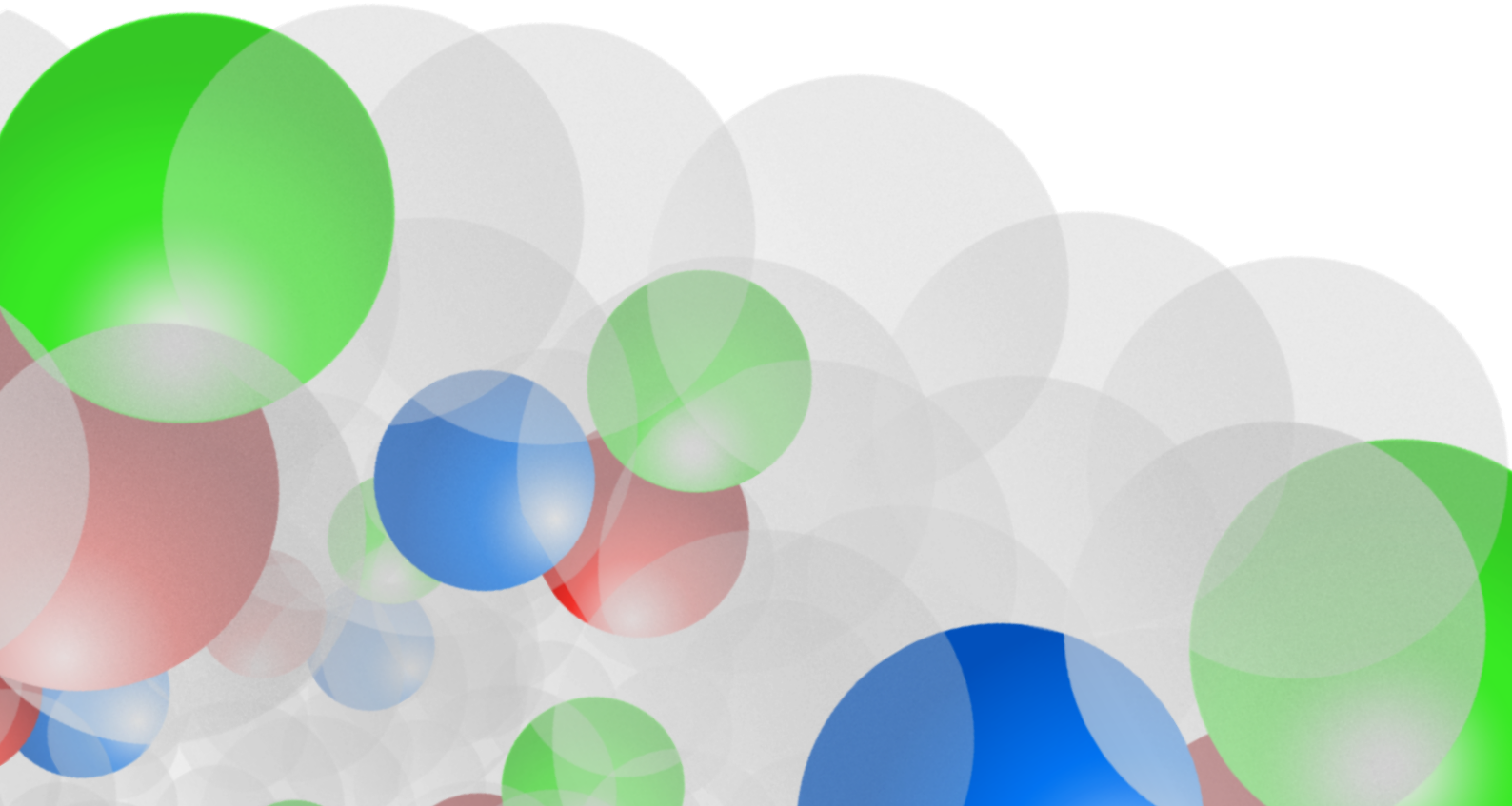
Fractal Quantum Space Model (FQSM)

A Foundational Ontological Model

Part 1 – The Geometry of Reality

Frank Hafer

Version 1.0



Document history

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Abstract

The Fractal Quantum Space Model (FQSM) is a foundational ontological model of reality. It describes the fundamental constituents of reality and their underlying relationships. Building on this, selected dynamic processes are developed in the individual parts of the model, and various physical phenomena are classified on a more fundamental plane.

