Afbeelding met outdoor-object

Beschrijving is gegenereerd met zeer hoge betrouwbaarheid

**Preface**

When you read this book, it is very likely that the world of Physics is still very calm. Like in the early morning, just when the sun rises. You feel peace and the birds start to wake up and you hear the first sounds breaking the silence of the night. The sounds of joy, the sounds of happiness, the sounds of peace. But it is the morning of the great battle. The battle in physics. Still everybody is asleep. There is no sign of aggression. But soon the armies will rise and the battle will be dark and merciless.

Because there is so much to lose. And what is there to gain. Physics has taken over Religion. Physics has replaced the God of Love by the God of the Dice. In Quantum Physics the magicians wave like Harry Potter magicians with their wants and speak out not understandable spells and create new formulas, new elementary particles which need so much more money to investigate . Physics has taken over the immense donations which were given in the past to the churches and which are given now in immense amounts in the form of worldwide funding to high energy accelerators like CERN.

But the war is coming. And this book is written in the darkest hours of the night and is presented in the morning just when the sun is rising and just before the war is starting. And the war will be merciless. Because there is so much to lose. It will be the war between Light and Darkness. The war between Freedom and Slavery. The war between Probability and Light.

And the empires of physics will ignore what is coming. They will look deep into their books with magic spells and they do not see that the war is coming. Because they do not see what they do not want to see.

The new theory presented in this book book will break patterns, will break believes and will break power. But that will not happen until the war has started and the Empire of Physics will strike back. Because there is so much to lose.

Because this theory will break patterns in thinking it is not possible to avoid the old patterns. And it is not possible to avoid the old equations and to avoid the old theories and to avoid the old spells. In the ancient Greece, philosophers like [Plato](https://www.britannica.com/biography/Plato) were already discussing the concept of matter build out of particles. Called a-tomos (atom) by [Democritus](https://www.iep.utm.edu/democrit/) and means not dividable. And since then the concept of the atom has never left the human mind.

This new theory will break with the ancient concepts over more than 2000 years old. This new theory will be avoided by any physicist who respects himself and has been respected by his colleagues. How dare somebody to claim that we think in the wrong way already over more than 2000 years. It is like cursing in the Holy Church. The Holy Church of Physics. But this theory is already spreading over the internet like an indestructible bug. And when the morning rises, Physics cannot deny anymore the question: Is Physics following the right path of human logic or is Physics a mind blowing expensive trip in the non-existing worlds of illusions?

**The Power of The Light over modern Quantum Physics**

[**Wim Vegt**](http://orcid.org/0000-0002-7002-8610)

**Technical University Eindhoven**

**The Netherlands**

[j.w.vegt@topacademy.center](mailto:j.w.vegt@topacademy.center)

All [Calculations](https://osf.io/gbn4p/) in [Mathematica 11.0](http://www.wolfram.com/mathematica/new-in-11/?src=google&416) have been printed in a [PDF File](https://osf.io/gbn4p/)

**1.** **Introduction**

The famous [1927 Solvay Conference](https://rarehistoricalphotos.com/solvay-conference-probably-intelligent-picture-ever-taken-1927/) was considered a turning point in the world of Physics. The scientific realists like Albert Einstein had lost and the instrumentalists like Niels Bohr had won the fundamental conflict. Since then Physics has followed the path of the instrumentalists in which Quantum Physics has been determined by the concept of Elementary Particles and Probability Waves. Until May 2013, when for the first time a photo had been made of the [Probability Waves Inside the Hydrogen Atom](https://www.researchgate.net/publication/237093403_Hydrogen_Atoms_under_Magnification_Direct_Observation_of_the_Nodal_Structure_of_Stark_States) . It should be impossible to make a photo of a [non-existing complex probability wave with mass zero](https://arxiv.org/ftp/physics/papers/0404/0404044.pdf) But the fact could not be denied anymore that scientists had succeeded to make the “complex” and the “[non-existing](https://arxiv.org/ftp/physics/papers/0610/0610220.pdf)” quantum mechanical “[Probability Wave](https://phys.org/news/2012-04-quantum-function-reality.html)” visible. New discoveries like “[Photonic Molecules](http://vixra.org/pdf/1411.0008v1.pdf)” and “[Photon-Photon Interaction](https://www.nature.com/nphys/journal/v13/n9/full/nphys4208.html)” require a new interpretation of the [Copenhagen Interpretation](https://plato.stanford.edu/entries/qm-copenhagen/) . Since the [Copenhagen Interpretation](https://arxiv.org/abs/quant-ph/0509089) there is still no clarity about the physical interpretation of the Quantum Mechanical “[Probability Wave Function](https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.108.150402)”

This Manuscript describes a third unknown interpretation of the Quantum Mechanical “Probability Wave Function”. A fundamental physical interpretation that will change the generally accepted [Copenhagen Interpretation](https://plato.stanford.edu/entries/qm-copenhagen/).

This Manuscript will answer the fundamental question: Does an alternative theory exist in which the existence of this particular photo, of the Quantum Mechanical [Probability Wave within the Hydrogen Atom](https://physicsworld.com/a/quantum-microscope-peers-into-the-hydrogen-atom/), could be explained. And that the famous photo of the [Hydrogen Atom](https://www.geek.com/news/researchers-capture-image-of-hydrogen-atoms-electron-orbital-for-first-time-1556448/) can be explained in a logical and a simple way.

To find the answer, we have to go back in time. Back 300 years in time to the moment when [Isaac Newton](http://rsta.royalsocietypublishing.org/content/373/2039/20140213) discovered the [beauty and one of the many secrets of the light](https://en.wikiquote.org/wiki/Isaac_Newton). The moment when science walked away from light.

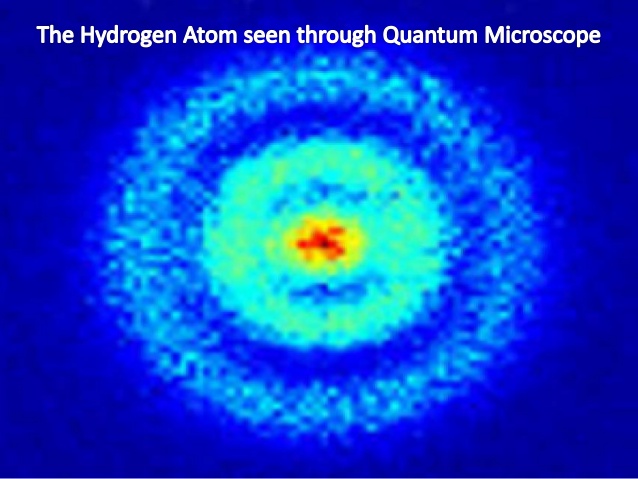
And we return to the fundamental question: “Is it possible to build [Matter](https://www.nature.com/articles/nature17943?foxtrotcallback=true) out of [Light](https://www.nature.com/articles/nphoton.2014.95) ([confined electromagnetic waves](https://www.imperial.ac.uk/news/149087/scientists-discover-turn-light-into-matter/))?” To answer this question if it is possible to build [Matter out of Light](https://phys.org/news/2014-05-scientists-year-quest.html), we first have to answer the question how we have come to this world of Probability Waves and Elementary Particles and Quantum Physics.

Afbeelding met persoon, buiten, poseren, gebouw

Beschrijving is gegenereerd met zeer hoge betrouwbaarheid

**Figure 1. Participants at the famous 1927 Solvay Conference**

Louis de Broglie described in 1924 in his PhD thesis the wave properties of matter. Erwin Schrödinger published in 1926 the well-known Schrödinger wave equation with the characteristic spherical and elliptical wave solutions. To describe these material waves, the immediately and first explanation was: “There is only one possibility. These are “Electromagnetic Waves”. [De Broglie Waves](https://www.nature.com/articles/d41586-018-03793-2) are ” Light Waves”. Because these were the only waves, known in the world of Physics, that could travel through vacuum.



**Figure 2 First Image of the Hydrogen Atom’s Orbital structure**

But there was a fundamental problem. These [material waves](https://io9.gizmodo.com/the-first-image-ever-of-a-hydrogen-atoms-orbital-struc-509684901), discovered by Louis de Broglie and mathematically described by Erwin Schrödinger could never be solutions of the well-known 4 linear equations of James Clerk Maxwell. The material waves were spherical and elliptical solutions of confinement and that was impossible for the solutions of the linear [Maxwell Equations](https://physics.info/maxwell/). According to the linear Maxwell Equations, superposition is possible but Electromagnetic Interaction and Electromagnetic Confinement can only be described by a set of non-linear differential equations.

To solve this fundamental problem a new set of 3 non-linear Electromagnetic Equations (Equation 5 in this manuscript) has been developed which replaces the well-known 4 linear [Maxwell Equations](http://hyperphysics.phy-astr.gsu.edu/hbase/electric/maxeq.html) and the possible solutions of Equation (5) are also Spherical and Elliptical solutions of confinement. Table 1 in this manuscript presents a number of Electromagnetic Spherical Confinements as solutions of Equation 5a .

A second problem was that the model of the atom of Bohr could not hold. How could an electron be everywhere at the same time in a kind of a spherical shell surrounding the nucleus. And be a particle at the same time.

And Bohr found a compromise to declare the “De Broglie” waves to be the probability waves. Two problems were solved. Bohr’s planetary model could hold. And there was a name for the unknown material waves, discovered by Louis de Broglie and mathematically described by Erwin Schrödinger. The theory of “Probability Waves, Elementary Particles and Quantum Physics” had been created.

To find a possibility, to [create matter out of light](http://www.bibliotecapleyades.net/ciencia/secret_projects/project077.htm) we have to go back to the Equations of James Clerk Maxwell. The only possibility to declare the probability waves, discovered by Louis de Broglie, to be electromagnetic waves, to be light, and to be the building element of our universe, is to find evidence that he Maxwell Equations are not complete and that it is possible to confine light (electromagnetic waves) in spherical and elliptical shapes. A new equation has to be found. In this article it has been claimed that this missing equation is Equation (5). Because the Theory of General Relativity has been built on the Einstein-Maxwell Equation, a new equation has to be found that describes in a generalized way the interaction between light and matter. This missing equation is Equation (5-a).

**2.** [**A Historical Perspective on the conflict between Causality and Probability, the Ethics and the conflicts in Science on the battlegrounds of Light and Darkness**](https://www.researchgate.net/publication/324820328_A_Historical_Perspective_on_the_conflict_between_Causality_and_Probability_the_Ethics_and_the_conflicts_in_Science_on_the_battlegrounds_of_Light_and_Darkness)

The famous eclipse expedition of 1919 to Sobral, Brazil, and the island of Principe, in the Gulf of Guinea, led by Dyson, Eddington and Davidson was a turning point in the acceptance of the General Theory of Relativity developed by Albert Einstein in 1915. The correctness of this theory has been proven since then in many experiments. The success of his predictions made Einstein famous. When Albert Einstein published his famous Einstein Field Equations (Einstein-Maxwell equations), which were the mathematical foundation on which the Theory of General Relativity has been built, he built his theory on the complex 4-dimensional Minkovski Space, developed by Hermann Minkovski, the Electromagnetic Lorentz Transformations, developed by Hendrik Antoon Lorentz and the fundamental Maxwell Equations. Einstein had a great imagination and was inspired by the imaginary 4-dimensional complex space-time continuum, suggested by his teacher Hermann Minkovski.

