

Quantum Mechanics

Quantum Mechanics C(omplete) N(on-Reducible) derived from a CN rewritten analyzed easy linear mathematical-model of Albert Einstein his General Relativistic [Comprehensive Action Principle](#).

Mathematical, i.e. *Closed-*, Knots are only possible in easy imaginable [CAP-dual](#) either 4D-Spacetime or 4D-Momentumenergy analyses, the 2 Fourier-transformed [CAP-dual](#) representations. Mathematics is a *pure linear-model*, so can easily be used CN imaginable to analyze [everything](#) including the only symmetrical spin 2 [gravitational-field](#) together with all its associated conditions.

In line with Albert Einstein's theory of [General Relativity](#) any valid (math.) model of reality must always comply to the [Comprehensive Action Principle](#)!

The [CAP](#) implies that the only symmetrical spin 2 action must be (CN) included in any math. model to end up with correct results. In other words, the spin 2 effects must actually also be used CN to be able to get a trustworthy derivation of the still not-understood so-called **QM**! If one is able to CN derive QM from the only symmetrical gravitational-field as required by the [CAP](#) one of the last mysteries of our reality will finally be answered in a Complete Non-Reducible logical-way.

[Albert Einstein](#) solved required curvature of easy imaginable 4D-Spacetime resulting from the always dependent & present Gravitational-field **incorrectly** in a higher-dimensional so-called [Riemannian-manifold](#)! Solving the [CAP-dual](#) character of the **spin 2** gravitational-field actually was the most troublesome characteristic of GR to both Albert Einstein & David Hilbert, who together tried to solve the theory of GR.

The only reason for the [CAP-dual](#) curvature of 4D-Spacetime just is the fundamental elementary only symmetrical spin 2 of the invisible Graviton!

The conserved physical phenomenon called **spin** or more literally “*conserved intrinsic angular-momentum in the direction-of-motion*” just cannot be interpreted as **a math. logical-concept!**

Only when reanalyzing Einstein's theory of general relativity compliant to the math. [CAP-dual](#) requirements can both GR and QM, i.e. SR [QFT](#), be understood math. Complete Non-Reducible.

Even though Albert Einstein's first Nobel-prize of the Photo-Electric effect shows that the EM-field is CN represented by elementary [Photons](#), Einstein never realized that the photon is math. represented by the easiest Anti-Symmetrical **spin 1** U(1)-Gauge-Symmetry which CN represents the EM-field and he probably just disliked the used simple Point-Particles analyses of QM, even though all analyzed particles all have conflicting Energy proportional to a Frequency $E = \hbar \cdot f$:

Energy implies *not* Point-like Spacetime-like extensiveness to allow oscillation!

As a direct consequence all [26 different elementary particles](#) which represent everything possible in our universe with just **3 conserved** Fermi-Families must be analyzed as logical Spacetime-like extended easy linearly analyzed *Ideal Harmonic Oscillating* “**mathematical**” objects.

Therefore, to analyze still not-understood “*Quantum Mechanics*” CN math. Logic Consistently compliant to the [CAP](#), stable elementary and [CAP-dual](#) otherwise stable compound “*Particles*”

must be described CN as math. *dual* (orthogonal in 2 different ways*) oscillating extended identities:

Ideal Harmonic Oscillating math. Point-Waves in the 2D-Plane* Orthogonal to the Direction-of-motion (SR worldline) with CAP-dual Open - or Closed - Boundary Conditions.

(1)

As direct consequences all stable particles must have energy (linear-) proportional to a frequency & conserved angular-momentum in the direction-of-motion (helicity of the CAP-dual 2 perpendicular zero rest-mass bosons {Graviton & *orthogonal* Photon} or chirality in all other “massive”-cases). This last-property is usually called spin as an incorrectly assumed so-called “*intrinsic*” property of elementary always analyzed math. Point-Particles in the *still not-understood* so-called QM \Rightarrow A CAP-dual logical math. CN theory where all possible particles with all their required extended properties are explicitly described & explained CN according to (1) to logically explain QM spin.

This removes the so-called “Spookiness” of Quantum Mechanics by math. *explicitly* describing all assumed “*intrinsic*”-properties!