In the FQSM, reality is not described in terms of matter and its interactions, but rather in terms of the structure of quantum spaces and quantum points. Quantum points possess determinations that describe their current states. The manifestations described in the model and the underlying processes arise from these states.

The FQSM is not intended as a replacement for existing physical theories. Rather, it describes the ontological and geometric framework within which established laws of nature and various physical phenomena can be understood on a fundamental plane.

The term ‘fractal’ refers to the self-similar structural organisation of the model and not to a fractal geometry of space.

This first part describes the ontological and geometric foundations of the FQSM. The mechanisms of projection, energy supply, time, physical interactions and other dynamic processes are developed in the subsequent parts of the model.

Within the FQSM, consciousness is assumed to exist. However, its structure is not the subject of this model; rather, it is described in the Fractal Consciousness Layer Model (FCLM).

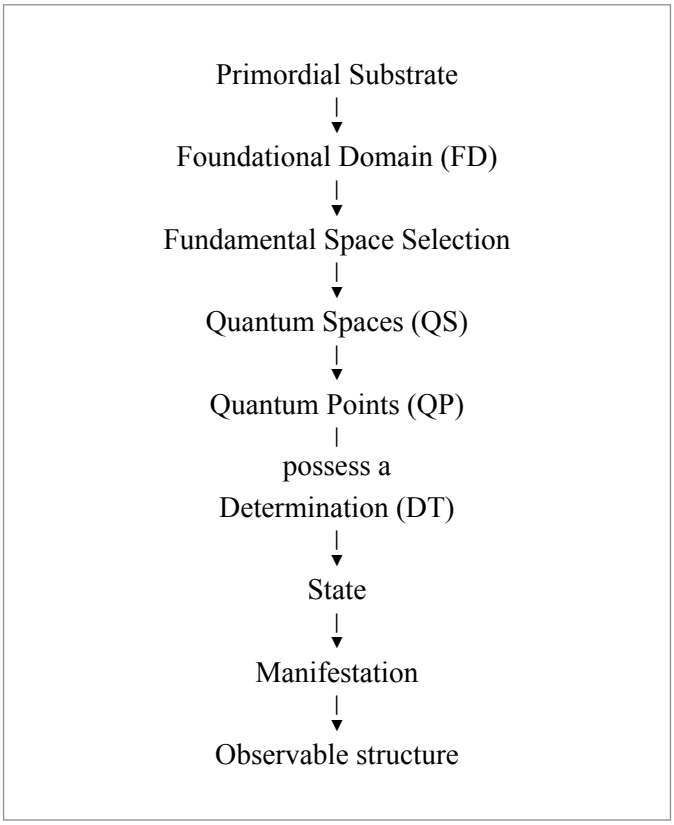


Figure 1: Ontological basic structure of the FQSM

Fractal Organisation of Reality

In the Fractal Quantum Space Model, the structural architecture refers to the fundamental composition of a level consisting of quantum points, their determinations, and the interactions arising from them.

The fractal nature of the model is based on the self-similarity of its fundamental structure. All levels of the model share the same structural composition of quantum points, their determinations and the relationships between them. Different physical phenomena arise from different states and interactions within the same fundamental structural architecture.

Notation

Throughout the Fractal Quantum Space Model, the following notation is used for the sake of simplicity.

Definitions of terms

Symbol	Meaning
FQSM	Fractal Quantum Space Model
FCLM	Fractal Consciousness Layer Model
FD	Foundational Domain
QS	Quantum Space
QP	Quantum Point
QL	Quantum Layer
SL	Subtle Layer
ML	Material Layer
SubS	Subspace
DT	Determination

The symbols used are intended to provide a concise and consistent description of the model. They constitute an internal notation for the model and should not be regarded as a complete mathematical formalisation.