But questions remain. Why would space and time be equal. We do experience space and time always very differently. When we shine the light into a room, all 3-spatial dimensions of the room will be enlightened and become visible. But the fourth dimension time will always remain invisible. We cannot look into the future and we cannot look back in time by the illumination of light that shines into time. There is still no fundamental logical ground for the Theory of General Relativity and the 4-dimensional complex Space-Time Continuum ([Minkowski Space](https://www.pitt.edu/~jdnorton/teaching/HPS_0410/chapters/spacetime/)). Since the success of the predictions of Albert Einstein, nobody ever doubted about the correctness of the theories of Albert Einstein. The success of his predictions made Einstein famous.

In this manuscript, the starting point is almost 300 years ago. Long before James Maxwell published his Maxwell equations, before Albert Einstein published the Theory of General Relativity and far before the time Niels Bohr introduced the probability waves, discovered by Erwin Schrödinger which were the nonlogical grounds on which Quantum Physics has been built.

The starting point is the moment just after Isaac Newton had published the breaking of light into the colors of the rainbow through a prism in the “[Lectiones Opticae](https://cudl.lib.cam.ac.uk/view/MS-ADD-04002/20)” in 1728. Newton just had discovered the beauty of light when light had revealed one of its many secrets. And he could only express: ”Light is beautiful”.

That has been the turning point in our history of science. Since then science has left the path of the light and has followed the path of our own mind. We did not follow anymore, but we started to lead. To lead in arrogance and surrounded by the illusions of fame. But instead of following the path of the mind that has left every logical thinking, a path that is finally following the path of quantum physics and elementary particles, the ghost lights that will lead us to the swamps of darkness, this manuscript wants to return to the path of the light. Because the light has always given the right answers. And has always guided mankind in science and through life. What would our world be without the beauty of light? When we look at the fruits of our modern science we can only see the fruits of darkness.

A darkness where the predators are hiding to destroy our world of beauty, our world of light, our world of truth. Who are we following? The gambling devil leading us towards the ghost lights, the elementary particles, our new religion, which will finally lead us into the swamps of darkness, the swamps of blindness and finally no scientist will know how to go further? Or do we follow the fake light of the illusion of fame that will lead us into the deepest darkness the world has ever known?

In this time where a totally destructive final world crisis is building. the world needs leadership. And the most powerful leadership is science. But how can science lead when science is totally blind. And science believes in the lies of the illusions of Maya. We behave like children who throw a clock towards the wall until it falls apart and the wheels fall on the ground. Yes, a child believes that then it understands how a clock works. But that is the fantasy of a child. Like we believe that we will understand matter by smashing matter in high energy accelerators until it breaks apart into elementary particles. But that is the science of a child. A world of fantasy where logic does not exist.

Because a clock is so much more than a collection of wheels. To understand a clock we have to build a clock. To understand matter we have to build matter. And we will will never be able to build matter until we understand the secrets of light.

Science needs a compass like a ship needs a compass. A compass without a ship sinks to the bottom of the ocean and will be be totally meaningless. A ship without a compass will finally destroy itself when it breaks on the rocks of arrogance like the Titanic broke itself in arrogance. The ship needs the compass and the compass needs the ship. Together they are powerful. Alone they will destroy themselves. The science in our world is a science blind without a heart. The religion in our world is a non-logical religion without a mind. The heart needs the mind and the mind needs the heart. Together they are the most powerful weapon in spiritual warfare and together they can save the world and destroy the powers of darkness that are coming to the world. Alone they have no chance to survive the powers of evil and the world will come to an end surrounded by darkness. A worldwide holocaust, the world has never seen before. The empire of evil. Only when religion and science come together, they will become invincible and the evil powers will break themselves on this invincible shield. A shield that will rise when the heart and the mind come together.

Because science alone will be fooled by the darkness, because the science is blind and cannot see when it is surrounded by the darkness. In blindness science has created the atomic bombs that has destroyed Hiroshima and Nagasaki, in blindness science creates the most evil missiles and warplanes to kill and burn alive innocent women and children, in blindness sciences creates drones that are designed only to kill and bring fear over the world, in blindness science designs data systems that will control mankind and bring them to slavery, in blindness science creates genetical manipulation to destroy who we really are, in blindness science serves the darkness.

And religion alone will also be fooled by the darkness, because religion is blind and has lost any logical way of thinking when it is surrounded by the darkness. In blindness religion has burned innocent people alive on the stakes in the middle ages, in blindness religion has created wars and has killed so many innocent victims, in blindness religion has broken the souls of those who were different and did not fit into its own small and limited boundaries, in blindness religion has broken the people who believed in a different God, in blindness religion has broken the soul of those with a different sexuality, in blindness religion has broken to most beautiful and the most valuable people in our world, in blindness religion serves the darkness.

Religion has lost its mind when it has forgotten the revelation of God when God revealed himself to Moses from the midst of the burning bush by his only true name “YHWH”. “I am who I am”.

And that is the only logical consequence in religion. We have to be who we really are in the deepest of our soul and we have to let the other be who he or she really is. Do not transform ourselves or the others but follow the name of YHWH and be who you really are and let the other be who he or she really is. Instead of judging and breaking people because of their sexuality, those who are gay, transgender, pansexual, intersexual and so many other sexualities. Let them be who they are in the name of YHWH and do not judge them. What other kind of religion or God people do believe in, let them be in the name of YHWH, do not judge them. Respect who they are and what they do believe in. That is the only logical consequence of the holy name “YHWH”.

Evil grows on the fields of pain, injustice and suffering. And evil will cause more pain, more injustice and more suffering so that more evil will grow. Until evil will finally cover the whole earth and the evil will kill all the light, all the hope and all the love. Evils grows like a weed and feeds itself from the life forces of those who are strong and healthy until they are destroyed and the hope and the love in them has died.

Evil grows like it has grown in the concentration camps of evil in [Auschwitz-Birkenau](http://auschwitz.org/en/), [Treblinka](https://www.holocaust.cz/en/history/concentration-camps-and-ghettos/treblinka-3/), [Sobibor](http://www.holocaustresearchproject.org/ar/sobibor.html) and so many [Concentration Camps](https://www.ushmm.org/wlc/en/article.php?ModuleId=10005475) in the [Second World War](https://www.britannica.com/event/World-War-II) where the injustice ruled and the hope and the love were killed. That is the face of darkness. That is the [face of evil.](http://www.leaderu.com/orgs/probe/docs/evil-holo.html) That is our future when we do not fight back.

Jesus gave mankind the perfect weapon to destroy the evil, to destroy the darkness. ”Love your enemies”. These are his powerful words in spiritual warfare. Because by loving our enemies we will destroy them. We will smash the darkness that has taken them into the bright light of love. Only by love we will destroy the fields of pain on which the evil is growing, by love we will destroy the powers of injustice that gives power to the evil, by love we will bring back the hope because hope is the light the darkness cannot face.

There is no power in the whole universe stronger than love. And only love can destroy darkness and only love can destroy evil and only love can save the world.

All the Jews, all the Muslims and all the Christians in our whole beautiful world are following “[YHWH](https://www.britannica.com/topic/Yahweh)” ,the only creator of the universe, the only creator of the light. God of truth, God of justice, God of mercy.

But who are you following? “YHWH” is his only name, “I am who I am”. You can only follow “YHWH” by being “YHWH”. Be who you really are and do not let yourself be threatened by fear and be enslaved by the king of darkness. When you are rainbow color sexual, be rainbow color sexual. The love has no walls. The love has no boundaries. The love has no fear. The love is pure and is created by “YHWH like he created the light and the beauty of the light shines through the rainbow.

The only one who want to be kneeled for is the king of darkness. The only one who wants to enslave the whole world in his darkness is the king of darkness. The only one who preaches the fear is the king of darkness. The only one who kills the beautiful love in the human soul is the king of darkness. Why are you following the king of darkness with his evil lies, tricks and manipulations of truth.

The king of darkness, he who has entered, hidden in darkness, your holy Synagogues, your holy Mosques and your holy Churches. In blindness you are preaching the fear. In blindness you are preaching the merciless judgement. In blindness you are preaching the war. In blindness you are serving the darkness.

The king of darkness who has entered the holy Temple of Science. The Temple of the mind. The Temple of power, controlled by funding. You are managed, controlled and enslaved by money, controlled by evil. How could you forget your heart. Instead of using your power to save the people and to save the world, you use your power to create war machines to kill people, to create software that will finally be used to enslave the whole world and to manipulate the genetic code of our whole creation. You who believe in honor, in prizes, in funding are being mislead by honor, by funding and by prizes. You are creating the fruits of darkness and in blindness you are following the king of darkness. Mislead by non-existing probability. Mislead by non-existing elementary particles. Mislead by darkness.

“YHWH” is the light. The light that will destroys the darkness and will save the world. The light that shines in this world and becomes visible in the spiritual world as love.

When religion comes together with science, when the heart finds back the mind, evil will lose all his power. Then we will find that the light in our world is the same light that we see after we die. And in the spiritual world, the world we were before we were born, the world we go to after we die, in that world, love is visible as the strongest and the most beautiful light we have ever seen. Light is the first we see when we are born. Light is the first we see after we die. When we will understand the deepest secrets of light, the walls between our world and the spiritual world of the life after death will fall down.

“YHWH”. I am who I am. When we become “YHWH” we will understand that we are the spiritual world as well as this world as well as the doorway to heaven. The father, the Son and the Holy Spirit. The Tri-Unity “YHWH”.

We are the Tri-Unity of light as it was said by Jesus. Light is in the spiritual world (The father). Light is in this world (The son, born out of the Father, this world born out of the spiritual world). Light is the only doorway, the Holy Spirit, that connects this world with the spiritual world and let us pass from this world to the spiritual world when we die.

As Jesus has spoken: “I am the light of the world (John 8:12). No one comes to the father than through the son (John 14:6). I am the doorway to heaven (John 10:9)”. Jesus spoke about the light when he spoke about the Father, the Son and the Holy Spirit. Only the The light can bring back together science and religion. When science and religion come together, when the heart comes back to the mind, a shield will rise that no evil can pass.

The doorway of light through which we leave this earth when we die and pass on from this world to the spiritual world. To heaven or to hell. Everyone who dies has to pass through the doorway of light, the Holy Spirit. An immense light that blinds you and throws you back. A light that only the love can pass.

That is the new path for science and religion together. To find back the light, science has thrown away. To find back the cornerstone that the world has lost.

In his famous conclusion to the book: ”A Brief History of Time”, one of our most courageous scientists Stephen Hawking has written: “If scientists could find the most fundamental laws of nature, then we should know the mind of God”.

