3.3 Configuration of Particle Types

The derivation of the present particle model is the logical consequence of the relationships established so far for a 6-dimensional field-space. In order to understand the mass formula for arbitrary particles, it must first be explained how different particles can be composed and what different particle groupings exist. The classical model and the Field-Space-Mechanical model with its innovative approach will be discussed. In addition, the particle structure will be used to investigate the concrete influence of hidden matter on the atomic nucleus.

Particle types:

In FSM, the term "particle types" encompasses all particles, regardless of their complexity. The purpose of this classification is to take into account the number of individual interaction partners with the mechanical processes in the field-space, from a single fermionic particle structure to a complex compound of baryonic particle structures. Depending on the complexity, this increases the frequency or mass of the particle.

These so-called particle types include the individual active fions, the fermions and the particle group of baryons with half-integer spin, as well as the bosons, the so-called meson-bosons and the particle group of mesons with integer spin. The particle types meson-bosons, mesons and baryons occur as particle compounds of elementary particles of the individual fermions and bosons. Neutrons and protons belong to the group of baryons, among others.

The individual particle types that occur individually or as particle compounds due to their particle structures are discussed below. The FSM can determine their composition.

Fermions:

Fermions include all particles with a spin of $\frac{1}{2}$. According to the standard model of Quantum Mechanics for elementary particles, these include the electron and positron, all known quarks, the muon, tauon and the associated neutrino types with the electron neutrino, muon neutrino and tau neutrino. The electron was examined in detail in the previous **Chapter 3.2**. In the next step, quarks will be considered.

Distinction between quarks in the Standard Model and quarks in FSM:

In the Standard Model of particle physics, quarks are described as a hypothetical structure that occurs primarily in more complex particle structures such as the proton and neutron. They are subject to all fundamental interaction forces and do not have a multiple of an integer elementary charge. There are the following types of quarks: the u quark, the d quark, the C quark, the B quark, the T quark and the S quark. Their energy contributions in more complex particle structures are relatively small compared to gluons as carriers of binding energy.

In contrast, quarks in the FSM represent structures that occur both in baryons, such as protons and neutrons, and in bosons. In this model, just as in the Standard Model, a quark never exists on its own as an elementary particle. In the FSM, a quark is produced only through the reduction of an electron as part of a boson. Its exchange fion then takes over the task of interaction. This makes it possible to derive complex particle structures and thus, for example, to determine the charge state of the quark within a meson or baryon.

Bosons in classical particle physics and in the FSM:

In the Standard Model of particle physics, bosons are the carriers of the forces of interaction between particles and, depending on their complexity, can mediate electric, strong or weak interactions. Due to the conservation of momentum, boson exchange always takes place with integer spin. In the Standard Model, bosons are divided into gluons, photons, Z-bosons, W-bosons and H-bosons. It has not yet been possible to find a significant reason for the difference between fermions, which have half-integer spin, and bosons, which have integer spin. Furthermore, the graviton with spin 2 has been postulated as a hypothetical exchange boson for gravitational forces, but its existence has not yet been proven.

In FSM, bosons are initially regarded as a state consisting of a specific mode of an electron and its exchange fion. The exchange fion with integer spin is the mediator of the interaction. It can only recombine with particles that also have an integer total spin. The receiving boson determines the multiple wavelength to which an exchange particle must adjust with its structure. This process is the reason why bosons with integer spins are not subject to the Pauli principle and can interfere with other particles.

Composite particles such as mesons are also classified as bosons in standard physics due to their integer spin. In the FSM, however, a distinction is made between whether the boson occurs as a single particle or as a meson in a composite of single particles. This distinction is made within the framework of this particle model so that its particle structure can be reconstructed at the elementary level. As will be shown, Z-, W- and H-bosons are particle structures consisting of two extended modes of the electron. The structure of these heavy bosons with mass numbers can also be reproduced using the particle model of the FSM.

With the help of the required boson structure, an essential component of the mass formula for any particle is described.

Distinction between mesons and baryons in the Standard Model and in the FSM

Mesons:

From the Standard Model, we know that mesons belong to a higher-level particle group composed of more complex structures of several quarks and antiquarks. Why this composition of quarks and antiquarks is necessary when the nuclear force between them is greater than their electric forces is not yet clear. They are considered unstable and have an integer spin. They are therefore classified as bosons.

As already indicated above, mesons in the FSM consist of two bosons, which in turn contain certain quarks and their exchange fions. Two bosons with half-integer or integer spin always result in a meson with integer spin. In some cases, two bosons interact with hidden matter, which is shifted and rotated from the dimension plane D_{56}. The different charge states can be assigned in its structure. Furthermore, mesons consisting only of positive or negative bosons are possible. The particle model of the FSM makes it possible to use the modelled particle structure to highlight the difference between bosons as individual particles (e.g. photons) and bosons as composite particles (e.g. mesons).

Baryons:

Similar to mesons, baryons also belong to a higher particle group in the Standard Model of particle physics. In their S-sphere, baryons consist of a structure of at least three quarks with different charge states, as well as their exchange particles. It is assumed that the quarks hold together in the form of a triplet. The proton is considered the smallest and most stable baryon. With its half-integer spin, the proton is classified in the fermion particle group.

The particle model of the FSM also highlights the difference between a fermion as a single particle (e.g. electron) and a fermion as a composite particle (e.g. proton) through its particle structure. The special feature of the baryon in the FSM is that a binding neutrino ensures stability in the particle structure consisting of quarks and exchange fions. A triplet would even disrupt stability. This different particle structure explains how the different charges of the quarks for protons and neutrons come about, and why the nuclear force of protons exceeds the repulsion between charges of the same name. Using the example of baryons (e.g. protons), the influence of hidden matter in an atom can also be represented concretely as a ratio. Interpretations of the origin of hidden matter and the reason for the repulsion between protons and neutrons can also be made.

Meson-Bosons :

Meson-bosons are the lightest mesons as composite particles that occur in nature according to the FSM and have the same mass equivalent as the smallest boson as a single particle. In particle structure, these lightest mesons can be distinguished from bosons as individual particles with identical mass. This type of particle is therefore referred to as a meson-boson. This is not to be understood as a pleonasm, but rather to indicate that their particle structures are determined differently.

Configuration of bosons and different types of particles:

Configurations provide qualitative information about how the bosonic properties and multiples of these bosons are implied in the form of particle types.

The bosonic properties are the prerequisites for interaction with another particle. The aim of **boson configuration (BC)** is to produce a total angular momentum for an exchange fion that has a bosonic integer spin. Certain **electron configurations (EC)** are already bosonic, while other cases only become bosonic when they receive external fions for a short period of time. Once a particle is bosonic, it can provide an exchange fion that transfers the properties of interaction and object mass.

The **particle configuration (PC**) is based on the multiple exchange of fields for arbitrarily complex particle structures. This is the mathematical sum of all bosons minus their necessarily emitted active fions, which are converted by the creation of exchange fion/passive fion pairs. During a bosonic field exchange, such pair formations provide the exchange fions in the particle structure, which are structured with varying degrees of complexity depending on the particle in the 6-dimensional field-space.

Counting method for active fions, external fions and pair formation from exchange fions and passive fions:

The **electron configuration** describes the number of active fions in a sphere S. **Figure 3.5** shows the electron in the mode with three to five active fions.

The **boson configuration** takes into account the ratio of **the electron configuration** in the **denominator** to the sum of **active** and **external fions** in the **numerator**. **Figure 3.5** could also be used to illustrate the situation in the case of external fions being received. However, this would not include participation as a partial charge in the particle sphere S.

The following **Figure 3.12** can be used for the field exchange of two bosons with their respective exchange fions.

The following generalisation applies to the counting pattern:

Electron configuration – EC

EC = No. of active fions = N_{aF} $N \varepsilon \mathrm{N}$ (3.05)

Boson configuration – BC

$$BC = \frac{N_{aF} + N_{eF}}{N_{aF}}$$

$$BC = \frac{\text{No. of active fions + No. extern fions}}{\text{No. active fions}} \quad (3.06)$$

Particle configuration – PC

$$PC = \frac{N_{aF} + N_{eF} - N_{F/\mathrm{A}}}{N_{aF}} \quad (3.07)$$

$$PC = \frac{\text{No. of active fions + No. extern fions – No. exchange fion/passive fion-pair}}{\text{No. active fions}}$$

N_{aF} – Number of active fions

N_{eF} – Number of external fions

$N_{F/\mathrm{A}}$ – Number of exchange fion/passive fion pairs

In the first case, consider the electron that temporarily receives a certain number of external active fions with its three active fions, which increases the total mass of the electron. These cases are expressed as follows:

eF1/2/3 – Number of externally absorbed fions

Case a. – Electron with three active fions

Electron configuration – EC

EC = N_{aF} = 3

Boson configuration – BC

1) In the case of an electron with an electron configuration of EC = 3, the bosonic configuration BC(eF1) = $\frac{4}{3}$ is created upon receiving an external fion, which only exists temporarily in the electron. The electron becomes temporarily bosonic.

$$\text{BC(eF1)} = \frac{\text{3 active fions + 1 extern fion}}{\text{3 active fions}} = \frac{4}{3}$$

2) In the case of a boson with the boson configuration BC(eF1) = $\frac{4}{3}$, the boson configuration BC(eF2) = $\frac{5}{3}$ is created upon receiving another external fion.

$$\text{BC(eF2)} = \frac{\text{3 active fions + 2 extern fions}}{\text{3 active fions}} = \frac{5}{3}$$

For case 1) with four active fions, the total angular momentum of all individual angular momenta of the fiones acting therein is determined as an integer using Pythagoras' theorem:

$$L_{4fions}{}^2 = \left(\frac{h}{4\pi}\right)^2_{fion1} + \left(\frac{h}{4\pi}\right)^2_{fion2} + \left(\frac{h}{4\pi}\right)^2_{fion3} + \left(\frac{h}{4\pi}\right)^2_{fion4} \qquad [L] = \text{Js}$$

$$L_{4fions} = \frac{\sqrt{1^2 + 1^2 + 1^2 + 1^2}}{4\pi} h$$

This electron has an integer spin for a certain period of time due to the temporary reception of an external fion and is capable of bosonic interaction. Case 1) is the smaller structure compared to case 2) and can be assigned with high probability to occur most frequently in nature.