1. Axioms of the model

The Fractal Quantum Space Model is based on a small number of fundamental assumptions. All subsequent descriptions and conclusions are derived from these axioms.

Axiom A1

There is exactly one primordial substrate. Within this, there is exactly one foundational domain.

Axiom A2

The foundational domain contains all quantum points.

Axiom A3

Every quantum point has a unique identity, a position within the foundational domain, and a current state described by its determination.

Axiom A4

The quantum points of the foundational domain are permanently assigned to quantum spaces by the fundamental space selection.

Axiom A5

Each quantum point belongs to exactly one quantum space.

Axiom A6

The assignment of a quantum point to its quantum space is immutable.

Axiom A7

The foundational domain encompasses all quantum spaces.

Axiom 8

The spatial extent of each quantum space corresponds to the spatial extent of the foundational domain.

Axiom A9

Determinations describe the states of the quantum points and thus form the basis of the model-internal processes from which manifestations and observable structures arise.

Preliminary remark

The axioms formulated in this document do not constitute physical laws. They define exclusively the fundamental ontological and geometric premises of the Fractal Quantum Space Model and form the starting point for all further descriptions of the model. The derivation of physical processes, properties and phenomena takes place in the subsequent parts of the model. In doing so, the basic assumptions of the model may be supplemented by further axioms.

2. Basic concepts

The following basic concepts define the fundamental structure of the Fractal Quantum Space Model (FQSM). They form the basis for all further descriptions.

2.1. Primordial Substrate

The primordial substrate is the continuous medium within which the foundational domain (FD) exists. The physical significance of the intermediate regions is described only in later parts of the FQSM.

2.2. The Foundational Domain (FD)

The FD is the fundamental space of the universe. It encompasses the entire spatial extent within which all quantum spaces (QS) exist. Quantum points (QP) are localised within the FD, with regions of the primordial substrate lying between them. Both the quantum points and the intervening regions form an integral part of the FD and, together, constitute the basis for all further model structures; see Figure 2.