**3.** **Light as the Building Material of our Universe**

When we return back to the world of light, we simply have to ask one question to the light. How is it possible that the light in our world does exist? And we simply follow Newtons third law of equilibrium published in the “[Principia Mathematica Philisophiae Naturalis](https://cudl.lib.cam.ac.uk/view/PR-ADV-B-00039-00001/1)” in 1686.

This single fundamental only question has been asked: What are the fundamental boundaries which are required for a stable electromagnetic field configuration in which light can exist? And instead of taking the 4 well-known electromagnetic low frequency equations and put them together and find exactly the same results as James Maxwell has found, a different path has been chosen. There is only one boundary condition. **“The electromagnetic field has to be in a perfect equilibrium (balance) with itself and its surrounding.**” And when an electromagnetic field interacts with a gravitational field, **exactly the same boundary condition is required**. That is the single and only requirement. From this single requirement follows one single equation. Equation (5) (gravity excluded) and equation (5-a) (gravity included) in this manuscript.

All the solutions for electromagnetic configurations that are solutions of the Maxwell Equations are also solutions of Equation (5). But because of the special mathematical structure of (5) and (5-a) other electromagnetic field configurations are possible. And this will have an impact on our understanding of the universe, on our understanding of light. Because we cannot understand the universe until we understand light.

To find a possibility, to [create matter out of light](http://www.bibliotecapleyades.net/ciencia/secret_projects/project077.htm) we have to go back to the Equations of James Clerk Maxwell. The only possibility to declare the probability waves, discovered by Louis de Broglie, to be electromagnetic waves, to be light, and to be the building element of our universe, is to find evidence that he Maxwell Equations are not complete and that it is possible to confine light (electromagnetic waves) in spherical and elliptical shapes. A new equation has to be found. In this article it has been claimed that this missing equation is Equation (5). Because the Theory of General Relativity has been built on the Einstein-Maxwell Equation, a new equation has to be found that describes in a generalized way the interaction between light and matter. This missing equation is Equation (5-a).

Afbeelding met tekst

Beschrijving is gegenereerd met zeer hoge betrouwbaarheid

**Figure 3 First Image of the Hydrogen Atom’s Orbital structure**

The first step that has to be taken, is to find evidence that “de Broglie Waves” (“Material Waves”, “Quantum Mechanical Probability Waves”) are “Confined Single Harmonic Electromagnetic Waves” is to find a new Electromagnetic Equation that will replace the well-known 4 Maxwell Equations. James Clerk Maxwell published in 1865 in ”A Dynamical Theory of the Electromagnetic Field” the 4 well-known [Maxwell Equations](http://www.maxwells-equations.com/). To find an equation that describes in an extended way the Electromagnetic field we have to go back to the time before the Maxwell’s Equations. The Maxwell’s equations have been called the “second great unification in physics” after the “first unification in physics, realized by Isaac Newton. And that is the time we have to go back to, to discover a new equation, that unifies the electric and the magnetic field in a generalized way.

Afbeelding met schermafbeelding

Beschrijving is gegenereerd met zeer hoge betrouwbaarheid

**Figure 4 Maxwell’s Equations**

The second step that has to be taken, is that Confined Electromagnetic Waves have to be presented in a complex way comparable with the quantum mechanical probability function ψ and the complex conjugate function ψ\* in which the quantum mechanical probability density ψ ψ\* will be replaced by the electromagnetic mass density. This second step has been taken in an earlier publication (29) in which a complex notation for the electromagnetic field has been introduced in the equations (13), (14) and (15) on page 202, which has been published in 1995 in Physics Essays in [A Continuous model of Matter](https://www.researchgate.net/publication/256596197_Physics_Essays_1995?channel=doi&linkId=0deec523746b81b135000000&showFulltext=true) (*DOI:* 10.13140/RG.2.2.25149.77281). (ref. 29)

In Ref (29) in equation (13) the vector function  and the complex conjugate vector function  have been introduced in which  is the magnetic induction vector,  the electric field intensity vector and c the speed of light. Equation (14) represents the dot product which is proportional to the electromagnetic energy density w and according to Einstein’s equation  proportional to the electromagnetic mass density ϱ. The cross product  in equation (15) is proportional to the momentum of the confined single harmonic electromagnetic radiation

The third step step that has to be taken, is to provide evidence that the well-known “de Broglie” waves are solutions of the “Electromagnetic Continuity Equation” for “Confined Single Harmonic Electromagnetic Waves” with one single harmonic Frequency ω0 . And that the Quantum Mechanical Schrödinger Wave Equation is a complex notation presented in Ref. (29) in equation (55) on page 208 in which the complex notation for the Electromagnetic Continuity Equation has been presented which turns out to be identical to the well-known Quantum Mechanical Schrödinger Wave Equation. This has been published in 1995 in Physics Essays in [A Continuous model of Matter](https://www.researchgate.net/publication/256596197_Physics_Essays_1995?channel=doi&linkId=0deec523746b81b135000000&showFulltext=true) (*DOI:* 10.13140/RG.2.2.25149.77281). (ref. 29)

The fourth step that has to be taken, is to provide evidence that the well-known “de Broglie” waves at relativistic velocities are solutions of the “Electromagnetic Continuity Equation” for “Confined Single Harmonic Electromagnetic Waves” with one single harmonic Frequency ω0 . And that the Quantum Mechanical Dirac Equation is a complex notation for the Electromagnetic Continuity Equation for confined single harmonic electromagnetic waves. This evidence has been presented in Ref. (29) in equation (102) on page 213 in which the complex notation for the Electromagnetic Continuity Equation has been presented which turns out to be identical to the well-known Quantum Mechanical Dirac Equation at relativistic velocities. This has been published in 1995 in Physics Essays in [A Continuous model of Matter](https://www.researchgate.net/publication/256596197_Physics_Essays_1995?channel=doi&linkId=0deec523746b81b135000000&showFulltext=true) (*DOI*: 0.13140/RG.2.2.25149.77281). (ref. 29)

The famous [eclipse expedition of 1919](https://arxiv.org/ftp/arxiv/papers/0709/0709.0685.pdf) to Sobral, Brazil, and the island of Principe, in the Gulf of Guinea, led by Dyson, Eddington and Davidson was a turning point in the acceptance of the [General Theory of Relativity](http://theconversation.com/from-newton-to-einstein-the-origins-of-general-relativity-50013) developed by Albert Einstein in 1915. The correctness of this theory has been proven since then in many experiments. The success of his predictions made Einstein famous. Albert Einstein published his famous “Einstein Field Equations” (Einstein-Maxwell equations) in 1915, which were the mathematical foundation on which the Theory of General Relativity has been built. Einstein built his theory together with [Hermann Minkowski](http://www-history.mcs.st-andrews.ac.uk/Biographies/Minkowski.html) using the complex [4-dimensional Minkowski Space](https://www.impan.pl/~pmh/teach/algebra/additional/minkowski.pdf) and [Hendrik Antoon Lorentz](http://www-groups.dcs.st-and.ac.uk/history/Biographies/Lorentz.html) using the Electromagnetic Lorentz Transformations, developed by [Hendrik Antoon Lorentz](http://www-groups.dcs.st-and.ac.uk/history/Biographies/Lorentz.html) .

In this manuscript, the starting point is almost 300 years ago. Long before James Maxwell published his Maxwell equations, before Albert Einstein published the Theory of General Relativity and far before the time Niels Bohr introduced the probability waves, discovered by Erwin Schrödinger which were the nonlogical grounds on which Quantum Physics has been built.

The starting point is the moment just after [Isaac Newton](https://www.britannica.com/biography/Isaac-Newton) had published the breaking of light into the colors of the rainbow through a prism in [The Lectiones Opticae” in 1728](http://users.clas.ufl.edu/ufhatch/pages/02-TeachingResources/readingwriting/newton/05-newton-timeline-m.htm). Newton just had discovered the beauty of light when light had revealed one of its many secrets. And he could only express: ”Light is beautiful”.

When we return back to the world of light, we simply have to ask one question to the light. How is it possible that the light in our world does exist? And we simply follow Newtons third law of equilibrium published in the “[Principia Mathematica Philisophiae Naturalis](https://plato.stanford.edu/entries/newton-principia/)” in 1686.

This single fundamental only question has been asked: What are the fundamental boundaries which are required for a stable electromagnetic field configuration in which light can exist? And instead of taking the 4 well-known electromagnetic low frequency equations and put them together and find exactly the same results as James Maxwell has found, a different path has been chosen. There is only one boundary condition. **“The electromagnetic field has to be in a perfect equilibrium (balance) with itself and its surrounding.**” And when an electromagnetic field interacts with a gravitational field, **exactly the same boundary condition is required**. That is the single and only requirement. From this single requirement follows one single equation. Equation (5) (gravity excluded) and Equation (5-a) (gravity included) in this manuscript.

All the solutions for electromagnetic configurations that are solutions of the Maxwell Equations are also solutions of Equation (5). But because of the special mathematical structure of Equation (5) and (5-a) other electromagnetic field configurations are possible which are non-linear solutions of (5) and (5-a). And this will have an impact on our understanding of the universe, on our understanding of light. Because we cannot understand the universe until we understand light.

[John Archibald Wheeler](https://phy.princeton.edu/department/history/faculty-history/john-wheeler) (1)  introduced in 1953 the concept of [GEONS](https://journals.aps.org/pr/abstract/10.1103/PhysRev.97.511) (**G**ravitational **E**lectr**O**-magnetic e**N**tities) in which electromagnetic radiation has been confined by its own gravitational field. To calculate the dimensions of these gravitational-electromagnetic confinements J. Wheeler based his calculations on the Einstein-Maxwell equations, the mathematical ground on which the Theory of General Relativity has been built and found electromagnetic-gravitational confinements with a diameter of several lightyears and a lifetime of several milliseconds. The results were very disappointing because an elementary particle with a diameter of several lightyears and a lifetime of a few milliseconds can hardly be considered as an elementary particle.

In the presented theory the electromagnetic-gravitational interaction has been grounded on Newton’s third law. It has been grounded on the stability of electromagnetic-gravitational fields in a perfect equilibrium with itself and its surrounding. In table 1, electromagnetic-gravitational confinements have been presented for any harmonic (sinusoidal) frequency with an infinite lifetime and diameters varying from  based on equation 5-a in a spherical coordinate system.

Because this fundamental approach in electromagnetic field configurations is different than the classical approach by J. Maxwell and A. Einstein, a different result is expected. Instead of electromagnetic-gravitational confinements with a diameter of several lightyears and a lifetime of several milliseconds, presented by J. Wheeler in 1953, electromagnetic-gravitational confinements have been presented in Table 1 with diameters varying from  and an infinite lifetime for any harmonic frequency based on equation (5-a).

**4.** **Newton’s Third law generalized for Electromagnetic Radiation**

In a way comparable to the way that GEONS (**G**ravitational **E**lectr**O**-magnetic e**N**tities) are described by J. Wheeler in General Relativity by the Gravitational-Electromagnetic Equilibrium Equation (1,7,8,13,35,38) (the Einstein-Maxwell Equations) , Electromagnetic Confinements are described by the Dynamic Equilibrium Equation (5).