Case 2) has the following total angular momentum:

$$L_{5fions} = \left(\frac{h}{4\pi}\right)^2_{fion1} + \left(\frac{h}{4\pi}\right)^2_{fion2} + \left(\frac{h}{4\pi}\right)^2_{fion3} + \left(\frac{h}{4\pi}\right)^2_{fion4} + \left(\frac{h}{4\pi}\right)^2_{fion5}$$

$$L_{5fions} = \frac{\sqrt{1^2 + 1^2 + 1^2 + 1^2 + 1^2}}{4\pi} h$$

This modelled electron with two externally absorbed fions must have an integer spin as a boson in order not to violate the conservation of angular momentum for a coupling with an integer exchange fion. Since the orbital velocity across all active fions is greater than the maximum velocity $V_{max} = c$ according to Pythagoras' theorem with $V_{rot} = \frac{\sqrt{5}}{2} c > c$, this electron requires a dimension reduction factor. The dimension reduction factor is explained in the following chapter. The reduction of the resulting orbital velocity V_{rot} to the maximum velocity $V_{max} = c$ is noticeable in that measuring instruments will again register an orbital velocity of $V_{rot} = \frac{\sqrt{4}}{2} c$.

This modelled electron is presumably measured with this angular momentum

$$L_{4fions} = \frac{\sqrt{1^2 + 1^2 + 1^2 + 1^2}}{4\pi} h$$

and is thus capable of exchanging like a boson.

Particle configuration – PC – Meson

Particle formation requires at least two such bosons that exchange with each other. In addition, an active fion is split into an exchange fion/passive fion pair so that one of the split fions is available as an exchange fion and the other partial fion remains passive. During its field exchange, the exchange fion/passive fion pair no longer contributes to the mass of the boson due to its formation in the dimension plane D_{56}. A meson with the following particle configuration is created:

$$PC_{boson1} = \frac{\text{3 active intern fions + 1 extern fion – 1 exchange fion/passives fion-pair}}{\text{3 active intern fions}}$$

$$PC_{boson2} = \frac{\text{3 active intern fions + 1 extern fion – 1 exchange fion/passives fion-pair}}{\text{3 active intern fions}}$$

$$PC_{meson} = \frac{3 + 1 - 1}{3} + \frac{3 + 1 - 1}{3} = \frac{6}{3}$$

The terms show that bosons are composed of electron modes. The electron configuration **EC = 3** allows the electron to expand into the elementary particle of the so-called **u/d-quark** with an **exchange fion** in the event of an interaction.

Note: This model can bring about a qualitative distinction between u-quarks and d-quarks. However, for the coupling frequency and mass determination, they represent the same harmonic for the total oscillation of a particle on average. Therefore, u and d quarks are combined as u/d-quarks in the FSM. The fact that this is acceptable for the FSM model is confirmed by the calculation of various quark excitations with u/d-quarks.

Special modes for the u/d quark:

It is conceivable that an externally absorbed fion could leave the electron sphere during the mutual fion exchange. In this special case, the mass of the external fion disappears after recombination in the meson. This results in the following particle configuration for this meson:

$$PC_{boson1} = \frac{\text{3 active intern fions + 0 extern fion – 1 exchange fion/passives fion-pair}}{\text{3 active intern fions}}$$

$$PC_{boson2} = \frac{\text{3 active intern fions + 0 extern fion – 1 exchange fion/passives fion-pair}}{\text{3 active intern fions}}$$

$$PC_{meson\text{-}boson} = \frac{3+0-1}{3} + \frac{3+0-1}{3} = \frac{4}{3}$$

It can be seen that the special case in which the external fion leaves the electron sphere during the exchange phase leaves behind a particle configuration for the meson that is equal to the boson configuration for an electron with a received external fion. In this model, only the structure of the particle and its charge distribution can be used to determine whether the configuration corresponds to a boson as a single particle or a meson as a composite particle. This meson would be the lightest meson in nature. Due to the lack of distinguishability in the configurations between whether it is a single particle or a composite particle, this particle is referred to as **a meson-boson** in the FSM model.

Further modes for the electron:

The electron can expand internally from three to four or five active fions, which carry a partial charge accordingly. The electron configuration expands. **Figure 3.5** shows the possible composition for the fourth and fifth active fions in a sphere S.

Case b. – Electron with four active fions

Electron configuration – EC

EC= N_{aF} = 4

Boson configuration – BC

$$BC = \frac{4 \text{ active fions} + 0 \text{ extern fion}}{4 \text{ active fions}} = \frac{4}{4}$$

The total angular momentum is an integer according to Pythagoras' theorem:

$$L_{4fions}{}^2 = (\frac{h}{4\pi})^2{}_{fion1} + (\frac{h}{4\pi})^2{}_{fion2} + (\frac{h}{4\pi})^2{}_{fion3} + (\frac{h}{4\pi})^2{}_{fion4} = \frac{\sqrt{1^2 + 1^2 + 1^2 + 1^2}}{4\pi}\, h$$

This modelled electron (formerly EC= 3 with three active fions) has four active fions with the electron configuration EC = 4, which results in an integer total spin. It is already bosonic without the addition of external fions and can immediately interact with another particle.

Particle configuration – PC – Meson

$$PC_{boson1} = \frac{4 \text{ active intern fions} + 0 \text{ extern fion} - 1 \text{ exchange fion/passives fion-pair}}{4 \text{ active intern fions}}$$

$$PC_{boson2} = \frac{4 \text{ active intern fions} + 0 \text{ extern fion} - 1 \text{ exchange fion/passives fion-pair}}{4 \text{ active intern fions}}$$

$$PC_{meson} = \frac{4 + 0 - 1}{4} + \frac{4 + 0 - 1}{4} = \frac{6}{4}$$

The electron configuration **EC = 4** allows the modelled electron to expand into the elementary particle known as the **C-quark** with an **exchange fion** in the event of an interaction.

Case c. – Electron with five active fions

Electron configuration – EC

EC = N_{aF} = 5

Boson configuration – BC

$$BC = \frac{5 \text{ active fions} + 0 \text{ extern fion}}{5 \text{ active fions}} = \frac{5}{5}$$

The total angular momentum is half-integer according to Pythagoras' theorem:

$$L_{5fions} = (\frac{h}{4\pi})^2_{fion1} + (\frac{h}{4\pi})^2_{fion2} + (\frac{h}{4\pi})^2_{fion3} + (\frac{h}{4\pi})^2_{fion4} + (\frac{h}{4\pi})^2_{fion5}$$

$$L_{5fions} = \frac{\sqrt{1^2 + 1^2 + 1^2 + 1^2 + 1^2}}{4\pi} h$$

This modelled electron with electron configuration EC = 5 must also have an integer spin as a boson in order not to violate the angular momentum conservation law for a coupling with an integer exchange fion. As in case 2) with the addition of two external fions, the measuring instruments will again register an orbital velocity of $V_{rot} = \frac{\sqrt{4}}{2} c$ with the aid of a dimension reduction factor.

This boson is presumably measured with this angular momentum

$$L_{4fions} = \frac{\sqrt{1^2 + 1^2 + 1^2 + 1^2}}{4\pi} h$$

and is thus capable of exchanging like a boson.

Particle configuration – PC – Meson

$$PC_{boson1} = \frac{5 \text{ active intern fions} + 0 \text{ extern fion} - 1 \text{ exchange fion/passives fion-pair}}{5 \text{ active intern fions}}$$

$$PC_{boson2} = \frac{5 \text{ active intern fions} + 0 \text{ extern fion} - 1 \text{ exchange fion/passives fion-pair}}{5 \text{ active intern fions}}$$

$$PC_{meson} = \frac{5 + 0 - 1}{5} + \frac{5 + 0 - 1}{5} = \frac{8}{5}$$

The electron configuration **EC = 5** enables the modelled electron to expand into the elementary particle known as the **B-quark** with an **exchange fion** in the event of an interaction.