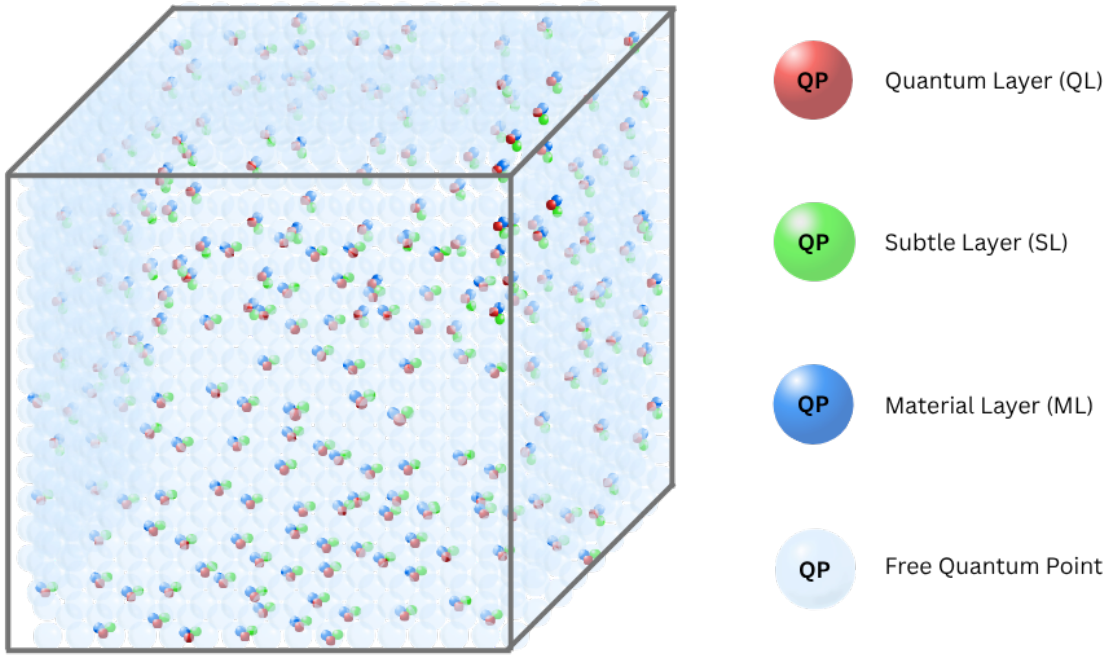


Figure 2: A section of the FD with its individual QPs

2.3. Fundamental Space Selection

Fundamental space selection describes the fundamental allocation of all QPs in the FD to the various QSs. Each quantum point is permanently assigned to exactly one QS. Fundamental space selection is not an ongoing process, but rather a fundamental property of the structure of the FQSM. Once fundamental space selection is complete, the assignment of each quantum point remains unchanged.

2.4. Quantum Space (QS)

A QS consists of all QPs assigned to it through fundamental space selection. Each QS has its own laws that determine the properties of its QPs. Several QSs co-exist within the same FD without sharing any QPs.

2.5. Quantum Point (QP)

A QP is the smallest structural unit of the FD. Each QP has a unique identity, a position within the FD, and a determination (DT) which describes its current state. Through fundamental space selection, each QP is assigned to exactly one QS. The properties of a QP are determined by the laws of the QS to which it belongs. Changes to its DT alter only its state, but not its identity or its position.

2.6. Free Quantum Point

A free quantum point is a QP whose DT consists solely of its fundamental determination and the fundamental extensions arising from the laws governing its QS. It does not yet possess any extended DTs. An extended DT will only come about through further processes internal to the model.

2.7. Subspace (SubS)

A SubS is a locally bounded subset of free QPs within a QS. It inherits the fundamental laws of its original QS and can be extended by additional laws. It exists as an isolated, spatially bounded region within the same foundational domain.

2.8. Determination (DT)

The DT describes the current state of a QP. Every QP already possesses a fundamental state, which is described by a fundamental determination. Upon assignment to a QS, this DT is extended in accordance with the laws of the QS. Further model-internal processes may gradually expand or modify the DT, ensuring that it describes the current overall state of the QP at all times.

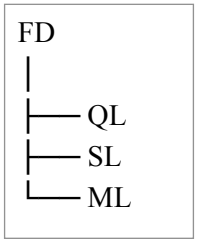
Any change or addition to a DT alters the state of the QP. The current state determines the properties of the QP and thus forms the basis for its interactions and for the internal model processes that can lead to the manifestation of structures. The DT alters neither the identity nor the position of a QP, but solely its state.

3. Quantum Space

Fundamental space selection gives rise to several QS. In the FQSM, three QS are initially considered:

- Quantum Layer (QL)
- Subtle Layer (SL)
- Material Layer (ML)

They co-exist within the same FD.



3.1. Quantum Layer (QL)

Of the QSs described here, only the QL contains both fixed and movable QPs. This gives the QL a special status within the FQSM.

3.2. Subtle Layer (SL)

The SL consists exclusively of fixed QPs. It acts as a projection surface for the QL. It can produce subtle-matter manifestations and serves as a source of potential for the material layer (ML).

3.3. Material Layer (ML)

The ML consists exclusively of fixed QPs. It acts as a projection surface for the QL. It can produce material manifestations and can transfer potentials to the SL.

4. Coexistence of Quantum Spaces

Following fundamental space selection, several quantum spaces (QS) coexist within the same foundational domain (FD). Each of these QS possesses its own quantum points (QP) as well as its own laws. Nevertheless, together they form the complete reality of the Fractal Quantum Space Model (FQSM).

The QS do not exist one after the other, nor do they exist in different locations. They coexist within the same fundamental geometry of the FD. They are separated solely by fundamental space selection. This allows different QS to exist simultaneously without overlapping or sharing their QPs; see Figure 3.