Newton’s Third law has been generalized in all layers of Physics. There is no reason not to generalize Newton’s third law also within electromagnetic fields. To generalize Newton’s third law within Electromagnetic Field Configurations, the [Divergence](https://en.wikiversity.org/wiki/Pressure_stress-energy_tensor) has been taken of the Stress Energy Tensor (3) , which results in Equation (4) to calculate the [force densities f](https://en.wikiversity.org/wiki/Pressure_stress-energy_tensor) within the Electromagnetic Field Configuration.

The [Energy Momentum Tensor](http://www.maths.dur.ac.uk/~klnh23/presentations/energy-momentum-slides.pdf)(9)  equals:



In which are the elements of the [Maxwell Tensor](https://quantummechanics.ucsd.edu/ph130a/130_notes/node451.html) defined by:



The four-vector potential  is defined by:  where  is the electric scalar potential, c the speed of light in vacuum and  is the magnetic vector potential(1,2,3). Substituting (2) in (1) results in the [Stress Energy Tensor](https://en.wikipedia.org/wiki/Electromagnetic_stress%E2%80%93energy_tensor)(1,16,29). :



In the absence of any Gravity, the force density  in the 3 directions of the 3 coordinates of the chosen 3-coordinate system follows from the (4-dimensional) Divergence of the (4-dimensional) [Stress Energy Tensor](https://arxiv.org/pdf/1605.09236.pdf) (8,9,38) (3).

The Divergence of a Vector equals a Scalar. The Divergence of a Tensor equals a Vector. The 4-dimensional Divergence of the 4-dimensional [Stress Energy Tensor](https://en.wikipedia.org/wiki/Electromagnetic_stress%E2%80%93energy_tensor) (4) equals the [4-dimensional Force-density Vector](https://en.wikipedia.org/wiki/Four-force). The first 3 terms of the 4-dimensional Force-density vector equal the force densities in the corresponding 3 dimensions of the chosen Coordinate System. The 4th component equals the [Electromagnetic Poynting’s Theorhem](https://en.wikipedia.org/wiki/Poynting%27s_theorem).

To calculate the equilibrium conditions in the Electromagnetic Field Configuration, the first 3 terms of the 4-dimensional Force-density vector are being used.

By re-arranging the first 3 terms of the (4-dimensional Divergence) of the (4-dimensional) [Stress Energy Tensor](https://arxiv.org/pdf/1605.09236.pdf) (4) an equation for the [3-dimensional force density](https://en.wikiversity.org/wiki/Pressure_stress-energy_tensor) within the Electromagnetic Field Configuration has been created. This Equation (4) represents the [3-dimensional force density](https://en.wikiversity.org/wiki/Pressure_stress-energy_tensor)  in a coordinate-free vector equation in the absence of any Gravity:



According Newton’s third law, the force density has to equal zero for any physical possible electromagnetic configuration (free radiation or confinement). According Newton’s third law it is the only required and sufficient boundary condition that the force densities in the 3 dimensions of the chosen coordinate system equal zero at any space at any time.

An electromagnetic field which is in a perfect equilibrium with itself and its surrounding at any space and time, fulfills the necessary requirements of Newton’s third law for the physical possibility of the existence of this field. Under that condition Equation (4) transforms into the [Dynamic Equilibrium Equation](https://www.nature.com/articles/nature12512) (5), which expresses the force density equals the vector zero of an electromagnetic field on itself and its surrounding in a [perfect equilibrium](https://arxiv.org/pdf/1709.01478.pdf). The part of the Dynamic Equilibrium Equation(7,8,9.20). (DEE) (5), representing the equilibrium for the force densities in the 3 directions of the chosen coordinate system equals: The resulting [REM](http://news.mit.edu/2018/physicists-create-new-form-light-0215) equation equals:

Substituting the well-known [4 Maxwell Equations](https://en.wikipedia.org/wiki/Maxwell%27s_equations) in vacuum into (5) results in:



According Maxwell’s equations the electromagnetic field is divergence free. And (5.1) results in:



Equation 5.2 is a well-known vector identity and the left side also equals zero. Equation (5) is a much more powerful Equation than the four well-known [4 Maxwell Equations](https://en.wikipedia.org/wiki/Maxwell%27s_equations). Equation (5) includes all the [4 Maxwell Equations](https://en.wikipedia.org/wiki/Maxwell%27s_equations) in vacuum. This implies that every solution of the [4 Maxwell Equations](https://en.wikipedia.org/wiki/Maxwell%27s_equations) in vacuum is also a solution of Equation (5).

But in contradiction to the solutions for the [4 Maxwell Equations](https://en.wikipedia.org/wiki/Maxwell%27s_equations) there is no requirement that for Equation (5) the electromagnetic field has to be Divergence-Free. And in physics this is very often a fact. A laser beam with a Gaussian Intensity Division is never Divergence-free. But it is a perfect solution of Equation (5). Equation (5) offers unique possibilities for Electromagnetic Interactions and for Electromagnetic Confinements. And that powerful fact makes Equation (5) unique and will change the possibilities in the Electromagnetic Field Configurations dramatically.

The Relativistic Gravitational Electro Magnetic (RGEM) equation within a gravitational field  equals:



**5. 1** **EM Radiation within a Cartesian Coordinate System in the absence of gravity**

The required [Electromagnetic Field Configuration](https://osf.io/gbn4p/) for a perfect Equilibrium in Space and Time follows from the dynamic equilibrium equation (5) and equals in Cartesian Coordinates for the Electric Field Components e:

The required Electromagnetic Field Configuration for a perfect Equilibrium in Space and Time follows from the dynamic equilibrium equation (5) and equals in Cartesian Coordinates for the Magnetic Field Components m:



In which  is an arbitrary constant. For the divergence-free function , the solutions (6) and (7) are also the solutions for the known Maxwell Equations. For the non-divergence-free functions, the solutions (6) and (7) are not solutions for the Maxwell Equations, which requires divergence-free electromagnetic waves, propagating with the speed of light , in the absence of any matter. But they are solutions of the [Dynamic Equilibrium Equation (5)](http://science.topacademy.center/Electromagnetic%20Gravitational%20Interaction/Berekeningen/Electromagnetic-Gravitational%20Interaction%20and%20Confinement%20Extended%20Version%201.01.nb) and clearly do exist in physics. Comparable with the projection of a slide with a beamer on a flat screen in the z-direction. In which the slide has an arbitrary intensity-division. The information on the slide propagates with the speed of light towards the screen in the z-direction in this example.

**5. 1.1** **Laser Beam with a Gaussian division in the x-y plane within a Cartesian Coordinate System in the absence of gravity**

The required [Electromagnetic Field Configuration](https://osf.io/gbn4p/) for a perfect Equilibrium in Space and Time follows from the dynamic equilibrium equation (5).



**Figure 5. Electromagnetic Field Intensity with a Gaussian division**

The required [Electromagnetic Field Configuration](https://osf.io/gbn4p/) equals in Cartesian Coordinates for the Electric Field Components e:

The required Electromagnetic Field Configuration for a perfect Equilibrium in Space and Time follows from the dynamic equilibrium equation (5) and equals in Cartesian Coordinates for the Magnetic Field Components m:



In which  is an arbitrary constant. The Gaussian division is ***not a solution*** of the Maxwell Equations, because the divergence of the Electric field intensity ***does not equal zero***



And the divergence of the Magnetic field intensity ***does not equal zero***.



For the non-divergence-free functions , the solutions (6) and (7) are not solutions for the Maxwell Equations, which requires divergence-free electromagnetic waves, propagating with the speed of light , in the absence of any matter. But they are solutions of the [Dynamic Equilibrium Equation (5)](http://science.topacademy.center/Electromagnetic%20Gravitational%20Interaction/Berekeningen/Electromagnetic-Gravitational%20Interaction%20and%20Confinement%20Extended%20Version%201.01.nb) and clearly do exist in physics. Comparable with the projection of a slide with a beamer on a flat screen in the z-direction. In which the slide has an arbitrary intensity-division and the intensity is not [Divergence Free](https://en.wikipedia.org/wiki/Solenoidal_vector_field). The information on the slide propagates with the speed of light towards the screen in the z-direction in this example and is a real physical possibility and is not a solution of the Maxwell equations but is a solution of the Dynamic Equilibrium Equation (5) and clearly do exist in physics.

**5.2** **EM Radiation within a Cartesian Coordinate System under the influence of a Longitudinal Gravitational Field g**

The required [Electromagnetic Field Configuration](https://osf.io/gbn4p/) for a perfect Equilibrium in Space and Time for a Longitudinal Gravitational Field (The Light propagates in the same z-direction as the z-direction of the Gravitational Field ) follows from the Dynamic Equilibrium Equation (5-a) and equals in Cartesian Coordinates for a gravitational field “g” for the Electric Field Components e:

****

The required Electromagnetic Field Configuration for a perfect Equilibrium in Space and Time for a Longitudinal Gravitational Field (The Light propagates in the same z-direction as the z-direction of the Gravitational Field ) follows from the Dynamic Equilibrium Equation (5-a) and equals in Cartesian Coordinates for a gravitational field “g” for the Magnetic Field Components m:



Equation (6-a) and (7-a) are solutions of [(5-a)](http://science.topacademy.center/Electromagnetic%20Gravitational%20Interaction/Berekeningen/Electromagnetic-Gravitational%20Interaction%20and%20Confinement%20Extended%20Version%201.01.nb) under the influence of a Longitudinal Gravitational field with field intensity “g” that acts along the z-direction while the electromagnetic wave is also propagating in the z-direction.

The electromagnetic wave is propagating with the unaltered speed of light , independently of the strength g of the gravitational field in the z-direction. However, the amplitude of the electromagnetic wave becomes dependently of the gravitational intensity “g” and the distance “z” and changes along the z-axis with the electromagnetic-gravitational interaction term  .

In this example is chosen for e.g. a laser beam positioned vertically on the ground on earth , shining vertically against the gravitational field “g” of the earth. Because the laser beam presents electromagnetic energy, the beam has electromagnetic mass. The potential energy of the electromagnetic mass is increasing while the laser light is propagating upwards, against the direction of the gravitational field. Because of the law of conservation of Energy, the electromagnetic energy is decreasing over a distance “z” proportional with the same amount  as the potential energy of the electromagnetic mass is increasing.

**5. 3** **The Real Light Intensity of the Sun, measured in our Solar System, including Electromagnetic Gravitational Conversion**

When a beam of light leaves the surface of the sun, the light will travel in the radial direction of the radial gravitational field caused by the sun. The required [Electromagnetic Field Configuration](https://osf.io/gbn4p/) for a perfect Equilibrium in Space and Time for a Radial Gravitational Field (The Light propagates in the same radial-direction as the radial-direction of the Gravitational Field ) follows from the Dynamic Equilibrium Equation (5-a) and equals in Spherical Coordinates for a gravitational field “g(r)” for the Electric Field Components e:

****

The required [Electromagnetic Field Configuration](https://osf.io/gbn4p/) for a perfect Equilibrium in Space and Time for a Radial Gravitational Field (The Light propagates in the same radial-direction as the radial-direction of the Gravitational Field ) follows from the Dynamic Equilibrium Equation (5-a) and equals in Spherical Coordinates for a gravitational field “g(r)” for the Magnetic Field Components m:



Equation (6-b) and (7-b) are solutions of [(5-a)](http://science.topacademy.center/Electromagnetic%20Gravitational%20Interaction/Berekeningen/Electromagnetic-Gravitational%20Interaction%20and%20Confinement%20Extended%20Version%201.01.nb) under the influence of a Radial Gravitational field with field a gravitational field intensity “g(r)” that acts along the radial-direction while the electromagnetic wave is also propagating in the radial-direction.