CAP-dual, force-fields are either elementary spin 2 Symmetrical described by the invisible mass-related Graviton or orthogonal spin 1 Anti-Symmetrical charge-related force-fields, described by so-called Gauge-Symmetries. The CN Gauge-Symmetry of 4D-Spacetime & CAP-dual 4D-Momentumenergy analyses are just the always used Gauge-Symmetries of the Standard-Model:

U(1) x SU(2) x SU(3): U(1) x SU(2) describe the U(1) – EM-field CN describing the Photon with it's (spin) 1 x (anti-symmetrical) 6 = 6 degrees-of-freedom and the 3 SU(2) – Gauge-Symmetry both charged (non-zero charge-densities) and massive (rest-masses > zero) weak nuclear force bosons {W[±], Z} mixed by the Weinberg-angle. The last possible Gauge-Symmetry, **SU(3)** describes the 3 Fermi-Families in our universe with only different rest-masses resulting into CAP-dual 2 x 3 = 6 different spin 1½ so-called Quarks {(up, down), (charm, strange), (top, bottom)}, which in the also not-understood so-called Quantum Chromo-Dynamics of QM are incorrectly assumed to be (*stable*) spin ½ fermions with as a direct result of that also required so-called also *dual* Isospin ½!

Here it must be noted that compliant to the CAP all possible math. expressions of reality must be described with stable elementary and CAP-dual compound spin ½ fermions, i.e. Baryons, the primary sources of all bosons. Fermions are described math. with **Open**- Boundary Conditions & Bosons must be described math. with **Closed-BC** as described by logical expression (1).

The required CAP-dual math. analyses of any correct model of reality is CN related to the always present Rotational-Symmetry of analyzed (elem. or compound CAP-dual) stable particles.

The conserved Angular-Momentum in the Direction-of-Motion is a conserved property of stable particles as a direct result of Rotational-Symmetry when rotating the QM wave-function (1) of a particle around its axis-of-motion (SR worldline): Spin in the direction-of-motion of particles is conserved as a result of Rotational-Symmetry after a rotation over $\delta\phi = \frac{2\pi}{s}$ radians around the axis-of-motion with s the half-integer spin of elementary fermions or the integer spin of stable energetic-oscillating elementary bosons.

To obtain the actual angular-momentum with the correct dimensional proportionality-constant, s must of-course still be multiplied by Dirac's constant “***h-bar***” $\hbar = \frac{h}{2\pi}$, with h the [Planck constant](#).

All stable elementary [Matter-Particles](#), i.e. so-called [Fermions](#) with **CAP-dual** half-integer spin-values $s \in \{\frac{1}{2}$ (*leptons & stable fermionic hadrons called baryons*), $\frac{1}{2}$ (*always connected, i.e. not-stable on their own single quarks*) $\}$ must be described with **Open-BC**. This explains why they must all have conserved rest-masses $>$ zero & (also **CAP-dual**) conserved non-zero [Bohr magnetons](#).

This is a needed fundamental property of particles, so I'll repeat the required property one more time:

And all stable [Force-Particles](#), so-called [Bosons](#) with **CAP-dual** positive-integer spin-values $s \in \{1$ (*all anti-symmetrical Gauge-symmetry $U(1) \times SU(2) \times SU(3)$ bosons*), 2 (*the only symmetrical elementary graviton*) $\}$ must of-course be described with **Closed-BC**.

This math. explicitly described (**CAP-dual**) conserved spin (*in the direction-of-motion*) at-once makes it evident that still assumed to be valid [elementary](#) spinless bosons ([Higgs mechanism](#)) which as a direct consequence just cannot carry energy proportional to a frequency must be discarded as a (math.) incorrect assumption:

As it is today, still
nobody áctually
really understands

Beautiful

so-called **Quantum**
Mechanics!

And this simple fact appeared to be Albert Einstein's greatest frustration during his later-life while living at the [IAS](#) at Princeton, in the rural-province New Jersey in the U.S.A.!

The reason is that **QM** can only be understood Complete Non-Reducible when it's derived CN with **easy-linear** mathematical-tools from the always dependent, i.e. never negligible, only elementary symmetrical spin 2 Gravitational-field in CN **CAP-dual** 2 independent c.q. orthogonal ways!

Based on CN symmetries analyses, **Anti-Symmetrical** representations must be represented by **spin 1** bosons, while **Symmetrical** representations must be represented by **spin 2** bosons.