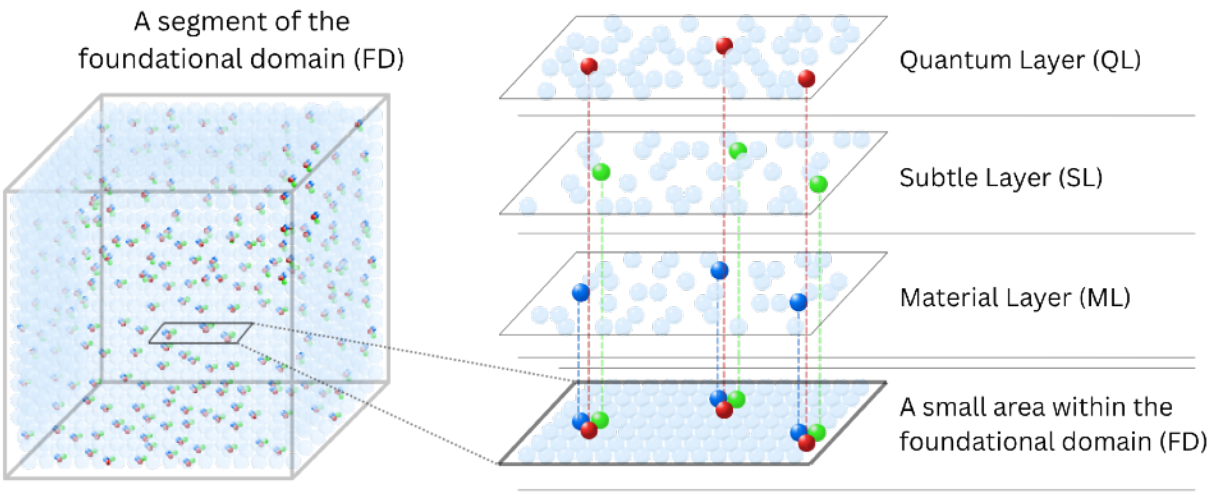


Figure 3: Sub-sampling of the quantum spaces in the foundational domain

4.1. Independence of Quantum Spaces

Each QS forms a self-contained system. All QPs within a QS belong exclusively to that QS. QPs are not exchanged between different QSs. The laws of a QS apply exclusively within that QS. Although all QSs share the same basic structural architecture, they differ in terms of their laws.

4.2. Common origin

Although the QS are separate from one another, they share a common origin. All QS arise from the same FD through fundamental space selection. They therefore do not represent independent universes, but rather different quantum spaces within the same fundamental reality. The unity of reality thus arises not from shared QPs, but from their common origin.

4.3. Delimitation of Quantum Spaces

Because each QS possesses only its own QPs, determinations apply exclusively within that QS. There is no direct influence on other QSs. Relationships between different QSs are described in the FQSM exclusively through defined projection mechanisms. These will be introduced in later parts of the model.

4.4. Different laws of Quantum Spaces

Although all QS are based on the same geometric principles, they differ in their laws. These determine, among other things, what types of QPs a QS possesses. For example, the quantum layer (QL) contains both fixed and movable QPs, whilst the subtle layer (SL) and the material layer (ML) consist exclusively of fixed QPs. As a result, the individual QS serve different functions within the FQSM.

4.5. Consequences

The coexistence of several QS gives rise to several fundamental consequences.

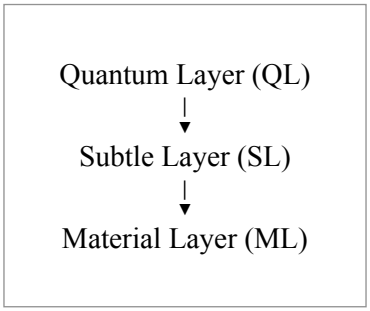
- Firstly, reality does not exist on a single level, but on several QS simultaneously.
- Secondly, different laws may coexist within the same geometric framework.
- Thirdly, the observable manifestations described in the FQSM arise from the interaction of several QS via defined projection mechanisms.

5. System architecture

Once the fundamental quantum spaces (QS) have been defined, their mutual arrangement can be described. The Fractal Quantum Space Model (FQSM) regards reality not as a single physical plane, but as a hierarchically structured system comprising several QS. Each of these QS has its own function within the overall system. The quantum layer (QL) forms the basis for projections onto the subtle layer (SL) and subsequently onto the material layer (ML). The system architecture describes exclusively these structural relationships. The actual projection mechanisms are described in later parts of the FQSM.