Case d. – Electron with six active fions

According to this model, bosons with more than five fions cannot exist naturally in R^6. Due to dimensional constraints, only a maximum of five fions rotating orthogonally to the dimension plane D_{56} would be conceivable, which could intersect simultaneously at a point of contact. However, it is conceivable that a temporarily and severely limited state could occur in which bosons with six active fions and thus also exist in seven dimensions.

Electron configuration – EC

$\mathrm{EC} = N_{aF} = 6$

Boson configuration – BC

$$\mathrm{BC} = \frac{\text{6 active fions + 0 extern fion}}{\text{6 active fions}} = \frac{6}{6}$$

The total angular momentum is an integer according to Pythagoras' theorem:

$$L_{6fions} = (\frac{h}{4\pi})^2_{fion1} + (\frac{h}{4\pi})^2_{fion2} + (\frac{h}{4\pi})^2_{fion3} + (\frac{h}{4\pi})^2_{fion4} + (\frac{h}{4\pi})^2_{fion5} + (\frac{h}{4\pi})^2_{fion6}$$

$$L_{6fions} = \frac{\sqrt{1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2}}{4\pi} h$$

This boson is probably measured with this angular momentum:

$$L_{4fions} = \frac{\sqrt{1^2 + 1^2 + 1^2 + 1^2}}{4\pi} h$$

This modelled electron with the electron configuration EC = 6 has an integer spin and can interact bosonic.

Particle configuration – PC – Meson

$$\mathrm{PC}_{\mathrm{boson1}} = \frac{\text{6 active intern fions + 0 extern fion – 1 exchange fion/passives fion-pair}}{\text{6 active intern fions}}$$

$$\mathrm{PC}_{\mathrm{boson2}} = \frac{\text{6 active intern fions + 0 extern fion – 1 exchange fion/passives fion-pair}}{\text{6 active intern fions}}$$

$$\mathrm{PC}_{\mathrm{meson}} = \frac{6 + 0 - 1}{6} + \frac{6 + 0 - 1}{6} = \frac{10}{6}$$

The electron configuration **EC = 6** allows the modelled electron to expand into the elementary particle known as the **T-quark** with an **exchange fion** in the event of an interaction.

Case e. – Electron with higher combinations of active fions

In the following modelled electron, higher combinations of its expansion are possible. It is conceivable that there are fions that exist with half the wavelength of an u/d-quark. The limitation on the number of fions present in a sphere S in R^6 that rotate in the same direction must be taken into account. Thus, the maximum occupancy consists of one active fion with the wavelength corresponding to a fion in the u/d-quark, plus four additional active fions corresponding to half the wavelength of an u/d-quark.

Electron configuration – EC

$$EC = N_{aF} = 1 \text{ active fion} + 4 \text{ active fions with } \frac{\lambda_{u/d\text{-}quark}}{2} = 5$$

Boson configuration – BC

$$BC = \frac{1 \text{ active fions} + 4 \text{ active fions with } \lambda_{u/d\text{-}quark}/2 + 0 \text{ extern fions}}{5 \text{ active fions}} = \frac{5}{5}$$

The total angular momentum is half-integer according to Pythagoras' theorem:

$$L_{5fions} = (\frac{h}{4\pi})^2{}_{fion1} + (\frac{h}{4\pi})^2{}_{fion2} + (\frac{h}{4\pi})^2{}_{fion3} + (\frac{h}{4\pi})^2{}_{fion4} + (\frac{h}{4\pi})^2{}_{fion5}$$

$$L_{5fions} = \frac{\sqrt{1^2 + 1^2 + 1^2 + 1^2 + 1^2}}{4\pi} h$$

This boson is probably measured again with this angular momentum:

$$L_{4fions} = \frac{\sqrt{1^2 + 1^2 + 1^2 + 1^2}}{4\pi} h$$

Particle configuration – PC – Meson

$$PC_{boson1} = \frac{5 \text{ active intern fions} + 0 \text{ extern fion} - 1 \text{ exchange fion/passives fion-pair}}{5 \text{ active intern fions}}$$

$$PC_{boson2} = \frac{5 \text{ active intern fions} + 0 \text{ extern fion} - 1 \text{ exchange fion/passives fion-pair}}{5 \text{ active intern fions}}$$

$$PC_{meson} = \frac{5 + 0 - 1}{5} + \frac{5 + 0 - 1}{5} = \frac{8}{5}$$

These modelled electrons are expected to interact strongly with the particle group of mesons. In the event of an interaction with each other, they correspond to the elementary particle of the so-called **S-quark** with an **exchange fion**.

Further modes of the S-quark:

Boson configuration – BC

With reception of an external fion:

$$BC = \frac{\text{1 active fions + 4 active fions with } \lambda_{u/d\text{-}quark}/2 \text{ + 1 extern fions}}{\text{5 active fions}} = \frac{6}{5}$$

The total angular momentum is an integer according to Pythagoras' theorem:

$$L_{6fions} = \frac{\sqrt{1^2 + 1^2 + 1^2 + 1^2 + 1^2 + 1^2}}{4\pi} h$$

This boson is presumably measured with this angular momentum:

$$L_{4fions} = \frac{\sqrt{1^2 + 1^2 + 1^2 + 1^2}}{4\pi} h$$

This S quark is bosonic and can also interact with another boson.

Particle configuration – PC – Meson

$$PC_{boson1} = \frac{\text{5 active intern fions + 1 extern fion – 1 exchange fion/passives fion-pair}}{\text{5 active intern fions}}$$

$$PC_{boson2} = \frac{\text{5 active intern fions + 1 extern fion – 1 exchange fion/passives fion-pair}}{\text{5 active intern fions}}$$

$$PC_{meson} = \frac{5 + 1 - 1}{5} + \frac{5 + 1 - 1}{5} = \frac{10}{5}$$

Hypothetically, the configuration for particle types such as mesons varies differently. The half-integer values could be due to the reception of half-wave external active fions, which have a factor of 0,5 instead of 1 in the particle configuration.

Other possible configurations:

Particle configuration – PC – Meson

$$PC_{boson1} = \frac{\text{5 active intern fions + 0,5 extern fion – 1 exchange fion/passives fion-pair}}{\text{5 active intern fions}}$$

$$PC_{boson2} = \frac{\text{5 active intern fions + 0 extern fion – 1 exchange fion/passives fion-pair}}{\text{5 active intern fions}}$$

$$PC_{meson} = \frac{5 + 0{,}5 - 1}{5} + \frac{5 + 0 - 1}{5} = \frac{8{,}5}{5}$$

Particle configuration – PC – Meson

$$PC_{boson1} = \frac{\text{5 active intern fions + 0 extern fion – 0,5 exchange fion/passives fion-pair}}{\text{5 active intern fions}}$$

$$PC_{boson2} = \frac{\text{5 active intern fions + 0 extern fion – 0,5 exchange fion/passives fion-pair}}{\text{5 active intern fions}}$$

$$PC_{meson} = \frac{5 + 0 - 0{,}5}{5} + \frac{5 + 0 - 0{,}5}{5} = \frac{9}{5}$$

Particle configuration – PC – Meson

$$PC_{boson1} = \frac{\text{5 active intern fions + 1 extern fion – 1 exchange fion/passives fion-pair}}{\text{5 active intern fions}}$$

$$PC_{boson2} = \frac{\text{5 active intern fions + 0,5 extern fion – 1 exchange fion/passives fion-pair}}{\text{5 active intern fions}}$$

$$PC_{meson} = \frac{5 + 1 - 1}{5} + \frac{5 + 0{,}5 - 1}{5} = \frac{9{,}5}{5}$$

3.4 Modelling Particle Structures

The next step towards understanding particle structures is to classify them visually in 6-dimensional field-space. The particles presented are selected mesons and baryons made up of u/d-quarks, which are geometrically different in the field-space and interact with each other. By modelling particles using the FSM model, the user can describe which configurations, charges and spins are present.

<u>Possible particle structures of mesons made of u/d-quarks:</u>

A) Mesons made of $Q = \frac{2}{3}e$ quarks:

To represent a meson consisting of two $Q = \pm\frac{2}{3}e$ quarks, it shall be considered a positive and a negative charged boson with the boson configuration BC = $\frac{4}{3}$. Each boson consists of a quark and an exchange fion. The positively charged quark rotates above and the negatively charged quark below, orthogonal to the dimension plane D_{56}. Since there is pair formation with different charges, attractive forces act between the partners. Both quarks have a multiple distance with a wavelength of $\frac{\lambda_{Fion}}{2}$ from each other. The fions are slightly shifted in their oscillation phase so that they do not immediately undergo an annihilation reaction. The particle configuration of this meson consists of the active electron-internal fions and the received external fion minus the pair of exchange fions and passive fions that arise at the expense of an active fion: PC = $\frac{3+1-1}{3} + \frac{3+1-1}{3} = \frac{6}{3}$. With the missing active fion in the electron sphere, the total charge is reduced as follows: $Q_{B1} = \frac{2}{3}$ e; $Q_{B2} = -\frac{2}{3}$ e. The spin for the respective u/d-quark is half-integer, with the three remaining fions. The spin of the meson is determined by the sum of the half-integer spins of the quarks.