When a light beam leaves the surface of the sun, the intensity will decrease according (6-b). At earth, the measured intensity will be according (5-a) and (6-b):



When a mass , for example a ball, has been thrown into the air, the mass moves against the direction of the gravitational field of the earth and kinetic energy has been converted into potential energy. When the ball has reached the maximum height, the ball falls back towards the earth and the potential energy has been converted again into kinetic energy. The total sum of kinetic energy and potential energy remains constant.

A beam of light represents an amount of electromagnetic energy. Which equals an amount of electromagnetic mass. This amount of electromagnetic mass is moving with the speed of light in the opposite direction of a (radial) gravitational field and gains potential energy. Because the law of conservation of energy , a part of the electromagnetic energy of the light beam has to be converted into potential energy according equation (6-c).



**Figure 6. Electromagnetic Gravitational Conversion Term **

For a radius of the sun equals 695,508 [km] and a distance from the sun to the earth of 149,600,000 [km], the Electromagnetic Gravitational Conversion (EMGC) term equals:



This means that the **real intensity** of the light at the surface of the sun is about 4 times higher than the intensity which would have been calculated in a classical way from the sunlight intensity measured on earth, due to Electromagnetic Gravitational Conversion.

Equations (6-b) and (7-b) are solutions of (5-a) under the influence of a Radial Gravitational field with field intensity “g(r)” that acts along the radial-direction while the electromagnetic wave is also propagating in the same radial-direction. The electromagnetic wave is propagating with the unaltered speed of light , independently of the strength g(r) of the gravitational field in the radial-direction. However, the amplitude of the electromagnetic wave becomes dependently of the gravitational intensity “g(r)” and the distance “r” and changes along the radial direction due to the Electromagnetic-Gravitational Conversion term  .

Because of the law of conservation of Energy, the electromagnetic energy of the light emitted by the sun is decreasing over a distance “r” proportional with the same amount  as the potential energy of the electromagnetic mass of the light emitted by the sun is increasing.

**5. 4** **The Origin of Dark Matter**

The Cosmic Microwave Background Radiation (CMBR) is the dominant radiation field in the Universe, and one of the most powerful cosmological tools that has yet been found, 25 years after its discovery by Penzias & Wilson (1965) .

Within a few years of the discovery of the CMBR, it was established the radiation field is close to isotropic, with a spectrum characterized by a single temperature, *T*rad approx 2.7 K. The specific intensity of the radiation is therefore close to



which corresponds to a peak brightness *I*max ~ 3.7 x 10-18 W m-2 Hz-1 sr-1 at fmax  ~ 160 GHz and an energy density *if* ~ 4 x 10-14 J m-3, which can also be expressed as a mass density ϱem ~ 5 x 10-31 kg m-3.

When from the earth an [Electromagnetic Mass Density](https://ned.ipac.caltech.edu/level5/Birkinshaw/Birk1_1.html) has been measured which equals , the [Total Mass of the Universe](https://ned.ipac.caltech.edu/level5/Birkinshaw/Birk1_1.html) can be roughly calculated without and with regarding the effect of Electromagnetic Gravitational Conversion.

At the Origin of the Universe, at the start of the Big Bang, a large amount of electromagnetic radiation has been blown into the universe, which has been measured on earth as the well-known CMBR. The radiation, traveling for billions of years against the gravitational field of the origin of the universe and has gained during that time an enormous amount of potential energy. Because of the conversation of energy and the transfer of electromagnetic energy into potential energy, the intensity of the CMBR, measured on earth, has been much lower than the real intensity has been at the origin.

As an example a visible universe like a sphere has been chosen with a [radius](https://en.wikipedia.org/wiki/Observable_universe) of 4.4 1026 [m] and the earth located in the middle between the origin of the Big Bang and the outer boundaries of the visible Universe. As an example, two basic calculations have been done. The first one, calculating the total electromagnetic mass in the universe without taking into account the Electromagnetic-Gravitational Interaction.



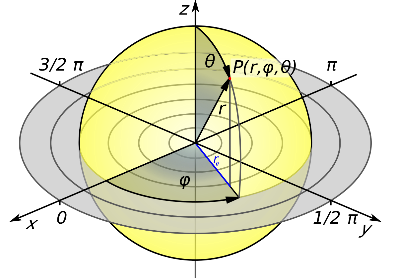
The second calculation has been done by taking into account the Electromagnetic-Gravitational Interaction, including the Electromagnetic-Gravitational Conversion term .



Including the effect of Electromagnetic-Gravitational Conversion changes an almost negligible effect of the CMBR on the total mass of the Universe into an effect that can easily explain the total mass of the Universe while neglecting the influences of the mass of the galaxies. And makes the Theory of Dark Matter avoidable.

**6.** **Electromagnetic Radiation within a Spherical Coordinate System**

The Spherical Coordinate System is parameterized by the radius r of the Sphere, the polar angle  and the azimuthal angle and the time t.

****

The required [Electromagnetic Field Configuration](https://osf.io/gbn4p/) for a perfect Equilibrium in Space and Time follows from equation (5) and equals in Spherical Coordinates for the Electric Field Components e:



The required Electromagnetic Field Configuration for a perfect Equilibrium in Space and Time follows from equation (4) and equals in Spherical Coordinates for the Magnetic Field Components m:



For the divergence-free function , the solutions (8) and (9) are also the solutions for the known Maxwell Equations. For the non-divergence-free functions  , the solutions (8) and (9) are no solutions for the Maxwell Equations, which require divergence-free electromagnetic waves in the absence of any matter. (29,35,36,37,38). They are however solutions of the [DEE (5)](http://science.topacademy.center/Electromagnetic%20Gravitational%20Interaction/Berekeningen/Electromagnetic-Gravitational%20Interaction%20and%20Confinement%20Extended%20Version%201.01.nb) and clearly they do exist in physics. Like the radiation of an inhomogeneous point light source like a LED.

**7.** **Confined Electromagnetic Radiation within a Spherical Coordinate System through Electromagnetic-Gravitational Interaction**

In physics it has been in generally assumed that the speed of light is a physical constant. In this paragraph the possibilities will be discussed of a variable speed of light (10,11,12). that can vary from zero until values higher than c. The only requirement for the existence of an Electromagnetic Field Configuration will be the requirement of a perfect equilibrium in space-time for the chosen electromagnetic field configuration(13,14,15). This single unique requirement will always be a solution of the DEE (5).

The required [Electromagnetic Field Configuration](https://osf.io/gbn4p/) for a perfect Equilibrium in Space and Time(16,17,18,30,31,39 in respectively the :  and the  follows from equation (5).

In Spherical Coordinates the solution for the [DEE (5)](http://science.topacademy.center/Electromagnetic%20Gravitational%20Interaction/Berekeningen/Electromagnetic-Gravitational%20Interaction%20and%20Confinement%20Extended%20Version%201.01.nb) for the Electric Field Components  equals:



In Spherical Coordinates the solution for the DEE (5) for the Magnetic Field Components  in respectively the :  and the  for the magnetic field components follows from equation (5) (29,30,31). and equals:



Equation (4) gives the 3-dimensional force density  of an Electro-Magnetic Field Configuration(19,20,21). in a coordinate free vector equation.



It follows from equation (4) that the radiation pressure in radial direction does not counterbalance and does not equal zero.

The energy-density of the Electromagnetic Configuration is essential for the calculation of the inward bounded gravitational pressure. The electromagnetic field configuration (10) and (11) for the functions , results into the electromagnetic energy-density :



According to Einstein’s mass-energy equivalent  ,the specific electromagnetic mass(22,23,24,29). density  equals:



The total electromagnetic mass (25,6,27,29,38).  within a sphere with radius R equals:



At a distance r from the center of the sphere, the total electromagnetic mass within the sphere(25,26,27,30). causes, according Newton’s Shell Theorem(28,29,30) , a gravitational field

strength :



In which  is the gravitational constant and equals . The gravitational inwards bounded radiation pressure(29,31,32,33). follows from (16):



When there is a perfect equilibrium between the outwards bounded electromagnetic radiation pressure  and the inward bounded gravitational pressure (29,34,35,38,39). we find from (12) and (17) the radius of the boundary sphere of the enclosed radiation . for the functions ,



In the following example we choose for the function f(r)

Substituting (19) in (18) results in the equation for :





**8.** **The fundamental conflict between Causality and Probability**

The beginning of the conflict between Causality and Probability in Physics started at the historic invitation-only “Conseil Solvay” in 1911. Since that conference Albert Einstein has always defended the fundamental concept of Causality and the logical grounds for Causality and Effect while Niels Bohr has always defended the fundamental concept of Probability in which there is no relationship between Causality and Effect. The most fundamental and famous conference was the October 1927 “Fifth Solvay International Conference on Electrons and Photons” where the newly formulated Quantum Theory, based on Probability, had been accepted. Since then Quantum Physics has grown in power and has always been grounded on the material waves, for the first time mathematically described by Erwin Schrödinger and designated to be probability waves.

In Ref. (29) page 206 the “law of continuity” for electromagnetic radiation has been presented in equation (42), By presenting the electromagnetic field in a complex configuration in equation (48) on page 207, the electromagnetic continuity equation (42) has been presented as the quantum mechanical Schrödinger wave equation (53) on page 207. However the function ψ in (53) does not represent the quantum mechanical probability function but represents the confined electromagnetic field with harmonic frequency ω0 in which the magnetic part has been presented as the real function  and the electric part has been presented as the imaginary function . With “i” the imaginary number . However as well as the electric part as the magnetic part of the confined electromagnetic field are both real.

In Ref. (29) on page 208 the “law of continuity” for electromagnetic radiation has been presented in equation (57). The vector function  represents the confined electromagnetic field with harmonic frequency ω0 in which the magnetic part has been presented as the real vector function  and the electric part has been presented as the imaginary vector function . By substituting the complex vector function  in (57) and using the relativistic Lorentz transformations, the quantum mechanical relativistic Dirac equation has been derived in equation (102) on page 213. This has been published in 1995 in Physics Essays in [A Continuous model of Matter](https://www.researchgate.net/publication/256596197_Physics_Essays_1995?channel=doi&linkId=0deec523746b81b135000000&showFulltext=true) (*DOI:* ***10.13140/RG.2.2.25149.77281***). (ref. 29).

This fundamental conflict is still going on and in this article [mathematical results](https://osf.io/gbn4p/) are presented in Table 1 in which the famous De Broglie waves, the material waves, designated as probability waves are electromagnetic waves with one harmonic frequency ω, confined by electromagnetic-gravitational interaction. Electromagnetic waves fully grounded on Causality and Effect.