Actually, the only problem with Quantum Mechanics is the fact that elementary particles are CN linearly (*i.e. mathematical*) analyzed as “**simple**” Point-Particles all with zero-size and as a direct result always required so-called **intrinsic** properties! Such properties can of-course not be analyzed in an easy imaginable logical way, as must actually be required of any acceptable model-of-reality!

This is actually identical to all easy & quickly math. analyzed mechanical problems: the sizes of the analyzed moving objects are neglected / omitted as not-important characteristics of these objects in relation to their traveled paths and only the easy imaginable Center of Mass is effectively analyzed.

The only way to resolve “**all stupid**” (*Einstein his own words!*) problems related to the still not-understood QM is by re-writing it CN compliant to the always required **CAP** according to (1). In the almost 10 years in which Albert Einstein tried to solve his equations of General Relativity in which accelerations are included in the otherwise restricted theory of Special Relativity he had great problems to solve these equations and had many discussions with David Hilbert and his friend Marcel Grossmann from the ETH about these in their eyes mathematical difficult problems.

Finally, Albert Einstein solved Gravitational-Curvature of 4D-Spacetime in a higher-dimensional so-called Riemannian-manifold. However, he did not have the slightest idea why the Gravitational-Field actually required curvature of easy imaginable 4D-Spacetime!?!

According to the Comprehensive Action Principle of Einstein's theory of GR, any math. model of reality must always include **the always dependent Gravitational-Field!**

Albert Einstein just did not understand the “**QM**” spin 2 **dual fundamental** consequences of the always demanded **CAP**, so never analyzed it's required consequences on a valid math. model of reality!

As every physicist knows today, the gravitational-field is the only elementary spin 2 boson representing the also only symmetrical force-field, which is orthogonal to all anti-symmetrical spin 1 force-fields in 4D-Spacetime Complete Non-Reducible described by the Gauge-Symmetry of the Standard-Model: $U(1) \times SU(2) \times SU(3)$. Here $U(1) \times SU(2)$ describe the $U(1)$ – EM-field CN describing the Photon with it's (spin) 1 x (anti-symmetrical) 6 = 6 degrees-of-freedom and the 3 $SU(2)$ – Gauge-Symmetry both charged (non-zero charge-densities) and massive (rest-masses > zero) weak nuclear force bosons $\{W^\pm, Z\}$ mixed by the Weinberg-angle. The last possible Gauge-Symmetry describes the 3 Fermi-Families in our universe with only different rest-masses resulting into **CAP-dual** $2 \times 3 = 6$ different spin $1\frac{1}{2}$ so-called Quarks $\{(up, down), (charm, strange), (top, bottom)\}$, which in the also not-understood so-called Quantum Chromo-Dynamics of QM are incorrectly assumed to be (*stable*) spin $\frac{1}{2}$ fermions with as a direct result of that also required so-called also **dual Isospin** $\frac{1}{2}$.

Already in 2003 Grigori Perelman helped Prof. Dr. Richard Hamilton at the Stony Brooke university in NY proof the Poincaré conjecture. In these 3 papers, Grigori Perelman effectively also proved that math. (Closed-) Knots are only possible in the easy imaginable 4D-Spacetime and the **CAP-dual** complex-conjugated 4D-Momentumenergy analyses of our daily experienced reality.

Always massive Fermions described with Open-BC must allow knots in their ideal harmonic-oscillating paths, so Fermions are only possible in easy-imaginable 4D-Spacetime!

This simple easy to remember math. fact at-once implies that the higher-dimensional so-called Riemannian-manifold used by Albert Einstein to solve curvature of always more-dimensional space-time in GR must be CN re-written *in the only possible* CN CAP-dual 4D-Spacetime & 4D-Momentumenergy sets-of-analyses!

Albert Einstein did not like **QM** as it was expressed in the Copenhagen interpretation with its statistical-interpretations, so he *never* took the time to investigate its characteristics really seriously.