Figure 3.12 shows the bosons described and the mechanical process involved in the exchange of their exchange fions. These are shown in light green. The directions of rotation are determined by the point of contact between the emitting quark and the receiving quark. The passive fions remaining in sphere S are marked in dark green and grey. The rotational speed for an active fion within a charge in sphere S can be $V_{rot} = \frac{c}{2}$ or, for a released exchange fion outside sphere S, the maximum speed $V_{max} = c$. The released exchange fion rotates clockwise towards its respective target particle. These exchange fions contribute to the mass only when they recombine with the particle at the point of contact and generate restoring forces. During the reduction of its rotational speed with $V_{rot} = c$ to $V_{rot} = \frac{c}{2}$, the electric, strong and weak interactions are also mediated into the particle-field $F_{1\text{-}3}$ at the point of contact, which lies in the dimension plane D_{56}. The strength and type of an interaction depend on the coupling frequency of the exchange fion relative to the nature of the receiving particle. The coupling frequency must therefore take into account the complexity of the receiving particle and is correspondingly higher or lower in its coupling frequency.

This will be considered in the next chapter under the topic *of particle-exchange fion-particle-coupling*.

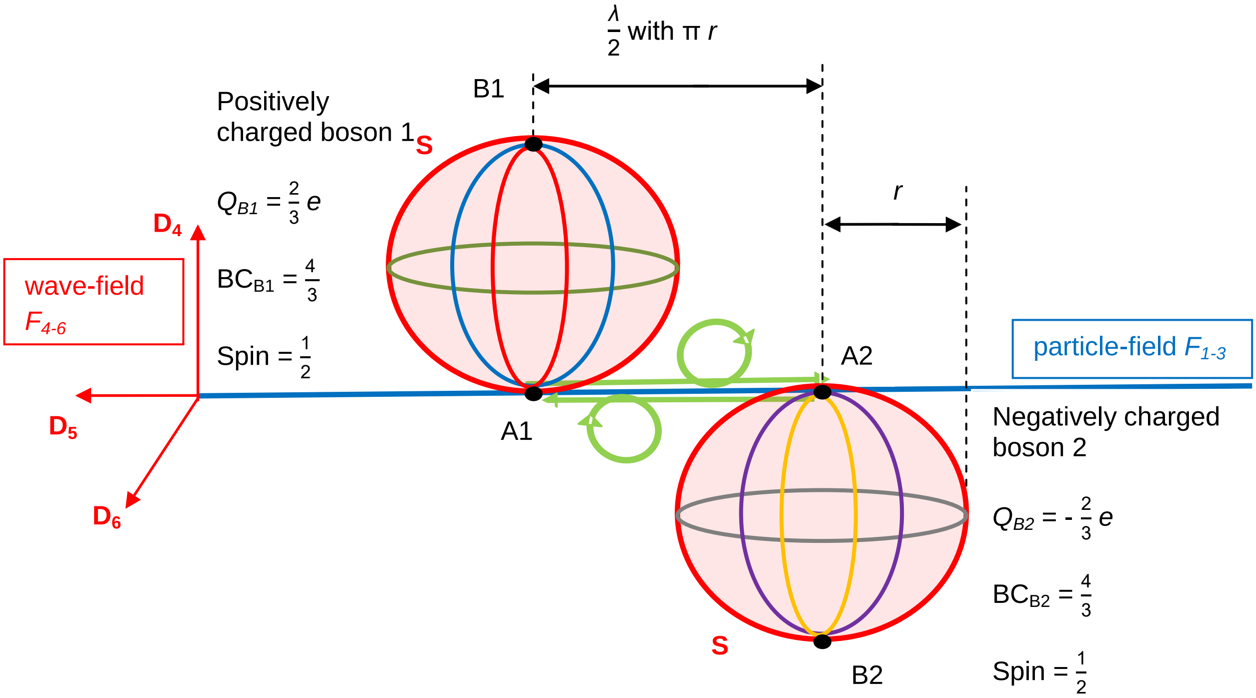

Figure 3.12: Meson consisting of two $Q = \frac{2}{3}$ *e* quarks

[Q_B] – charge of a quark in the boson in As

Figure 3.13 shows a schematic representation of this meson. Solid arrows indicate active fions within the quarks and dashed arrows indicate passive fions. The different arrow colours are intended to draw attention to the different states of the active fions. The two light green arrows between the quarks show the fion exchange of the respective exchange fions provided.

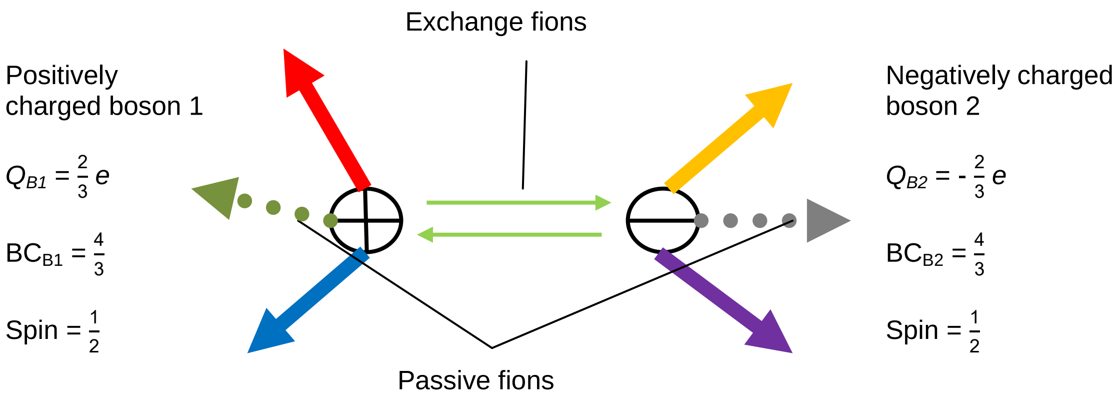

Figure 3.13: Schematic representation of a meson consisting of two $Q = \frac{2}{3}$ *e* quarks

Properties of mesons consisting of two $Q = \frac{2}{3}e$ quarks:

$$PC_{meson} = \frac{3 + 1 - 1}{3} + \frac{3 + 1 - 1}{3} = \frac{6}{3}$$

$$Q_{meson} = +\frac{2}{3}e - \frac{2}{3}e = 0$$

$$\text{Spin} = \frac{1}{2} - \frac{1}{2} = 0 \text{ or } = \frac{1}{2} + \frac{1}{2} = 1 \text{ or } = -\frac{1}{2} - \frac{1}{2} = -1$$

B) Mesons consisting of $Q = \frac{1}{3}e$ quarks:

The representation of the interaction of a meson consisting of $Q = \pm\frac{1}{3}e$ quarks is hypothetically possible if additional quarks from the set of hidden matter occur in the wave-field within the range of their short-range interaction, which do not rotate simultaneously on the dimension plane D_{56}. Once again, a positive and a negative charged boson are depicted, which, upon receiving an external fion, assume the boson configuration BC = $\frac{4}{3}$. Under the influence of the short-range interaction, they exchange bosons. As soon as an exchange takes place, these bosons again consist of a u/d-quark with their exchange fions. As in the above case, the total charge in their sphere S is initially $Q = \pm\frac{2}{3}e$. Now, these two are attached to another neighbouring boson of the wave-field F_{4-6} that does not interact with the particle-field F_{1-3}. A triplet ensures that all three u/d-quarks must now use two active fions to form the required number of exchange fion/passive fion pairs to ensure stable exchange. Only one active fion remains in each of the two u/d-quarks for field exchange, which could represent a single partial charge with $Q = \pm\frac{1}{3}e$ with respect to the particle-field F_{1-3}. The additional exchange fion touches its contact points at A2/B1 or A1/B2, respectively, and interacts with the u/d-quarks at exactly this point during rotation. The wavelength for the representation of the fion exchange is $\frac{\lambda}{2}$ and is shown twice in orange in a hemispherical shape. The exchange fions rotate counterclockwise because one quark is to the left and the other quark is to the right of the third quark. The fion exchange between the quarks mediates attractive forces back into the particle-field F_{1-3} upon absorption between the particles. The spin of the meson remains integer. The particle configuration for the meson remains at PC = $\frac{6}{3}$ because a pair of remaining passive fions together form a virtual exchange fion/passive fion pair, which is to be evaluated as an active fion in the numerator.