5.1. Hierarchical structure

The FQSM uses three QS. This diagram does not depict a chronological sequence, but rather the fundamental interdependence of the QS. The SL is dependent on the QL in terms of its projections. The SL, in turn, forms the basis of the ML. Each QS exists permanently and simultaneously with all the other QS.



5.2. Properties of Quantum Spaces

Each QS has its own function within the overall system.

Quantum Layer (QL)

Of the QS described here, only the QL contains both fixed and movable QPs. The movable QPs enable separate processes within the QL, but these will be examined in more detail in the Fractal Consciousness Layer Model (FCLM).

Subtle Layer (SL)

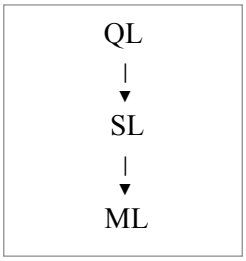
The SL consists exclusively of fixed QPs and forms a projection surface for the QL. Its QPs may be subject to specific conditions, causing their states to change and giving rise to subtle manifestations. Furthermore, the SL serves as an energy delivery system for the ML. The exchange of potentials between the SL and the ML is described in a later section of the FQSM.

Material Layer (ML)

The ML also consists exclusively of fixed QPs and forms a projection surface for the QL. If these QPs are assigned corresponding determinations (DTs), this can give rise to material manifestations whose fundamental stable units are atoms. The ML thus represents physically observable reality. The transfer of potentials between the ML and the SL is described in later parts of the model.

5.3. Projection directions

Determinations (DT) are not transferred arbitrarily between QS within the FQSM. The basic direction of projection for DT runs from the QL to the SL and then on to the ML.



This direction of projection describes the fundamental interdependence of the layers of manifestation. The mechanisms underlying these projections will be explored in greater depth later on.

5.4. Independence of Quantum Spaces

Although there are projection relationships between the QSs, each QS remains an independent system. Each QS possesses:

- its own QPs,
- its own DTs,
- its own laws.

The projections do not alter this independence. They merely enable the transfer of DTs between the quantum spaces.

5.5. Summary

The system architecture forms the backbone of the FQSM. It describes:

- which QSs exist,
- what functions they have,
- how they are fundamentally linked to one another in a hierarchical structure,
- and in which direction projections take place.

6. Quantum Points

Quantum points (QP) form the elementary building blocks of the foundational domain (FD). Each QP has a unique identity, a fixed position within the FD, and a fundamental state described by a fundamental determination (DT). Through fundamental space selection, each QP is permanently assigned to exactly one quantum space (QS). Each QP belongs exclusively to this QS. Upon allocation, its determination (DT) is extended in accordance with the laws of the QS. Further processes within the model may gradually expand or alter this DT. The properties of a QP are determined by the QS to which it belongs. Consequently, the properties of QPs differ depending on the QS to which they belong.

6.1. General characteristics

All QPs share common fundamental properties. Each QP has at least the following:

- a unique identity,
- a position within the FD,
- a DT that describes its current state,
- a permanent affiliation with exactly one QS.

These properties apply regardless of the specific QS.

6.2. Quantum Points on the Quantum Layer

The QL contains two different types of QP.

a. Fixed Quantum Points

They form the stable geometric basis of the QL. Their position does not change.

b. Movable Quantum Points

In addition, the QL contains movable QPs. These can change their position within the QL, but do not leave it.

6.3. Quantum Points on the Subtle Layer and the Material Layer

Unlike the QL, both the SL and the ML consist exclusively of fixed QPs. Any changes within these QSs therefore do not result from the movement of the QPs themselves, but from changes to their DT. As a result, the spatial arrangement of the QPs within these QSs remains constant.

7. Projection Surfaces

Within the Fractal Quantum Space Model (FQSM), the subtle layer (SL) and the material layer (ML) function as projection surfaces. A projection surface is a quantum space (QS) whose fixed quantum points (QP) serve as carriers of projected determinations (DT). Each projection surface consists of a fixed geometric arrangement of QPs. These QPs form the unchanging structure of the respective QS. The QPs of a projection surface are, first and foremost, structural elements of the QS. Their DTs describe the respective state of the QPs and form the basis of the model-internal processes from which subtle or material manifestations arise.

