Dynamic dimensions of particle

Ajmal Beg (mail@abctsau.org)
http://www.abctsau.org

Abstract

Particles change their dimensions while interacting with the environment. Change in the dimension helps particles adjust the number of field particles they receive in any unit time. This work further describes different mechanisms the particles might be using to change their dimensions.

1. Change in dimension under influence of force

It is believed that the surface of the particle contains pores for receiving field particles in the same way the living cells have pores to intake nutrients[1]. Figure 1 shows the surface of a particle which have pores to accept field particles. To understand how particles in particle accelerator adjust the number of field particles transferred through pores on their external surface, let's assume a three dimensional three space *Z* containing particle *P* with three dimensions. The dimensions of the space *Z* is given by:

L: Length of the space *Z*

W: Width of the space *Z*

H: Height of the space Z

All boundary walls of the space *Z* are at right angle to each adjacent wall, meaning that the space *Z* is a box shaped space with corners at the following *(x,y,z)* co-ordinates.

$(0, 0, 0)$, $(L, 0, 0)$, $(0, W, 0)$, $(0, 0, H)$

$(L,W,0)$, $(0, W, H)$, $(L, 0, H)$,(L, W, H)

Let's assume a particle *P* with dimensions which exists in space *Z* and have dimensions:

l: Length of the particle *P*

w: Width of the particle *P*

h: Height of the particle *P*

All boundary walls of the particle *P* are at right angle to each adjacent wall, meaning that the particle *P* is a box shaped particle. It is assumed that the particle *P* is smaller than the space *Z*, meaning dimension relationships between particle *P* and the space *Z* are:

$$l < L = 4 \qquad (1)$$

$$w < W = 4 \qquad (2)$$

$$h < H = 4 \qquad (3)$$

The volume v of the particle *P* is given by:

$$v = lwh \qquad (4)$$

Figure 2 shows such space. Assume a force *F* which exists in the space *Z*. The force *F* has a single direction, which is in positive *x* direction. The force *F* is exerted uniformly in the *y, z* plane of the space *Z*. Assume the density of the force *F* in space Z;

$$f = F/HW \quad (5)$$

The particle P is placed in the space Z, with its center at the coordinate ($L/2, W/2, H/2$). The force F will be exerted at the right angle of y,z surface of particle P. The force that particle P experiences follows:

$$F_P = fwh \quad (6)$$

It is a very common characteristic of the material that:

- Material reduces its volume under influence of external force.
- Material partially or fully restores to its original volume when temporary force does not last for longer period of time.
- Continuous force permanently change the shape of the material.

This work assumes that particles are also made of material which reduces its volume when external force is exerted on it. When external force is temporary and does not last for longer period of time, the particles resume their original form. If the external force on the particles exists for longer period of time, it will permanently change the dimensions of the particle. As the particles in the particle accelerator are exposed to immense force for longer period of time, particles may be changing their external dimensions. Let's assume the particle in the particle accelerator changes its dimensions under the influence of the force and the new dimensions are:

$$w \Rightarrow w/n \quad (7)$$

$$h \Rightarrow h/m \quad (8)$$

$$l \Rightarrow mnl \quad (9)$$

Now the force that particle P experiences after change in its dimensions varies as follows:

$$F_P \Rightarrow F_P / nm \quad (10)$$

To make the particle experience the same force as before, the f that is force by unit area in the space Z need to increased by factor nm. Assuming that the F_P is the force that a particle P experiences in the direction of its motion and the particle is of box shaped having width w, height h and the length l. If particle reduces its width and height while being accelerated in the vacuum tubes of accelerator, it will require more force to travel a distance d in a specific time t at speed v_2 compared to that of speed v_1. Changing shapes to reduce the force on the body is a well known observation in the daily life. For example,

- Stones with sharp corners when placed in the strong water current, will gradually change the shape of their corners.
- Birds like eagle while diving at a high speed, reduce the width of their wings.
- The sample principle is used in the airplanes. The area of the wing in the direction of the motion is increased when airplane is landing or taking off. While flying at the high speed, the area of the wing in the direction of the motion is reduced in order to reduce the force experienced by the air currents.