If he had investigated these not-understood characteristics of **QM** seriously, he would most probably have analyzed all stable particles math. explicitly as described above in (1). It's a pity that Albert Einstein never took the time to re-analyze **QM** math. explicitly, even though he could have derived it math. CN from his own GR so-called CAP-dual characteristics. He only had to dismiss his actually in-correctly used higher-dimensional so-called Riemannian-manifold to math. describe the required dual spin 2 characteristics of the invisible graviton & CAP-dual CN the resulting model of Everything Possible \Rightarrow TOE! He would very probably have decided that conserved Angular-Momentum in the Direction-of-Motion must be a conserved property of particles as a direct result of Rotational-Symmetry when rotating the **QM** wave-function of a particle around its axis-of-motion (SR worldline): So-called Spin of particles is conserved as a result of Rotational-Symmetry after a rotation over $\delta\phi = \frac{2\pi}{s}$ radians around the axis-of-motion with s the half-integer spin of elementary fermions or the positive integer spin of stable energetic-oscillating elementary bosons. To obtain the actual angular-momentum with the correct dimensional proportionality-constant, s must of-course still be multiplied by Dirac's constant "h-bar" $\hbar = \frac{h}{2\pi}$, with h the Planck constant named after one of the very first developers of still not-understood so-called **QM**,

Max Karl Ernst Ludwig Planck

☞ Please, always keep the fundamental spin 2-dual orthogonal differences in mind:

All stable elementary Matter-Particles, so-called Fermions with CAP-dual half-integer spin-values $s \in \{\frac{1}{2} \text{ (leptons \& stable fermionic hadrons)}, \frac{1}{2} \text{ (always connected single quarks)}\}$ must be described with Open-BC. This explains why they all have conserved rest-masses > zero & (CAP-dual) conserved non-zero Bohr magnetons.

All stable elementary Force-Particles, so-called Bosons with CAP-dual integer spin-values $s \in \{1 \text{ (all stable elem. and compound gauge-symmetry bosons with conserved anti-symmetrical spin 1)}, 2 \text{ (the only elem. symmetrical graviton)}\}$ must be described with Closed-BC.

What Albert Einstein *really* never realized was:

The only allowed math. (i.e. easy linearly analyzable) Space-time to analyze anything-possible is CN easy-imaginable **4D-Spacetime**, which as only math. space allows knots required to represent *always massive & non-zero charge-densities* carrying (Open-BC) **Fermions** (1).

So, all characteristics of still not-understood **QM** must be analyzed math. *explicitly* according to expression (1). In other words, the conserved angular-momentum in the direction-of-motion must be described math. explicitly as a force-constant related to the energy proportional to a frequency:

$$F = -k \cdot \rho, \quad \text{with } k(c, G, h, m_0) \text{ a to be determined force-constant.} \quad (2)$$

The math. space needed to describe this required extensiveness just is, i.e. CN explains, the complex so-called **Hilbert-space** always used to analyze still *not-understood* **Quantum Mechanics**.

From the inertial-frame moving with a particle with average-position (*of its ideal harmonic-oscillating motion in the 2D-plane perpendicular to the traveled worldline*) at the $z = 0$ position of the used positive z -axis as direction-of-motion, the average extensiveness is CN described in polar-coordinates by:

$$2 \langle \rho \rangle = \rho_{\max} + \rho_{\min} = 1\frac{1}{2} \rho_{\max} = 3 \rho_{\min} = \underline{s} \cdot \underline{\varphi} \cdot \underline{l}_h, \quad \text{with:} \quad (3)$$

\underline{s} the (half-) integer conserved spin, $\underline{\varphi}$ the **Golden-Ratio** & \underline{l}_h the **Planck-length**.

This beautiful expression is of-course only valid for ideal harmonic oscillation in the 2D-plane orthogonal to the Direction-of-Motion, i.e. the SR-worldline as described by (1)!

So, elementary spinless bosons cannot have energy proportional to a frequency & only the orthogonal only symmetrical spin 2 Graviton **múst be included in the CN re-written QM-model** independent from all 3 “*simple*” anti-symmetrical spin 1 Gauge-Symmetries remaining 3 fundamental-forces. This CN proves the **Higgs mechanism** with the only *elementary spinless Higgs-boson* to explain particles-masses > 0 non-logical & non-compliant with (1) as being **incorrect!**

Albert Einstein:

*If you can't explain it **simply**, you just don't understand it well-enough!*

So, to be **Short & Secure**, All always assumed “**intrinsic**” properties of analyzed **QM** - Point-Particles can only be analyzed CN math. Explicitly compliant to sentence (1) with *only* mathematical, i.e. CN, in Closed-**Knots** allowing **CAP-dual** 4D - Spacetime analyses.