7.1. Properties of Projection Surfaces

Projection surfaces have the following fundamental properties:

- They consist exclusively of fixed QPs.
- Their geometric structure remains unchanged.
- Each QP has a DT that describes its current state.
- Changes in state occur exclusively through changes to the DT.
- QPs are neither created nor removed.

As a result, the geometry of a QS is permanently preserved, whilst the states of its QPs may change continuously.

7.2. Projection surfaces as a medium for manifestations

The QPs of a projection surface initially have no material or subtle significance. Only when the DT of a QP describes a state that enables a manifestation does the QP in question become part of a manifestation within its QS. The manifestation is therefore not a property of the QP itself, but a consequence of its current DT. This applies equally to the SL and the ML.

7.3. Independence of the Projection Surfaces

Each projection surface has its own QPs. No QPs are exchanged between projection surfaces. Similarly, there are no shared QPs between different QSs. The relationship between the projection surfaces arises solely through the projection mechanisms described in later parts. The geometric independence of the individual QSs is thus maintained at all times.

7.4. Summary

Projection surfaces form the unchanging geometric basis of subtle and material manifestations. The states of their QPs are described by DTs and form the basis of the model-internal processes from which the observable structures of the respective QS emerge. The transmission of these DTs and the associated exchange of potentials are described in a further section of the FQSM.

8. Manifestation

A manifestation refers to a structure that arises within a quantum space, emerging from the states of its quantum points. Manifestations do not arise through the creation of new quantum points, nor through changes to the geometric structure of a quantum space. The geometry remains unchanged. Only the DT of the quantum points change. As a result, a wide variety of structures can arise within an unchanging projection surface without altering its geometric basis.

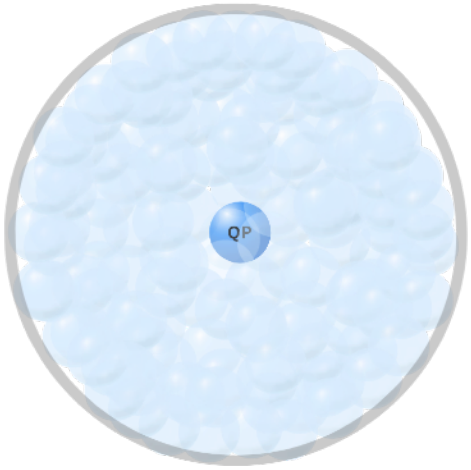


Figure 4: Manifestation of an atom on the material layer (ML)

8.1. Subtle Manifestations

On the subtle layer (SL), manifestations arise from the states of their QP as described by the DT. These manifestations form the basis of the subtle-matter structures of the Fractal Quantum Space Model (FQSM). The mechanisms underlying their formation are described in later parts of the FQSM.

8.2. Material Manifestations

Within the ML, material manifestations also arise from the states of their QPs as described by the DT. The QPs themselves remain unchanged. It is only the combined states of the QPs involved that determine which material structure manifests within the ML; see Figure 4 for further details.

8.3. Geometry and Manifestation

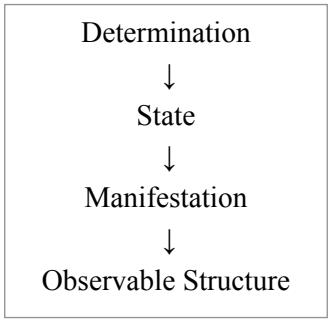
The FQSM makes a fundamental distinction between the geometric structure of a QS and the structures manifested within it. The geometric structure is described by the arrangement of the QPs and remains unchanged. The manifestation arises exclusively from the states of these QPs as described by the DT. This distinction makes it possible to generate different states and the resulting structures within an unchanging geometric structure.

8.4. Consequences

This distinction gives rise to several fundamental properties of the FQSM:

- The geometry of a QS remains permanently intact.
- QPs are neither moved, created nor destroyed.
- Changes occur exclusively through alterations to the DT.
- Matter and subtle structures are manifestations within an existing geometric structure.

the states described by the DT thus form the basis of all changes, whilst the QPs constitute the unchanging structure of the respective QS.