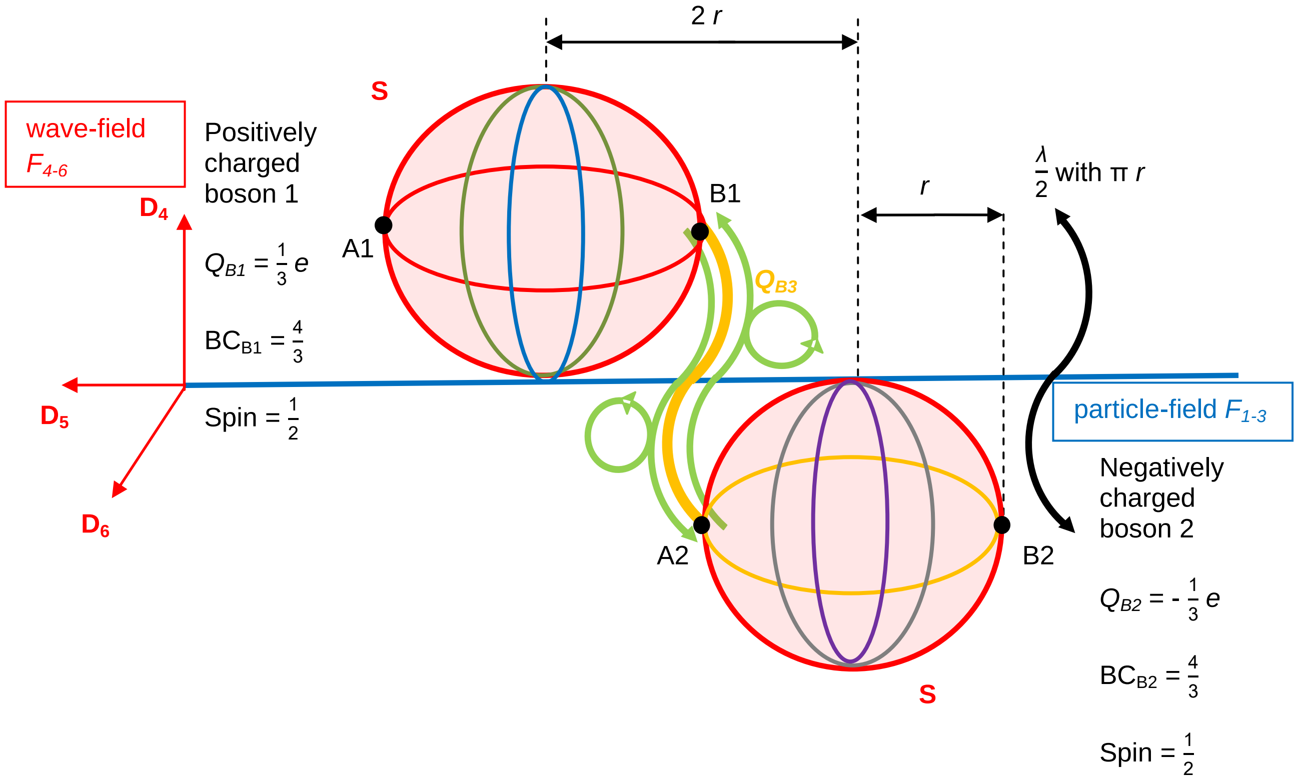

Figure 3.14: Meson, consisting of two $Q = \frac{1}{3}$ e quarks; yellow: a third quark from the set of hidden matter

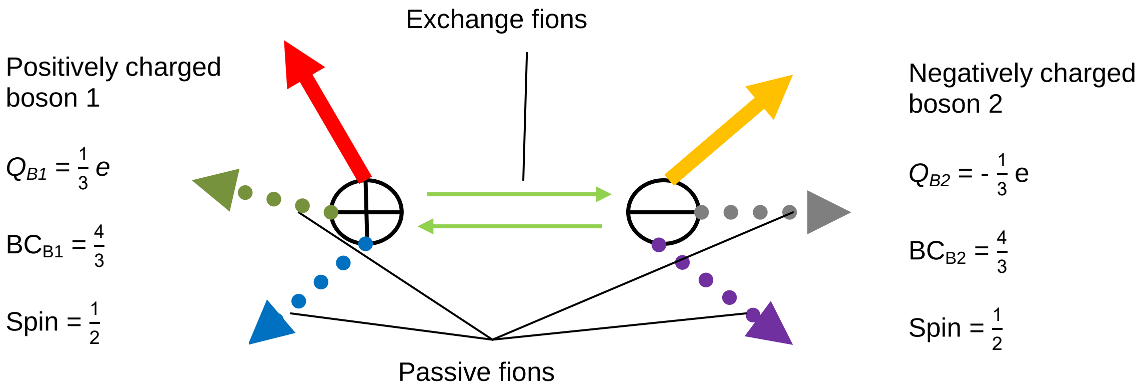

Figure 3.15: Diagram of a meson consisting of two $Q = \frac{1}{3}$ e quarks

Properties of mesons consisting of $Q = \frac{1}{3}$ e quarks:

$$PC_{meson} = \frac{3+1-1}{3} + \frac{3+1-1}{3} = \frac{6}{3}$$

$$Q_{meson} = +\frac{1}{3} e - \frac{1}{3} e = 0$$

$$\text{Spin} = \frac{1}{2} - \frac{1}{2} = 0 \text{ or } = \frac{1}{2} + \frac{1}{2} = 1 \text{ or } = -\frac{1}{2} - \frac{1}{2} = -1$$

C) Mesons consisting of one $Q = \frac{2}{3}\,e$ quark and one $Q = \frac{1}{3}\,e$ quark:

To represent a meson consisting of a $Q = \frac{1}{3}e$ quark and a $Q = \frac{2}{3}e$ quark, two bosons with the same positive charge, $Q = +\frac{2}{3}\,e$ and $Q = +\frac{1}{3}\,e$, are involved, which are phase-shifted by 90° relative to each other. Boson 2 is connected to another particle from the set of hidden matter in the wave-field $F_{4\text{-}6}$ in such a way that this particle structure occurs similarly to **case B)**. A fion exchange can occur between contact points A1/A2 and B1/B2. In this case, this process only begins after contact at point A1 or B1. Only when boson 1 comes into contact with point A1 or B1 does it convert one of its active fions into an exchange fion/passive fion pair. This exchange fion rotates clockwise to travel from the starting point A1 to A2 and back. When the exchange fion recombines at point A1/B1 in the dimension plane D_{56}, attractive forces are transmitted into the particle-field $F_{1\text{-}3}$. The spin of the meson remains an integer. The particle configuration for the meson is again given by

$$PC_{meson} = \frac{3+1-1}{3} + \frac{3+1-1}{3} = \frac{6}{3}\,.$$

The charges are $Q_{B1} = +\frac{2}{3}\,e$ for boson 1 and $Q_{B2} = +\frac{1}{3}\,e$ for boson 2. The wavelength between their points of contact is $\frac{\lambda}{4}$.

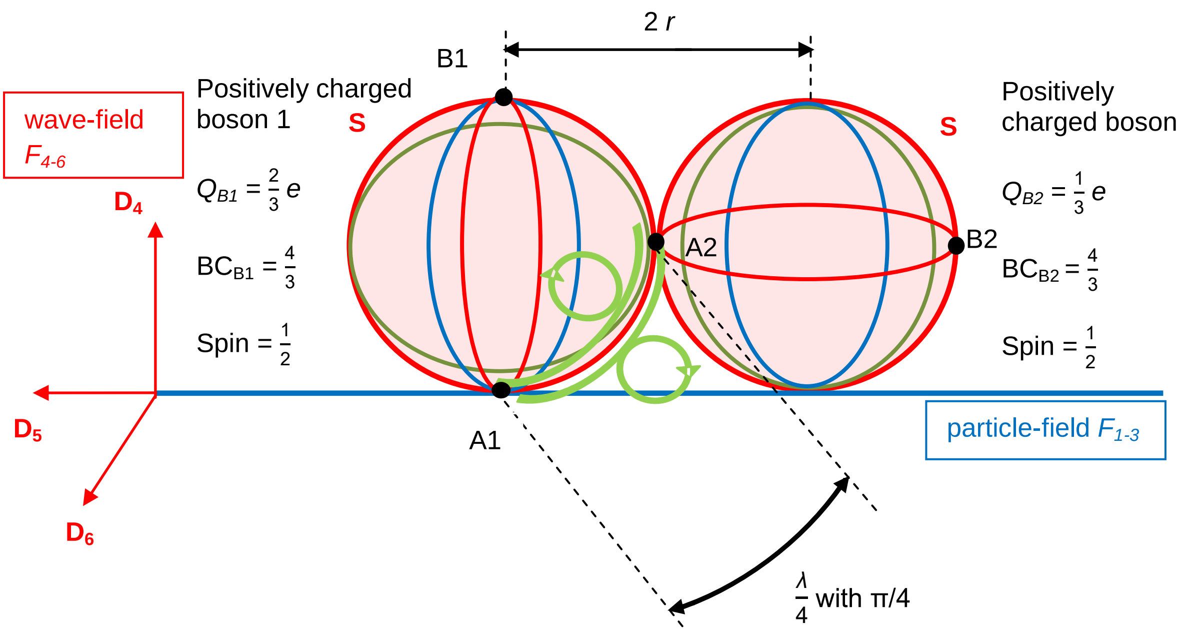

Figure 3.16: Meson consisting of one $Q = \frac{2}{3}\,e$ quark and one $Q = \frac{1}{3}\,e$ quark

Note: If boson 2 were also charged with $Q = +\frac{2}{3}$ e and not phase-shifted, both quarks would repel each other as positive charges. This representation is the only conceivable particle structure in which two bosons with the same charge exert attractive forces on each other.