Table 1 below presents several values for the [calculated](https://osf.io/gbn4p/) Equilibrium Radius  (20) at different values  and n in Equation (18), (19) and (20) for the harmonic Electromagnetic-Gravitationally confined Electromagnetic waves with frequency ω0:

[Table 1:](http://science.topacademy.center/Electromagnetic%20Gravitational%20Interaction/Berekeningen/Electromagnetic-Gravitational%20Interaction%20and%20Confinement%20Extended%20Version%201.01.nb)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Values for n | Values for | RBOUNDARY [m] | Frequency ω0 | Area |
| -10 | 1 | 0.000724227 | 2.6 × 1012 | Electromagnetic Particle  (Electromagnetically Controlled) |
| -4 | 1 | 5.5940239 × 10-10 | 3.37 × 1018 |
| -2 | 1 | 6.7798267 × 10-28 | 2.78 × 1036 |
| -2 | 2 | 1.3559653 × 10-27 | 1.39 × 1036 |
| -2 | 1018 | 6.7798267 × 10-10 | 2.78 × 1018 |
| -1.6 | 1 | 3.0622921 × 10-45 | 6.15 × 1053 |
| -1.51 | 1 | 4.7888625 × 10-52 | 3.94 × 1060 |
| -1.51 | 1018 | 9.4264902 × 10-17 | 2.0 × 1025 |
| -1 | 1 | Infinite |  | Solution of (5) |
| -0.9 | 1 | 1.2126075 × 10267 | 1.55 × 10-258 | Electromagnetic Black Hole  (Gravitationally Controlled) |
| -0.5 | 1 | 2.1755186 × 1054 | 8.66 × 10-46 |
| -0.5 | 1018 |  |  |
| -0.5 | 1036 |  |  |

**9.** **Confined Electromagnetic Radiation within a Toroidal Coordinate System**

The Toroidal Coordinate System is parameterized by the large radius R of the Torus. The Toroidal Coordinate System is obtained by rotating bipolar coordinates around an axis perpendicular to the axis connecting the two foci. The coordinate specifies the angle of rotation.

Afbeelding met lucht, vliegtuig, accessoire, ballon

Beschrijving is gegenereerd met hoge betrouwbaarheid

The required [Electromagnetic Field Configuration](https://osf.io/gbn4p/) for a perfect Equilibrium in Space and Time equals in Toroidal Coordinates for the [Electric Field Components](http://science.topacademy.center/Electromagnetic%20Gravitational%20Interaction/Berekeningen/Electromagnetic-Gravitational%20Interaction%20and%20Confinement%20Extended%20Version%201.01.nb) 



The required Electromagnetic Field Configuration for a perfect Equilibrium in Space and Time equals in Toroidal Coordinates for the [Magnetic Field Components](http://science.topacademy.center/Electromagnetic%20Gravitational%20Interaction/Berekeningen/Electromagnetic-Gravitational%20Interaction%20and%20Confinement%20Extended%20Version%201.01.nb) :



**10.** **Confined Electromagnetic Radiation within a Toroidal Coordinate System through Electromagnetic-Gravitational Interaction in a non-linear Space-Time Continuum**

The required [Electromagnetic Field Configuration](https://osf.io/gbn4p/) for a Gravitational-Electromagnetic Equilibrium in Space and Time equals in Toroidal Coordinates for the Electric Field Components e:



The required Electromagnetic Field Configuration for a Gravitational-Electromagnetic Equilibrium in Space and Time equals in Toroidal Coordinates for the Magnetic Field Components m:



The toroidal electromagnetic field configuration is in perfect equilibrium with itself and its surrounding in respectively the  direction. There is a resulting electromagnetic outward bounding force density in the r-direction,  indicated as the outward bounding radiation pressure of the toroidal electromagnetic confinement.



This resulting outward bounding radiation pressure has to be compensated by the inward bounding gravitational force density, to create the required equilibrium by [electromagnetic-gravitational interaction.](http://science.topacademy.center/Electromagnetic%20Gravitational%20Interaction/Berekeningen/Electromagnetic-Gravitational%20Interaction%20and%20Confinement%20Extended%20Version%201.01.nb)

In a comparable way as in the example presented in spherical coordinates in (13) and (14) , the electromagnetic mass-density from the energy density in the torus can be calculated. With these values the inward bounded gravitational radiation pressure can be derived. From the requirement that both force densities have to compensate each other, the Boundary Radius  for the toroidal confinement can be calculated.

**11.** **Newton’s second law for Confined Electromagnetic radiation**

When Erwin Schrödinger published in 1926 the well-known Schrödinger wave equation with the characteristic spherical and elliptical wave solutions, he found a mathematical presentation for “De Broglie” or the Material Waves. When Bohr assigned these “ De Broglie” waves as “Probability Waves”, he excluded ”De Broglie” from any mass. The mass was for 100 % in the elementary particle itself and “De Broglie” waves without any mass described the probability of the position of this elementary particle. A complete non logical approach.

A fundamental logical approach is to assign the mass to “De Broglie” waves. And that is only possible when we “De Broglie” waves are just “Confined Single Harmonic Electromagnetic Waves” (confined light). For this reason the mass of confined electromagnetic radiation has to be calculated. It will be clear that it is impossible to assign mass to free electromagnetic radiation. Because it is impossible to accelerate free electromagnetic radiation and the concept of mass if based on the inertia of mass by Newton’s second law. For this reason the inertia of “Confined Single Harmonic Electromagnetic Waves” (confined light) has to be calculated.

For the first step in this calculation an imaginary experiment has been used. Two 100 % reflecting mirrors B and A (both in the x-y plane and without any mass) are placed opposite each other at a distance ( [ref 29, page 7, figure 1](https://www.researchgate.net/publication/239010472_A_Continuous_Model_of_Matter_Based_on_AEONs) ). A single harmonic electromagnetic wave has been confined between both mirrors. Between both mirrors a “Standing Electromagnetic Wave” appears which has been formed by two waves travelling in opposite directions along the z-axis.

The Poynting vector corresponding with the electromagnetic wave propagating along the z-axis in the + direction (positive direction of the z-axis) has been indicated as  and the Poynting vector corresponding with the electromagnetic wave propagating along the z-axis in the - direction (opposite direction) has been indicated as .

The system is at rest. The [radiation pressures](https://en.wikipedia.org/wiki/Radiation_pressure), caused by the confined electromagnetic radiation, on both mirrors A and B are opposite and equal in magnitude:



Einstein has formulated this very well. “Velocities are always relative” . To calculate the radiation pressure on Mirror A, the velocities, only relative to Mirror A for the waves with the respective Poynting vectors  and  M , have to be calculated.

**11.1.1** **The radiation pressure on Mirror A, when Mirror A moves with a velocity v in the direction of the positive z-axis**

When the system of “Two Mirrors B - A” moves in the direction of the positive z-axis, Mirror A moves in the direction of the positive z-axis and the Poynting vector will decrease according the Lorentz transformation ( [ref. 29, page 23, A-57](https://www.researchgate.net/publication/239010472_A_Continuous_Model_of_Matter_Based_on_AEONs) ).



When the system of “Two Mirrors B - A” moves in the direction of the positive z-axis, Mirror A moves in the direction of the positive z-axis the Poynting vector will increase according the Lorentz transformation ( [ref. 29, page 23, A-57](https://www.researchgate.net/publication/239010472_A_Continuous_Model_of_Matter_Based_on_AEONs) ).



The total [radiation pressure](https://en.wikipedia.org/wiki/Radiation_pressure), caused by the confined electromagnetic radiation, on mirror A equals:



**11.1.2** **The radiation pressure on Mirror B when Mirror B moves with a velocity v in the direction of the positive z-axis**

When the system of “Two Mirrors B - A” moves in the direction of the positive z-axis, Mirror B moves in the direction of the positive z-axis and the Poynting vector will increase according the Lorentz transformation ( [ref. 29, page 23, A-57](https://www.researchgate.net/publication/239010472_A_Continuous_Model_of_Matter_Based_on_AEONs) ).



When the system of “Two Mirrors B - A” moves in the direction of the positive z-axis, Mirror A moves in the direction of the positive z-axis the Poynting vector will increase according the Lorentz transformation ( [ref. 29, page 23, A-57](https://www.researchgate.net/publication/239010472_A_Continuous_Model_of_Matter_Based_on_AEONs) ).



The total [radiation pressure](https://en.wikipedia.org/wiki/Radiation_pressure), caused by the confined electromagnetic radiation, on mirror B equals:



 and  are still equal in magnitude and both in opposite direction and still cancel each other. The system fulfils Newton’s first law of motion.

**11.2** **Newton’s second Law of Motion (Inertia) for Confined Electromagnetic Radiation**

When the system of “Two Mirrors B - A” accelerates, the velocity increases with  in a time interval . At time t the radiation pressures on mirror A and mirror B are presented in (29) and (32). At time the radiation pressures on Mirror A and Mirror B will different:

The [radiation pressure](https://en.wikipedia.org/wiki/Radiation_pressure) at time caused by the confined electromagnetic radiation, on mirror A equals:



Because the wave with Poynting vector  has left Mirror B at “t” and during the time interval  the magnitude of  and  has not changed.

The [radiation pressure](https://en.wikipedia.org/wiki/Radiation_pressure) at time caused by the confined electromagnetic radiation, on mirror B equals:



Because the wave with Poynting vector  has left Mirror A at “t” and during the time interval  the magnitude of  and  has not changed.

The radiation pressures on Mirror A and Mirror B do not counterbalance each other anymore and the resulting radiation pressure equals:



Equation (35) can be written as:



In which the acceleration  and the inertia . At non relativistic velocities  and (36) turns into the Newton’s second law of motion. From (36) also Einstein’s famous equation follows. In (36) W is the total confined electromagnetic mass.

Now we can consider electromagnetic confinements without mirrors but electromagnetic confinements through electromagnetic gravitational interaction. By superposition and integration over arbitrary surfaces it is possible to prove that all confined electromagnetic radiation equals (36) and has electromagnetic mass and follow Newton’s second law of motion.

**12.** **Concluding Remarks**

The example of Gravitational-Electromagnetic Interaction, presented in table 1 shows two types of confinement.

1. For values  ,the Gravitational-Electromagnetic Confinement will be Gravitationally controlled (Table 1). This means that for values for  the inward bounded Gravitational for will be larger than the outward bounded Electromagnetic Radiation pressure. Electromagnetic Radiation will be attracted by Gravity towards the confinement at the surface . Because for values the outward bounded radiation pressure is higher than the inward bounded gravitational pressure, all the radiation will be forced to be confined at equilibrium just at the surface of the spherical sphere with radius . The confinement can be considered as an Electromagnetic Black Hole.
2. For values  ,the Gravitational-Electromagnetic Confinement will be Electromagnetically controlled (Table 1). This means that for values for  the inward bounded Gravitational for will be smaller than the outward bounded Electromagnetic Radiation pressure. Electromagnetic Radiation will be scattered by the Radiation Pressure away from the confinement at the surface . Because for values the outward bounded radiation pressure is smaller than the inward bounded gravitational pressure, all the radiation will be confined within the sphere with radius . The confinement can be considered as an Electromagnetic Particle.
3. For values  ,the inward bounded Gravitational pressure equals the outward bounded Electromagnetic Radiation pressure at any distance r. The calculated value for becomes .