Final thought: The manifestation of movement

The chapters of the FQSM described so far have shown how QS are structured, how QP are organised, and how subtle and material manifestations arise from the states described by their DT. However, this merely describes the structure of reality.

Observable reality, however, is not static. Material objects change their position, interact with one another and evolve continuously. In the FQSM, therefore, motion is not understood as a property of the QPs. The QPs of the projection surfaces remain permanently fixed. Nor does the geometric structure of the QS change. The perceived motion arises exclusively from the continuous change in the states of the QPs.

A moving material structure is therefore not a wandering collection of QPs. Rather, the impression of motion arises because the states of the quantum points within the fixed projection surfaces are constantly changing. The geometry remains unchanged, whilst the states of the quantum points – and thus their manifestation – change; see Figure 5. This separation between an unchanging structure and a changing manifestation forms one of the fundamental principles of FQSM.

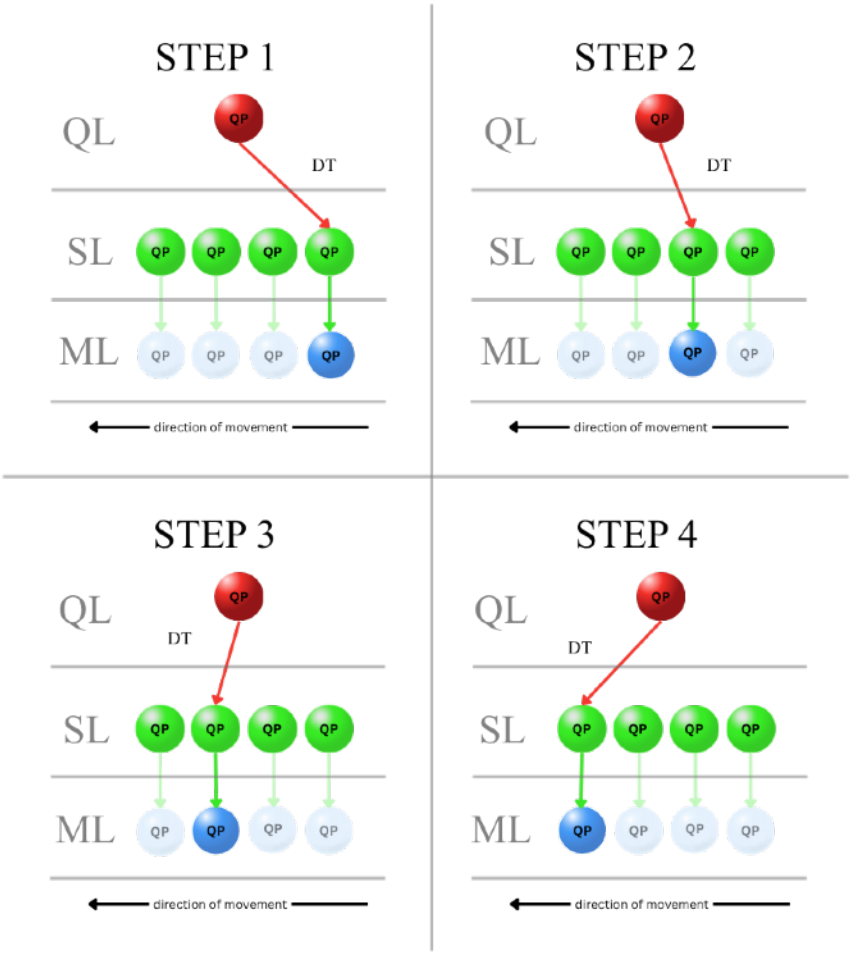


Figure 5: Positional displacement of an atom on the material layer (ML)

Note

This document describes the ontological and geometric foundations of the Fractal Quantum Space Model (FQSM). How states are transferred between quantum spaces, how potentials are exchanged, and how subtle and material manifestations arise from the states thus described are the subject of the second part of the FQSM.