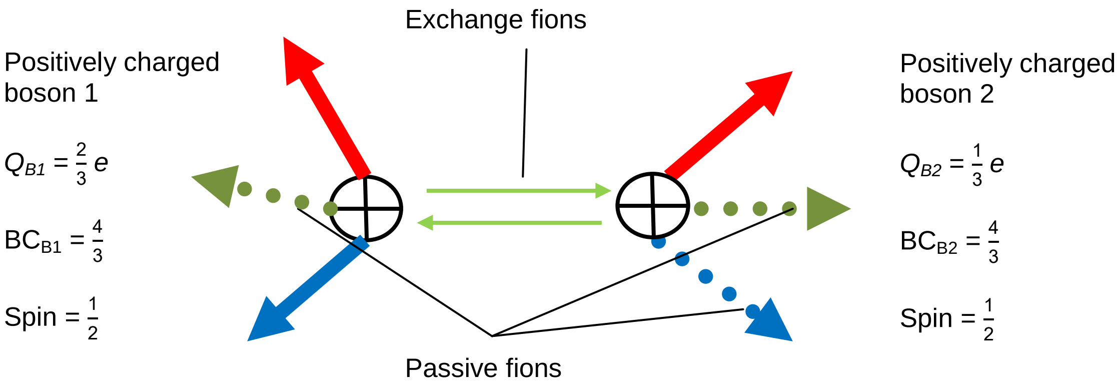

Figure 3.17: Schematic representation of a meson consisting of a $Q = \frac{2}{3}$ *e* quark and a $Q = \frac{1}{3}$ *e* quark

Properties of mesons consisting of a $Q = \frac{2}{3}$ *e* quark and a $Q = \frac{1}{3}$ *e* quark:

$$PC_{meson} = \frac{3+1-1}{3} + \frac{3+1-1}{3} = \frac{6}{3}$$

$Q_{meson} = +\frac{2}{3} e + \frac{1}{3} e = +1\ e$ for positively charged quarks and

$Q_{meson} = -\frac{2}{3} e - \frac{1}{3} e = -1\ e$ for negatively charged quarks

$$\text{Spin} = \frac{1}{2} - \frac{1}{2} = 0 \text{ or } = \frac{1}{2} + \frac{1}{2} = 1 \text{ or } = -\frac{1}{2} - \frac{1}{2} = -1$$

Possible particle structures of baryons made up of u/d-quarks:

D) Baryons consisting of a chain of two $Q = -\frac{2}{3}e$ quarks and one $Q = \frac{1}{3}e$ quark:

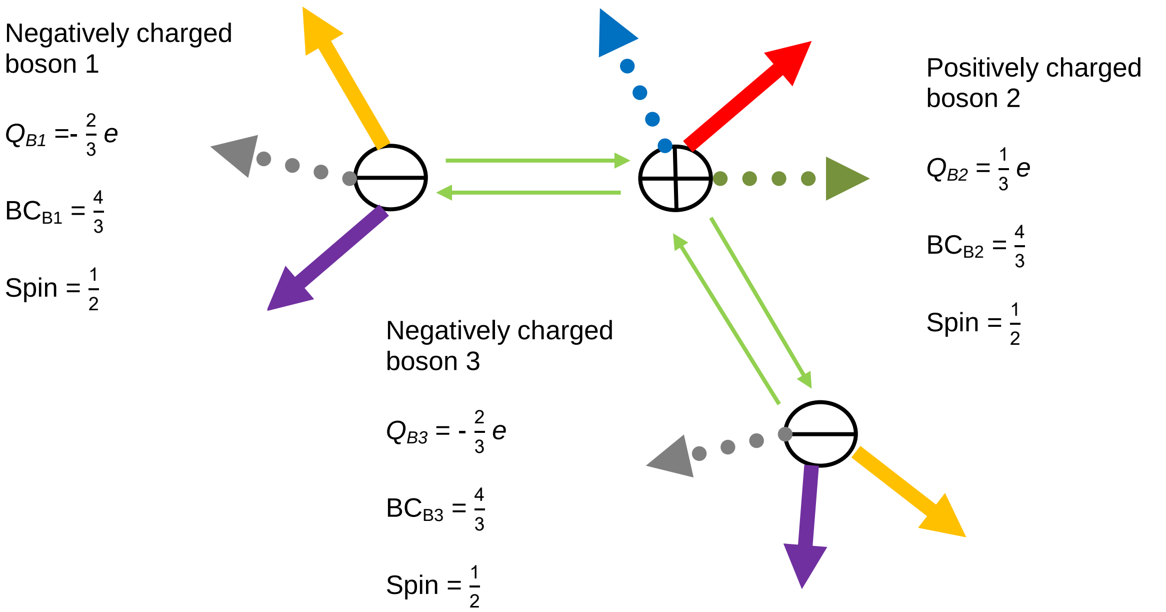

Figure 3.18: Binding chain consisting of two $Q = -\frac{2}{3}e$ quarks and one $Q = \frac{1}{3}e$ quark

The resulting chain has a half-integer spin like a baryon. In this case, a quark chain consisting of negatively-positively-negatively charged quarks has been created. The positively charged boson 2 has only one u/d-quark with a charge $Q_{B2} = +\frac{1}{3}e$ because it must bind to two negatively charged quarks. It must expose two of its active fions to form two exchange fion/passive fion pairs. The two passive fions are counted virtually as one active fion. As soon as the electrical forces begin to act after a field exchange, the outer quarks will align themselves at 90° to 180° due to repulsive forces between charges of the same name and continue to tear apart. This chain is unstable and does not occur in nature.

Properties of a baryon consisting of a chain of two $Q = \frac{2}{3}e$ quarks and one $Q = \frac{1}{3}e$ quark:

$$PC_{baryon} = \frac{3+1-1}{3} + \frac{3+1-1}{3} + \frac{3+1-1}{3} = \frac{9}{3}$$

$$Q_{baryon} = -\frac{2}{3}e + \frac{1}{3}e - \frac{2}{3}e = -1\,e \qquad \text{or:} \qquad Q_{baryon} = \frac{2}{3}e - \frac{1}{3}e + \frac{2}{3}e = +1\,e$$

$$\text{Spin} = \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{3}{2} \text{ or } = -\frac{1}{2} - \frac{1}{2} - \frac{1}{2} = -\frac{3}{2} \text{ or } = \frac{1}{2} + \frac{1}{2} - \frac{1}{2} = \frac{1}{2} \text{ or } = \frac{1}{2} - \frac{1}{2} - \frac{1}{2} = -\frac{1}{2}$$

E) Baryons made up of three $Q = \frac{2}{3}e$ quarks with a binding neutrino in the centre:

In the FSM, the stability of a baryon is established by a virtual neutrino. A pictorial comparison for such a neutrino is shown in **Figure 3.11 on the right** from the previous chapter. For the special cases of baryons, it will be referred to as **a binding neutrino**. The binding neutrino consists of three exchange fion pairs, which virtually form three active fions for one neutrino. The Pauli principle prevents the orbiting elementary particles from approaching the binding neutrino, because otherwise more 4-dimensional subspaces U would be localised at one location than would be possible in a space R^6. A space structure-induced repulsion occurs from the direction of the binding neutrino, while the strong nuclear forces promote attraction to the binding neutrino. This results in an energetically favourable distance between the surrounding elementary particles and the binding neutrino. Assuming that the proton brings about the energetically favourable state in its structure, it must remain largely undisturbed. Stability is maximised by an even arrangement and spacing of the elementary particles relative to each other. Taking this stability into account, the elementary particles interact preferentially with the binding neutrino. Due to the lack of orthogonal formation to the dimension plane D_{56}, this binding neutrino has no charge and a relatively low mass. The total spin of all exchange fions in the binding neutrino cancels out to zero. The additional rotation matrix for the elementary particles rotating around the binding neutrino runs parallel to the dimension plane D_{56} and is:

$$\overrightarrow{e_4}\, \mathrm{d}D_5 \mathrm{d}D_6 = \overrightarrow{\mathrm{d}A} = D_{56}.$$

Due to the dynamo effect in the wave-field $F_{4\text{-}6}$, a magnetic moment is generated via the spinless binding neutrino along the above-mentioned rotation matrix, which suggests to the observer that a proton consists of only a single particle.

With the emergence of the binding neutrino, two processes occur simultaneously. All external fions received from the respective bosons are converted into exchange fions/passive fion pairs. The particle configuration of the baryon is reduced to:

$$PC_{\text{baryon}} = \frac{3+1-1}{3}_{\text{(boson1)}} + \frac{3+1-1}{3}_{\text{(boson2)}} + \frac{3+1-1}{3}_{\text{(boson3)}}$$

Subsequently, one u/d-quark-internal active fion converts into an exchange fion/passive fion pair. The particle configuration is further reduced to the value:

$$PC_{\text{baryon}} = \frac{3+1-2}{3}_{\text{(boson1)}} + \frac{3+1-2}{3}_{\text{(boson2)}} + \frac{3+1-2}{3}_{\text{(boson3)}}$$

Now, each elementary particle is missing a partial charge due to the loss of an active fion. If the elementary particles consist of u/d-quarks, their respective charges are initially reduced to: $Q_{B1,2,3} = \pm\frac{2}{3}\,e$.

When a baryon decays, the binding neutrino is probably registered as a neutrino.