Because of the extremely high-energy densities within electromagnetic-gravitational confinements and the extremely small dimensions, the radiation pressure at small densities will be extremely high. For this reason, single harmonic (monochromatic) electromagnetic-gravitational confinements will behave like nondeformable particles in experiments.

Taking the 4-dimensional Divergence of the 4-dimensional [Stress Energy Tensor](https://en.wikipedia.org/wiki/Electromagnetic_stress%E2%80%93energy_tensor)(1,16,29) (Equation 3 ) results in a 4-dimensional [4-vector](http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.888.6695&rep=rep1&type=pdf) with 4 components which can be presented as 3 fundamentally different Electromagnetic and Quantum Mechanical equations.

1. The 4th component of this [4-vector](http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.888.6695&rep=rep1&type=pdf) equals [Poynting’s Theorhem](https://en.wikipedia.org/wiki/Poynting%27s_theorem). Evidence has been presented that the [Schrödinger Wave Equation](https://en.wikipedia.org/wiki/Schr%C3%B6dinger_equation) is nothing more than [Poynting’s Theorhem](https://en.wikipedia.org/wiki/Poynting%27s_theorem) (equation 42, [Ref.29](https://osf.io/ra7ng/)) rewritten in a complex way (equation 55, [Ref.29](https://osf.io/ra7ng/))
2. The 4th component of this [4-vector](http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.888.6695&rep=rep1&type=pdf) equals [Poynting’s Theorhem](https://en.wikipedia.org/wiki/Poynting%27s_theorem). Evidence has been presented that the relativistic [Dirac Equation](https://en.wikipedia.org/wiki/Dirac_equation)  is nothing more than [Poynting’s Theorhem](https://en.wikipedia.org/wiki/Poynting%27s_theorem) (equation 57, [Ref. 29](https://osf.io/ra7ng/)) rewritten in a complex way (equation 102, [Ref.29](https://osf.io/ra7ng/))
3. The first 3 components of this [4-vector](http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.888.6695&rep=rep1&type=pdf) result in the extended Maxwell Equations (5) and (5-a)

**13.** **The Carmen Cygni in Quantum Physics**

Now the four Powerful Castles have fallen:

1). **The Castle of the Dice**. It follows from (36) that “[Confined Single Harmonic Electromagnetic Wave](http://www.daniel-irimia.com/2013/05/29/video-first-picture-ever-of-hydrogen-atom-taken-by-dutch-scientists/)s” are far superior candidates for “De Broglie” waves because they carry the mass (electromagnetic mass) and probability waves do not carry mass at all.

After the first publications of the famous first [photo](https://io9.gizmodo.com/the-first-image-ever-of-a-hydrogen-atoms-orbital-struc-509684901) of the hydrogen atom it became clear that what had been photographed could never be a photo of a non-existing complex probability wave with zero mass.

And it will be clear that due to Electromagnetic Interaction it is very well possible to photograph a confined monochromatic electromagnetic wave. Instead of the non-logical model of a zero mass probability wave describing the probability that the mass of an elementary particle is at a certain time at a certain place, it is only logical to define the mass division through the electromagnetic mass division of a “Confined Single Harmonic Electromagnetic Wave” according Equation (36).

For that reason it has been concluded that “De Broglie” waves are not complex probability waves but are “Confined Single Harmonic Electromagnetic Waves” written in a complex way. (equation 13, [Ref.29](https://www.researchgate.net/publication/256596197_Physics_Essays_1995?channel=doi&linkId=0deec523746b81b135000000&showFulltext=true) ) like the example of a confined single harmonic electromagnetic wave in Equation (13) in this manuscript.

2). **The Castle of Schrödinger**. The 4th component of this [4-vector](http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.888.6695&rep=rep1&type=pdf) equals [Poynting’s Theorhem](https://en.wikipedia.org/wiki/Poynting%27s_theorem). Evidence has been presented that the [Schrödinger Wave Equation](https://en.wikipedia.org/wiki/Schr%C3%B6dinger_equation) is nothing more than [Poynting’s Theorhem](https://en.wikipedia.org/wiki/Poynting%27s_theorem) (equation 42, [Ref.29](https://osf.io/ra7ng/)) rewritten in a complex way (equation 55, [Ref.29](https://osf.io/ra7ng/))

3). **The Castle of Dirac**. The 4th component of this [4-vector](http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.888.6695&rep=rep1&type=pdf) equals [Poynting’s Theorhem](https://en.wikipedia.org/wiki/Poynting%27s_theorem). Evidence has been presented that the relativistic [Dirac Equation](https://en.wikipedia.org/wiki/Dirac_equation)  is nothing more than [Poynting’s Theorhem](https://en.wikipedia.org/wiki/Poynting%27s_theorem) (equation 57, [Ref. 29](https://osf.io/ra7ng/)) rewritten in a complex way (equation 102, [Ref.29](https://osf.io/ra7ng/))

4). **The Castle of Maxwell**. The first 3 components of this [4-vector](http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.888.6695&rep=rep1&type=pdf) result in the extended Maxwell Equations (5) and (5-a). The [4 Maxwell Equations](https://en.wikipedia.org/wiki/Maxwell%27s_equations) published in 1861 by James Maxwell are incomplete. The correct equation is Equation (5) in this manuscript or (Equation 3, [Ref 30](https://www.researchgate.net/publication/255686089_The_Maxwell-Schrodinger-Dirac_correspondence_in_Auto_Confined_Electromagnetic_Fields))

Now the four castles have fallen there is only one possible final conclusion: Indeed, [God does not play Dice](https://www.nature.com/articles/d41586-018-03793-2). Probability does not exist. And the Power of the Dice has been broken by the Power of the Light.

Without probability, elementary particles cannot exist. Because they belong together like the Dice and the Gambler. And without Probability and Elementary Particles, without the Dice and the Gambler, what has been left of Quantum Physics? The song of the Dying Swan?

[Light](http://article.sapub.org/10.5923.j.astronomy.20180701.02.html) (Confined Single Harmonic Electromagnetic Radiation) is the building element of our universe. As Jesus has spoken: “I am the Light of the World (John 8:12). He spoke for the world.

Now the world is free to leave the gambling house and to stop playing dice with the devil. Instead of spending trillions of dollars to investigate non-existing elementary particles in extremely expensive high energy accelerators, the world has the possibility to spent trillions of dollars to create, to build and to improve “[drinking water systems](https://en.wikipedia.org/wiki/Water_supply_and_sanitation_in_Israel)”, that change ocean water into drinking water, to turn the deserts into oases of green, into oases of fruit trees and vegetables. Instead of killing warzones, the whole Mideast, Africa and so many third world countries could turn into an oasis of prosperity where everybody has enough to eat and these countries will have the possibilities to export fruits and vegetables. Turn whole the Mideast and Africa into an Oasis of green instead of letting the thousands of refugees being drowned in the Mediterranean Waters. We have the powers and you we can do it. It is all a matter of choice. Do we chose for Light or do we chose for Darkness.

Because that is the Darkness of the Dice. To make us believe that it does not matter. That we can look away from all the injustice that happens around us because the Dice will decide the outcome anyways. To make us believe that it does not matter what we do or do not. That the fact if a totally destructive Third World War will come or not is not up to us but it is the outcome of a Dice which is completely beyond our control. Like the death of Schrödinger’s cat is determined by the outcome of the Dice.

How different is the world of the Light. The world without the Dice. A world in which we have the totally responsibility and the freedom to choose. And our choices will have consequences. We can create Heaven on Earth or Hell. It is just a matter of choice.

Now the world will have the possibilities to spent trillions of dollars to find in even more expensive Higher Energy Accelerators that tiny missing elementary particle to find out the Origin of Matter, the Origin of our Universe, to understand finally why we are here and to measure God. Or to spent trillions of dollars to build dikes to protect the people in the dangerous lowland that will come underwater when the ocean levels are rising and to build Oases of Green that will feed the hungry people.

To understand that Science is given to mankind to serve the people, to protect the people and to make their lives better. That Science is a gift from an unseen and an unknown world. And that Science is not something that we own, that we can control and that we are allowed to abuse. And that we will finally understand that we did not come to Earth to control each other and to manipulate each other but that we came to Earth to learn to love each other.

**Acknowledgment**

This work has been made possible by the contributions of the many scientists who have given their life to find a path of truth. I specially would like to thank (in memory of) Professor [Dr. F.W. Sluijter](https://assets.tue.nl/fileadmin/content/universiteit/emeriti/PDF_s_oude_site/Sluijter_Frans_W.pdf) TU/e, The Netherlands. He has shown me the way to physics that has been forgotten by so many. A humble man man with a great wisdom. For me he has always been one of the happy few of the superior level of Albert Einstein who think completely independently. I am indebted to all and to my family, who always has supported me on a long and insecure road, in particular.

In particular I would like to thank Professor Dr. [Albert Einstein](http://3.bp.blogspot.com/-S7Z6WVrbSjg/VIvk5Xv6OEI/AAAAAAAAJ18/RCxg43obsYc/s1600/The%2BSolvay%2BConference%2C%2Bprobably%2Bthe%2Bmost%2Bintelligent%2Bpicture%2Bever%2Btaken%2C%2B1927%2B(2).jpg). An honest man of wisdom, independent thinking and a great insight in Physics. He had the insight to see that the “Scientific World” was going to make the biggest mistake in History at the [1927 Solvay Conference](https://rarehistoricalphotos.com/solvay-conference-probably-intelligent-picture-ever-taken-1927/) where Bohr’s concept of “Probability Waves” was generally accepted. And he warned the World: “[God does not play Dice](http://www.hawking.org.uk/does-god-play-dice.html)”. And after 100 years his words are still echoing through the world. And they will never stop echoing until the “Scientific World” wakes up from the dream of the “Dice that Rules the Universe”.

