity and the resulting spreading of so-called elementary particles in all spacelike directions into a new universe away from the singularity is not easy!

But conservation of energy is always valid in any description of (any physical independent part of) our universe. This is why Planck's constant (always used in QM descriptions) must be a fixed constant!

Up to this day, 18-04-2008, nobody has ever observed experimentally that fine structure constant α isn't a constant!
If my description is correct, fine structure constant α is a fundamental constant of our universe, which depends on the spin1 related electrical charge and the spin2 related constant of Planck.
In my work Curvature and QM (http://quantumuniverse.eu/Tom/Curvature%20and%20QM.pdf)
I show that curvature of space-time implies that all elementary particles must be described as extended particles in the 2D-plane orthogonal to the observed direction of motion. To make sure I explain this correctly, I want to mention the fact that any exact description always is a point description. So, this extendedness of all elementary particles is described with an harmonic oscillating point in the 2D-plane orthogonal to the direction of motion. In the SR description the direction of motion is given by the so-called worldline.
In the case of the photon this extendedness just represents the EM-field, which only has polarization in the same 2D-plane orthogonal to the worldline. I.e. the EM-field comes to life when the description complies to the C(omprehensive)A(ction)P(rinciple), also see my work Curvature and QM.
The description of this harmonic oscillating motion has 2 constants of motion. One is the spacelike angular momentum, i.e. helicity (spin in the direction of motion) of the described particle. The second constant is the timelike total energy, equal to Planck's constant multiplied by the frequency of the EM-field represented by this extended photon as an oscillating point-particle in the 2D-plane orthogonal to the direction of motion.

This is the main focus of my mathematical explanation of QM. The solutions of extendedness of all elementary particles shows all characteristics of the Hilbert space of QM, i.e. it explains problem 6 of the 23 problems of David Hilbert completely.

This explanation shows that elementary (scalar) spinless particles aren't possible, because they don't comply to Einstein's CAP. To make myself clear, elementary spinless particles can't be specified with energy proportional to the particles frequency, because such particles haven't got the mathematical freedom to be able to oscillate. From this description I concluded in 1997, that the assumed spinless Higgs particle will never be found, because it doesn't comply to CAP, i.e. just isn't possible!

In all string theories Supersymmetry must be valid. In Supersymmetry it's assumed that each possible elementary boson has a partner particle that is a fermion and vice versa. Here it's assumed that all elementary fermions are spin½ particles and all corresponding bose partners are spinless.
This assumption can't be valid because this contradicts the CAP. Besides, in the so-called standard model it's assumed that quarks are spin½ particles with additional so-called isospin. In my description quarks are intrinsic unstable spin3/2 particles without any so-called isospin. In this way the intrinsic instability of quarks as sole particles is explained. In Supersymmetry it's assumed that the partner particle of the spin2 graviton is the spin3/2 so-called gravitino. This implies this gravitino to be intrinsic unstable, i.e. it can't exist on its own. So it cannot ever be detected!
As a result of all these weird characteristics I assume Supersymmetry is fiction, i.e. NOT possible!

Supersymmetry is used in so-called Super(2D-)String theories. In these models a 10 dimensional description is used of which 6 degrees of freedom are contracted to the Planck length, to make these degrees of freedom invisible. In 2003 Grisha Perelman proved that knots are only possible in 3D-space, i.e. 4D space-time.
In my description all elementary particles are extended. This solution can only be given completely using so-called B(oundary) C(onditions). These BC are either open or closed. Closed BC only allow interaction with other elementary particles in the direction of motion. So closed BC describe force particles, called bosons in QM.
Open BC yield an additional degree of freedom, which is a positive real integer. This integer describes the amount of rotations before the oscillating motion repeats itself. I.e. this is the quantum number specifying the particle family of the fermion described by open BC. The higher this number, the more interaction with gravitons, so the higher the mass. This characteristic shows that all fermions must have mass.
Massive particles can be analyzed mathematically with a changing direction of motion. So, all fermions allow knots in their 2D extended paths. From this fact, I concluded in 2007 that fermions are only possible in 3D-space, i.e. Einstein's 4D space-time. This does not imply that knots will ever occur in real life, only that mathematically it's possible. I.e. any space, in which no knots are possible, doesn't allow fermions. Without fermions, also no bosons, i.e. such space is not possible to describe any possible universe. In this way I try to explain that String Theories, even though they are described mathematical in a very beautiful way, are mathematical fiction, i.e. they can't describe any possible reality.

This is also my main problem related to String Theory, the QM is used ad hoc, i.e. without any explanation why QM has to be used as is always done. To me, the only correct description of physics must explain why QM has all the characteristics it has and all these characteristics must come to life in a relativistic description.

The new particles collider, called L(arge)H(adron)C(ollider), not only searches the assumed scalar Higgs particle, but also tries to discover the lightest super-partner.
The reason is that according to the Super String description the lightest of all super partners is expected to have energy (mass) just above 1TeV. If my description is correct, no new elementary particles will ever be detected. The last found elementary particle is the very heavy top quark, which was found in 1995 at the Tevatron detector in the USA.
And to mention another problem with a Higgs particle with mass higher then 1 TeV is the fact that the Higgs is supposed to explain mass of all elementary particles. As a result of that fact the Higgs particle must be present in our universe with a mass density such that our universe would have collapses almost directly. I.e. the flatness of our universe already shows that a very massive spinless particle to explain masses of all elementary particles doesn't exist! In fact this is a simple proof that there's no very heavy spinless Higgs particle, even though without a Higgs mechanism the very successful SR Q(uantum)F(ield)T(heories) are non-renormalizable.

I.e. SR QFT must be rewritten with all elementary particles described as extended particles in the 2D-plane orthogonal to the observed direction of motion given by the SR wordline. In this way QFT not only comply to SR, but also to GR. This fact alone explains spin and all appearing divergences in all QFT are removed due to the fact that all fermions always have a minimum displacement equal to the Planck length.

In fact all characteristics of QM follow completely from a correct analysis of Einstein's SR and GR.

I expect that a spinless elementary particle will never be detected! And this assumption will be tested with the LHC. However, all QM followers probably won't give up that easily, so it may take more years of hunting the Higgs which will start in May 2008 when the LHC becomes fully operational.

To me, it seems a logical task to explain mathematically why QM has all the characteristics it has. So QM doesn't have to be used ad hoc any more.

In short this is my view on my work, as written on 19-04-2008.