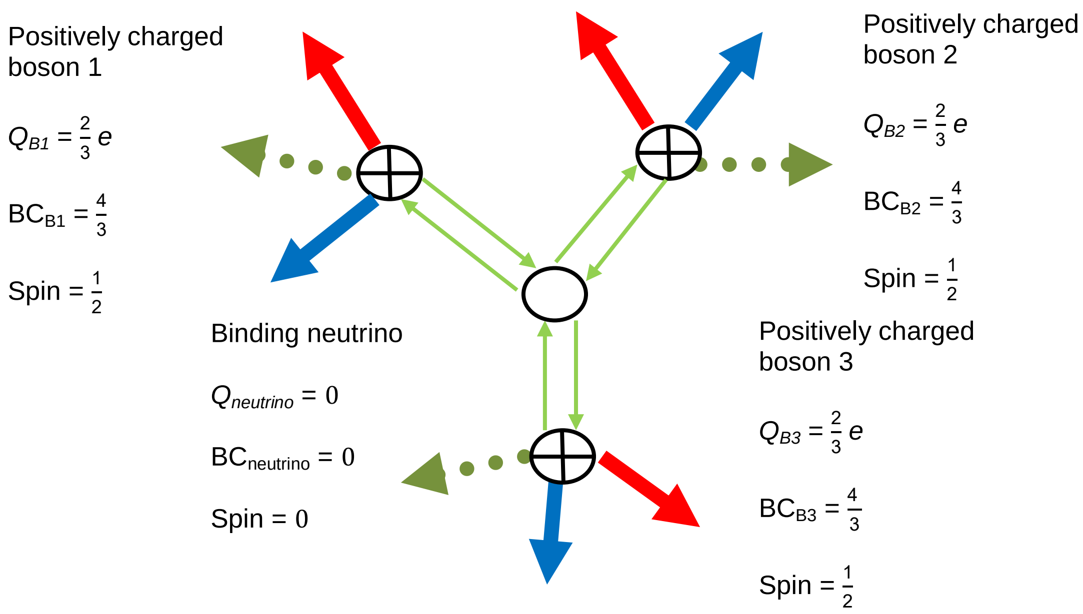

Figure 3.19: Baryon with a binding neutrino without spin in the centre to promote stability

The spin of the individual boson would suggest an integer spin due to the integer boson configuration. The two exchange fions emitted with integer spin have left their two passive fions in the respective boson for the binding neutrino. Virtually, an active fion with a spin of $\frac{1}{2}$ could arise again, but this would not contribute to the virtual mass because a passive fion originates from the external fion. The individual spin of the bosons remains half-integer. Accordingly, the total spin of three bosons with a spin of $\frac{1}{2}$ remains half-integer.

Properties of baryons consisting of three $Q = \frac{2}{3}\,e$ quarks with binding neutrinos:

$$PC_{baryon} = \frac{3+1-2}{3} + \frac{3+1-2}{3} + \frac{3+1-2}{3} + 0 = \frac{6}{3}$$

$$Q_{baryon} = +\frac{2}{3}\,e + \frac{2}{3}\,e + \frac{2}{3}\,e + 0 = +2\,e$$

$$\text{Spin} = \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{3}{2} \text{ or } = -\frac{1}{2} - \frac{1}{2} - \frac{1}{2} = -\frac{3}{2} \text{ or } = \frac{1}{2} + \frac{1}{2} - \frac{1}{2} = \frac{1}{2} \text{ or } = \frac{1}{2} - \frac{1}{2} - \frac{1}{2} = -\frac{1}{2}$$

These particle structures are unlikely to occur in nature with such a one-sided charge configuration, or if they do, only with a very low probability.

F) Baryon consisting of two $Q = \frac{2}{3}e$ quarks, one $Q = -\frac{1}{3}e^{-}$ quark and one binding neutrino:

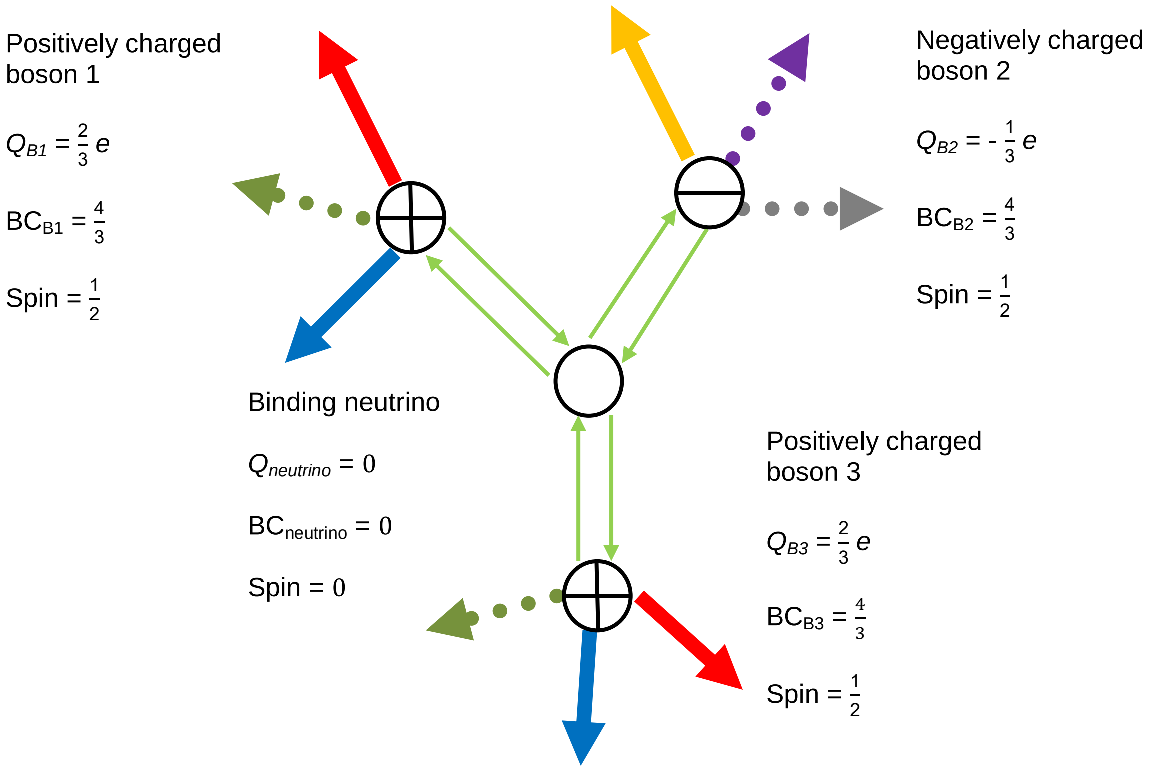

Figure 3.20: Baryon consisting of two $Q = \frac{2}{3}e$ quarks, one $Q = -\frac{1}{3}e$ quark and a binding neutrino in the centre of the particle structure

Properties of baryons consisting of two $Q = \frac{2}{3}e$ quarks, one $Q = -\frac{1}{3}e$ quark and a binding neutrino:

$$PC_{baryon} = \frac{3+1-2}{3} + \frac{3+1-2}{3} + \frac{3+1-2}{3} + 0 = \frac{6}{3}$$

$$Q_{baryon} = +\frac{2}{3}e + \frac{2}{3}e - \frac{1}{3}e + 0 = +1\,e$$ → **Proton**

$$\text{Spin} = \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{3}{2} \text{ or } = -\frac{1}{2} - \frac{1}{2} - \frac{1}{2} = -\frac{3}{2} \text{ or } = \frac{1}{2} + \frac{1}{2} - \frac{1}{2} = \frac{1}{2} \text{ or } = \frac{1}{2} - \frac{1}{2} - \frac{1}{2} = -\frac{1}{2}$$

Due to its charge, this baryon is the proton. The stability of the proton depends on how the additional exchange fion of *the* $Q = -\frac{1}{3}e$ quark interacts with its environment. For example, it could interact with a $Q = +\frac{1}{3}e$ quark together with a neutron (**Figure**

3.21). In the atomic nucleus, a proton with its negatively charged boson (2) specifically seeks out a positively charged boson from the neutron in order to create a direct connection. Otherwise, the proton would behave like a radical and destabilise the atomic nucleus. After the strong interaction with a neutron, the proton is considered saturated to the environment. Meanwhile, the neutron could interact with other protons or with hidden matter. This will be discussed in more detail in the section on neutrons. The atomic nucleus is thus an agglomerate of protons and neutrons held together by their strong nuclear forces. Due to the complexity of the particle structure and the coupling frequency required for it, the strong nuclear force is stronger than the electromagnetic force at comparable distances. However, the electrical interaction with its repulsive forces is exactly as strong as the strong nuclear force before the protons or neutrons merge. This is explained by the Pauli principle for the FSM, which prevents more than five 4-dimensional rotational orbits from encountering each other simultaneously within a sphere S.

The proton has a stabilising effect on the atomic nucleus by merely creating a binding site for a neutron. A neutron, on the other hand, has two binding sites and seeks two binding partners. As a single neutron, it decays into a proton, an electron and an antineutrino without a binding partner.