**References**

1. J. Wheeler, Phys. Rev. 97, 511 (1955).

2. Dirk Englund, Arka Majumdar, Michal Bajcsy, Andrei Faraon, Pierre Petroff, and Jelena Vučković; Ultrafast Photon-Photon Interaction in a Strongly Coupled Quantum Dot-Cavity System, Phys. Rev Lett. 108, 093604, March 2012, [DOI](https://arxiv.org/ct?url=http%3A%2F%2Fdx.doi.org%2F10%252E1103%2FPhysRevLett%252E108%252E093604&v=dd3b42df) : [10.1103/PhysRevLett.108.093604](https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.108.093604)

3. Brando Bellazzini, Francesco Riva, Javi Serra, and Francesco Sgarlata; Beyond Positivity Bounds and the Fate of Massive Gravity ; Phys. Rev. Lett. **120**, 161101 – Published 17 April 2018

4. Bao-Fei Li, Parampreet Singh, and Anzhong Wang; [Towards cosmological dynamics from loop quantum gravity](https://journals.aps.org/prd/abstract/10.1103/PhysRevD.97.084029) ;Phys. Rev. D **97**, 084029 – Published 17 April 2018

5. L. Filipe O. Costa, Georgios Lukes-Gerakopoulos, and Oldřich Semerák; [Spinning particles in general relativity: Momentum-velocity relation for the Mathisson-Pirani spin condition](https://journals.aps.org/prd/abstract/10.1103/PhysRevD.97.084023); Phys. Rev. D 97, 084023 – Published 16 April 2018

6. Ryotaro Kase, Masato Minamitsuji, and Shinji Tsujikawa; Relativistic stars in vector-tensor theories ; Phys. Rev. D **97**, 084009 – Published 9 April 2018

7. Hector O. Silva, Jeremy Sakstein, Leonardo Gualtieri, Thomas P. Sotiriou, and Emanuele Berti; [Spontaneous Scalarization of Black Holes and Compact Stars from a Gauss-Bonnet Coupling](https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.120.131104);Phys. Rev. Lett. **120**, 131104 (2018) - Published 30 March 2018

8. Jahed Abedi, Hannah Dykaar, and Niayesh Afshordi; [Echoes from the abyss: Tentative evidence for Planck-scale structure at black hole horizons](https://journals.aps.org/prd/abstract/10.1103/PhysRevD.96.082004) ;Phys. Rev. D **96**, 082004 (2017) - Published 26 October 2017

9. A. Hees, T. Do, A. M. Ghez, G. D. Martinez, S. Naoz, E. E. Becklin, A. Boehle, S. Chappell, D. Chu, A.

Dehghanfar, K. Kosmo, J. R. Lu, K. Matthews, M. R. Morris, S. Sakai, R. Schödel, and G. Witzel; [Testing General Relativity with Stellar Orbits around the Supermassive Black Hole in Our Galactic Center](https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.118.211101); Phys. Rev. Lett. **118**, 211101 (2017) - Published 25 May 2017

10. Petr Hořava ; [Spectral Dimension of the Universe in Quantum Gravity at a Lifshitz Point](https://link.aps.org/doi/10.1103/PhysRevLett.102.161301); [Phys. Rev. Lett. 102, 161301 (2009)](https://link.aps.org/doi/10.1103/PhysRevLett.102.161301); Published April 20, 2009

11. Kenji Hayashi and Takeshi Shirafuji ; Addendum to "New general relativity" ; Phys. Rev. D **24**, 3312 – Published 15 December 1981

12 Talmadge M. Davis and John R. Ray ; [Ghost neutrinos in general relativity](https://journals.aps.org/prd/abstract/10.1103/PhysRevD.9.331); Phys. Rev. D **9**, 331 (1974) - Published 15 January 1974

13 Patrick G. Whitman and Richard C. Burch ; Charged spheres in general relativity; Phys. Rev. D **24**, 2049 – Published 15 October 1981; Erratum [Phys. Rev. D **25**, 1744 (1982)](https://journals.aps.org/prd/abstract/10.1103/PhysRevD.25.1744)

14 Joseph Jacobson, Gunnar Björk, Isaac Chuang, and Yoshihisa Yamamoto ; [Photonic de Broglie Waves](https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.74.4835) ; Phys. Rev. Lett. **74**, 4835 (1995) - Published 12 June 1995

15 Bogeun Gwak and Bum-Hoon Lee ; Instability of rotating anti–de Sitter black holes ; Phys. Rev. D **91**, 064020 – Published 9 March 2015

16 Raphael Bousso and Stephen Hawking ; [Erratum: Lorentzian condition in quantum gravity [Phys. Rev. D 59, 103501 (1999)]](https://journals.aps.org/prd/abstract/10.1103/PhysRevD.60.109903) ; Phys. Rev. D **60**, 109903 (1999) - Published 8 October 1999

##### 17 A. Steane, P. Szriftgiser, P. Desbiolles, and J. Dalibard ; Phase Modulation of Atomic de Broglie Waves ; Phys. Rev. Lett. **74**, 4972 – Published 19 June 1995

##### 18 S. B. Cahn, A. Kumarakrishnan, U. Shim, T. Sleator, P. R. Berman, and B. Dubetsky ; Time-Domain de Broglie Wave Interferometry ; Phys. Rev. Lett. **79**, 784 – Published 4 August 1997

##### 19 J. L. Synge ; Primitive Quantization in the Relativistic Two-Body Problem ; Phys. Rev. **89**, 467 – Published 15 January 1953

20 H. Jehle, Flux Quantization and particle Physics, Phys. Rev. D6 (1972) 441 – 457

##### 21 Osung Kwon, Young-Sik Ra, and Yoon-Ho Kim ; [Observing photonic de Broglie waves without the maximally-path-entangled |N,0⟩+|0,N⟩ state](https://journals.aps.org/pra/abstract/10.1103/PhysRevA.81.063801) ; Phys. Rev. A **81**, 063801 (2010) - Published 1 June 2010

##### 22 V. Krachmalnicoff, J.-C. Jaskula, M. Bonneau, V. Leung, G. B. Partridge, D. Boiron, C. I. Westbrook, P. Deuar, P. Ziń, M. Trippenbach, and K. V. Kheruntsyan ; [Spontaneous Four-Wave Mixing of de Broglie Waves: Beyond Optics](https://journals.aps.org/prl/abstract/10.1103/PhysRevLett.104.150402) ; Phys. Rev. Lett. **104**, 150402 (2010) - Published 15 April 2010

##### 23 Andrey Turlapov, Alexei Tonyushkin, and Tycho Sleator ; [Talbot-Lau effect for atomic de Broglie waves manipulated with light](https://journals.aps.org/pra/abstract/10.1103/PhysRevA.71.043612) ; Phys. Rev. A **71**, 043612 (2005) - Published 25 April 2005

24 Jakob Petersen, Eli Pollak, and Salvador Miret-Artes ; Alberto Nicolis and Riccardo Penco ; [Mutual interactions of phonons, rotons, and gravity](https://journals.aps.org/prb/abstract/10.1103/PhysRevB.97.134516) ; Phys. Rev. B **97**, 134516 (2018) - Published 18 April 2018

25 [Quantum threshold reflection is not a consequence of a region of the long-range attractive potential with rapidly varying de Broglie wavelength](https://journals.aps.org/pra/abstract/10.1103/PhysRevA.97.042102) ; Phys. Rev. A **97**, 042102 (2018) - Published 3 April 2018

# 26 Jing, H., Jiang, Y. & Deng, Y.; Quantum superchemistry of de Broglie waves: New wonderland at ultracold temperature ; Front. Phys. China (2011) 6: 15. <https://doi.org/10.1007/s11467-010-0155-y>

# 27 Donald H Kobe ; Quantum power in de Broglie–Bohm theory ; [Journal of Physics A: Mathematical and Theoretical](http://iopscience.iop.org/journal/1751-8121), [Volume 40](http://iopscience.iop.org/volume/1751-8121/40) - [Number 19](http://iopscience.iop.org/issue/1751-8121/40/19) , Published 24 April 2007

# 28 Rodewald, J., Haslinger, P., Dörre, N. et al.; New avenues for matter-wave-enhanced spectroscopy ; Appl. Phys. B (2017) 123: 3. <https://doi.org/10.1007/s00340-016-6573-y>

# 29. J. W. Vegt, A Continuous Model of Matter based on AEONs, Physics Essays ,1995, Volume 8, Number 2,

201-224 [A Continuous model of Matter](https://www.researchgate.net/publication/256596197_Physics_Essays_1995?channel=doi&linkId=0deec523746b81b135000000&showFulltext=true) (*DOI:* ***10.13140/RG.2.2.25149.77281***).

30. J. W. Vegt, Annales Fondation Louis de Broglie, The Maxwell-Schrödinger-Dirac Correspondence in Auto

Confined Electromagnetic Fields, Annales Fondation Louis de Broglie, 2002, Volume 27, Number 1,

31. J. W. Vegt, A particle Free Model of Matter based on Electromagnetic Self-Cofinement, Annales Fondation

Louis de Broglie, 1996, January.

32. J. M. Maldacena , Black Holes in String Theory, Princeton University, arxiv.org/abs/hep-th/960723533.

33. V. C. de Andrade and J. G. Pereira, Gravitational Lorentz force and the description of the gravitational interaction, Phys. Rev. D **56**, 468

34. Mohr, P.J.; Taylor, B.N.; Newell, D.B. (2006). "CODATA recommended values of the fundamental physical constants". [Reviews of Modern Physics](https://en.wikipedia.org/wiki/Reviews_of_Modern_Physics). 80(2): 633–730. [arXiv](https://en.wikipedia.org/wiki/ArXiv" \o "ArXiv):[0801.0028](https://arxiv.org/abs/0801.0028), [Bibcode](https://en.wikipedia.org/wiki/Bibcode):[2008RvMP...80..633M](http://adsabs.harvard.edu/abs/2008RvMP...80..633M).  [doi](https://en.wikipedia.org/wiki/Digital_object_identifier):[10.1103/RevModPhys.80.633](https://doi.org/10.1103%2FRevModPhys.80.633)*.*

35. J. M. Maldacena , Black Holes in String Theory, Princeton University, arxiv.org/abs/hep-th/960723533.

36. V. C. de Andrade and J. G. Pereira, Gravitational Lorentz force and the description of the gravitational interaction, Phys. Rev. D **56**, 468

37. Mohr, P.J.; Taylor, B.N.; Newell, D.B. (2006). "CODATA recommended values of the fundamental physical constants". [Reviews of Modern Physics](https://en.wikipedia.org/wiki/Reviews_of_Modern_Physics). 80(2): 633–730. [arXiv](https://en.wikipedia.org/wiki/ArXiv" \o "ArXiv):[0801.0028](https://arxiv.org/abs/0801.0028), [Bibcode](https://en.wikipedia.org/wiki/Bibcode):[2008RvMP...80..633M](http://adsabs.harvard.edu/abs/2008RvMP...80..633M). [doi](https://en.wikipedia.org/wiki/Digital_object_identifier" \o "Digital object identifier):[10.1103/RevModPhys.80.633](https://doi.org/10.1103%2FRevModPhys.80.633)*.*

*38*. William A. Hiscock, Phys. Rev. D **31**, 3288 – Published 15 June 1985

39. T. Degrand, L. Jaffe, K Johnson, J. Kiskis, Masses and other parameters of the light Hadrons, Physical Review D: Particles and Fields, 12(7), October 1975, 2060-2076

40 Volodymyr Krasnoholovets, Motion of a Relativistic Particle and the Vacuum, Physics Essays, vol 10, no 3, 1997, 407-416, [arXiv:quant-ph/9903077](https://arxiv.org/abs/quant-ph/9903077)

41 H. Jehle, Flux Quantization and fractional charges of quarks, Phys. Rev. D11(1975) 2147

42 W.G.V. Rosser, Classical Electromagnetism via Relativity (Butterworths, London, 1968), p. 134.