G) Baryon consisting of a $Q = -\frac{2}{3}e$ quark, two $Q = \frac{1}{3}e$ quarks and a binding neutrino:

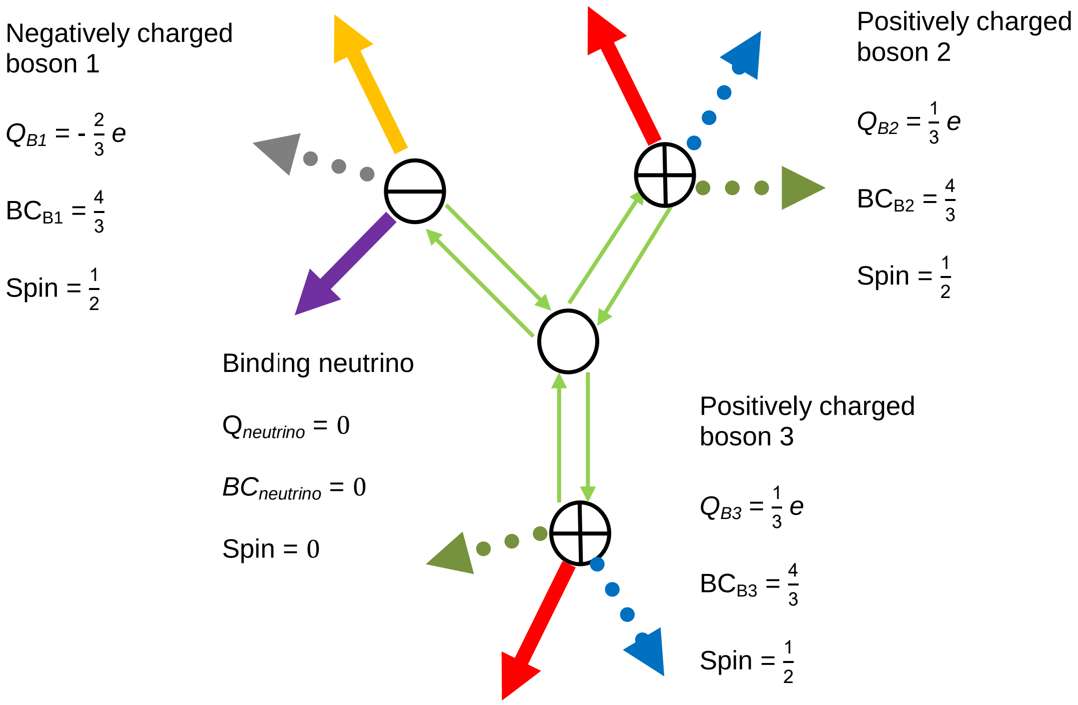

Figure 3.21: Baryon consisting of one $Q = -\frac{2}{3}e$ quark, two $Q = \frac{1}{3}e$ quarks and a binding neutrino in the centre of the particle structure

Properties of baryons consisting of one $Q = -\frac{2}{3}e$ quark, two $Q = \frac{1}{3}e$ quarks and a binding neutrino:

$$PC_{baryon} = \frac{3+1-2}{3} + \frac{3+1-2}{3} + \frac{3+1-2}{3} + 0 = \frac{6}{3}$$

$$Q_{baryon} = -\frac{2}{3}e + \frac{1}{3}e + \frac{1}{3}e + 0 = 0$$ → **Neutron**

$$\text{Spin} = \frac{1}{2} + \frac{1}{2} + \frac{1}{2} = \frac{3}{2} \text{ or } = -\frac{1}{2} - \frac{1}{2} - \frac{1}{2} = -\frac{3}{2} \text{ or } = \frac{1}{2} + \frac{1}{2} - \frac{1}{2} = \frac{1}{2} \text{ or } = \frac{1}{2} - \frac{1}{2} - \frac{1}{2} = -\frac{1}{2}$$

This baryon is apparently the neutron. The neutron has two $Q = +\frac{1}{3}e$ quarks. The neutron therefore has two exchange fions that can interact with the environment. One could interact with the proton, similar to **Figure 3.12**, which promotes stability in the atomic nucleus. This leaves one more free exchange fion that can interact with its environment. If it does not find a partner in the dimension plane D_{56} parallel to the particle-field $F_{1\text{-}3}$, then there is a probability that an interaction will take place in the wave-field $F_{4\text{-}6}$ with a particle relative to the dimension plane D_{56}. Such a connection can no longer be directly detected for the particle-field $F_{1\text{-}3}$. In such cases, the atomic nucleus receives a concrete interaction with hidden matter. This interaction tends to have a destabilising effect on the atomic nucleus by distributing the resulting field strength over its atomic nucleus and thus reducing the strong nuclear force in the atomic nucleus. Above a certain atomic nucleus size, the influence of the hidden matter exceeds a critical state, after which decay restores an energetically favourable state with hidden matter.

The process of nuclear fission appears to be a natural limitation for particles, preventing them from exceeding a certain size.

Calculation of the influence of hidden matter on the atomic nucleus:

The results of the particle structures presented so far with the charge distribution of the u/d-quarks for the proton and neutron suggest that the amount of hidden matter in the atomic nucleus increases with its size. The following calculation serves as verification.

For two cases, the extent of the influence of hidden matter on the atomic nucleus is determined specifically. The periodic table of elements (PTE) is the measured observation from the particle-field $F_{1\text{-}3}$. Furthermore, according to the FSM, it is known that, under the condition of energy conservation, every atom is created with an equal number of electrons and positrons. However, the mass data in the PTE deviates from the aforementioned equilibrium. The mass equivalent of the binding energy in an interaction with hidden matter could possibly be the reason for the difference. This will be investigated below. The figures from the PTE should remain simple factors because ratios are still being presented.

1) Example Zinc:

Atomic weight: 65,3; atomic number: 30; electrons: 30, protons: 30, neutrons: 35

Charge components: neutron with $\frac{2}{3}e^+$ and $\frac{2}{3}e^-$; proton with $\frac{4}{3}e^+$ and $\frac{1}{3}e^-$

Distribution of electrons and positrons to neutrons and protons:

Number of positrons in the neutron: NoPN

Number of electrons in the neutron: NoEN

Number of positrons in the proton: NoPP

Number of electrons in the proton: NoEP

Total number of positrons in the atom: NoPT

Total number of electrons in the atom: NoET

Neutron: NoPN = $\frac{2}{3}e^+ \cdot 35 = 23{,}3\ e^+$

NoEN = $\frac{2}{3}e^- \cdot 35 = 23{,}3\ e^-$

Proton: NoPP = $\frac{4}{3}e^+ \cdot 30 = 40\ e^+$

NoEP = $\frac{1}{3}e^- \cdot 30 = 10\ e^-$

Electron: 30

Total NoPT = 23,3 e^+ + 40 e^+ = 63,3 e^+

NoET = 23,3 e^- + 10 e^- + 30 e^- = 63,3 e^-

Deviation from atomic mass:

65,3 – 63,3 = 2

Evaluation:

Since, according to the representation in **Figure 3.21**, the neutron can only exchange with a negatively charged particle, negatively charged mass equivalents such as those of a proton or other negatively charged $Q = \frac{2}{3}e$ bosons can be considered for field exchange. Due to the size of the manipulation, the hidden matter probably consists of the mass equivalent of two protons.

2) Example Uranium:

Atomic weight: 238; atomic number: 92; electrons: 92, protons: 92, neutrons: 146

Charge components: neutron with $\frac{2}{3}e^+$ and $\frac{2}{3}e^-$; proton with $\frac{4}{3}e^+$ and $\frac{1}{3}e^-$

Distribution of electrons and positrons to neutrons and protons:

Neutron: NoPN = $\frac{2}{3}e^+ \cdot 146 = 97{,}33\ e^+$

NoEN = $\frac{2}{3}e^- \cdot 146 = 97{,}33\ e^-$

Proton: NoPP = $\frac{4}{3}e^+ \cdot 92 = 122{,}66\ e^+$

NoEP = $\frac{1}{3}e^- \cdot 92 = 30{,}66\ e^-$

Electron: 92

Total NoPT = 97,33 e^+ + 122,66 e^+ = 220 e^+

NoET = 97,33 e^- + 30,66 e^- + 92 e^- = 220 e^-

Deviation from atomic mass:

238 – 220 = 18

Evaluation:

As expected, the difference from the atomic mass increases with the size of the atomic nucleus. Since the neutron interacts with protons, the hidden matter could consist of the mass equivalent of 18 protons.

Configuration of fermions, bosons, mesons and baryons:

Table 3.2 lists the configurations available so far for the following chapter. The terms contain valuable information about the structure of particles, which is why they are not simply abbreviated but are used for later interpretations of a particle.

(3.08)

Particle type	Configurations with lowest energy level	Further possible configuration
$BC_{electron}$ (extensions of the electron)	$\frac{4}{3};\frac{4}{4};\frac{5}{5};\frac{6}{6}$	$\frac{5}{4};\frac{6}{5}$
PC_{fion}	$\frac{1}{3}$	
$PC_{electron}$	$\frac{3}{3}$	
PC_{meson}	$\frac{4}{3};\frac{6}{4};\frac{8}{5};\frac{10}{6}$	$\frac{5}{3};\frac{6}{3};\frac{8}{5};\frac{8,5}{5};\frac{9}{5};\frac{9,5}{5};\frac{10}{5}$
PC_{baryon}	$\frac{6}{3}$	

Table 3.2: List of configurations for different particles; BC – boson configuration; PC – particle configuration