According to modern science, the force is transferred from one particle to another particle due to transfer of field particles. Photon is an example of field particle. Reducing the external surface facing the field particles can reduce the impact of the force on the particle. Reduction in the dimension of particle under the immense and long lasting force in the particle accelerator can require extra force.

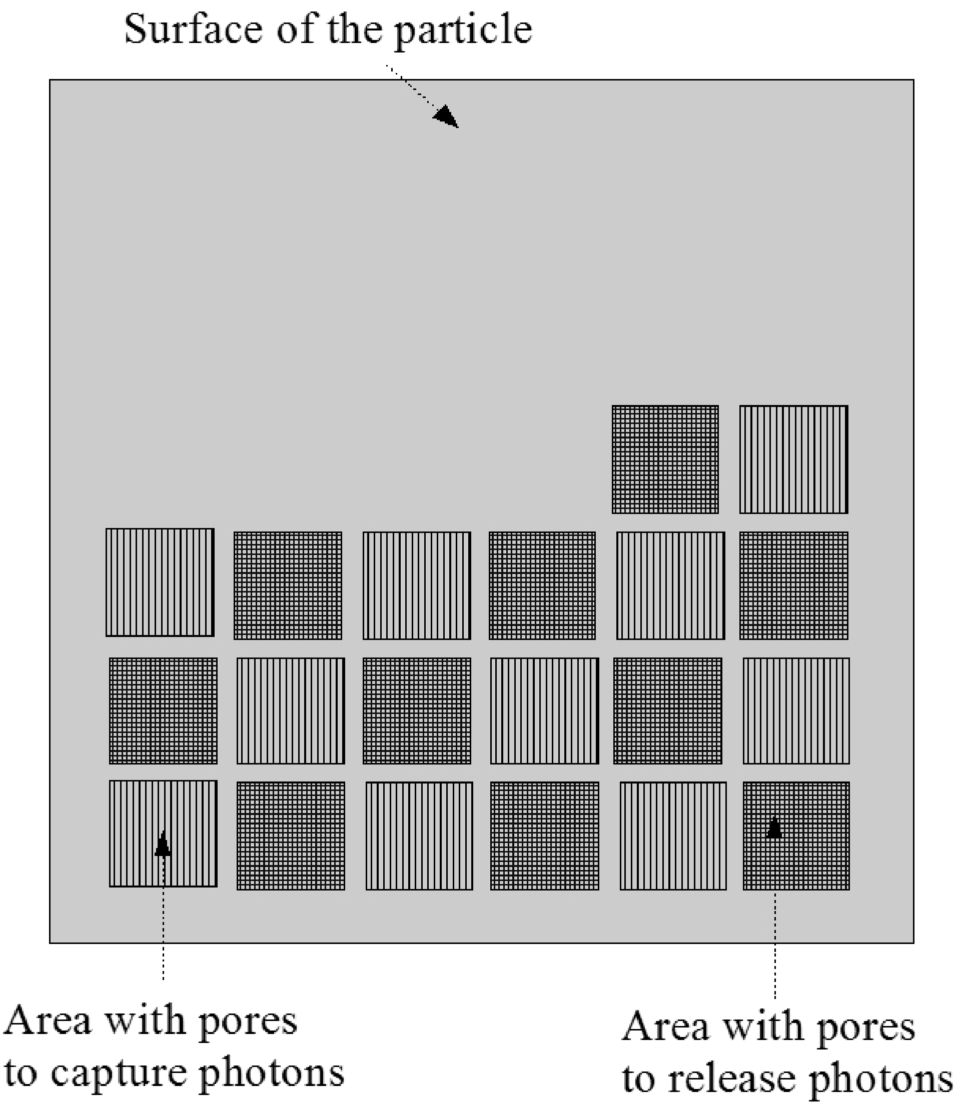


Figure 1: Surface of the particle to exchange field particles

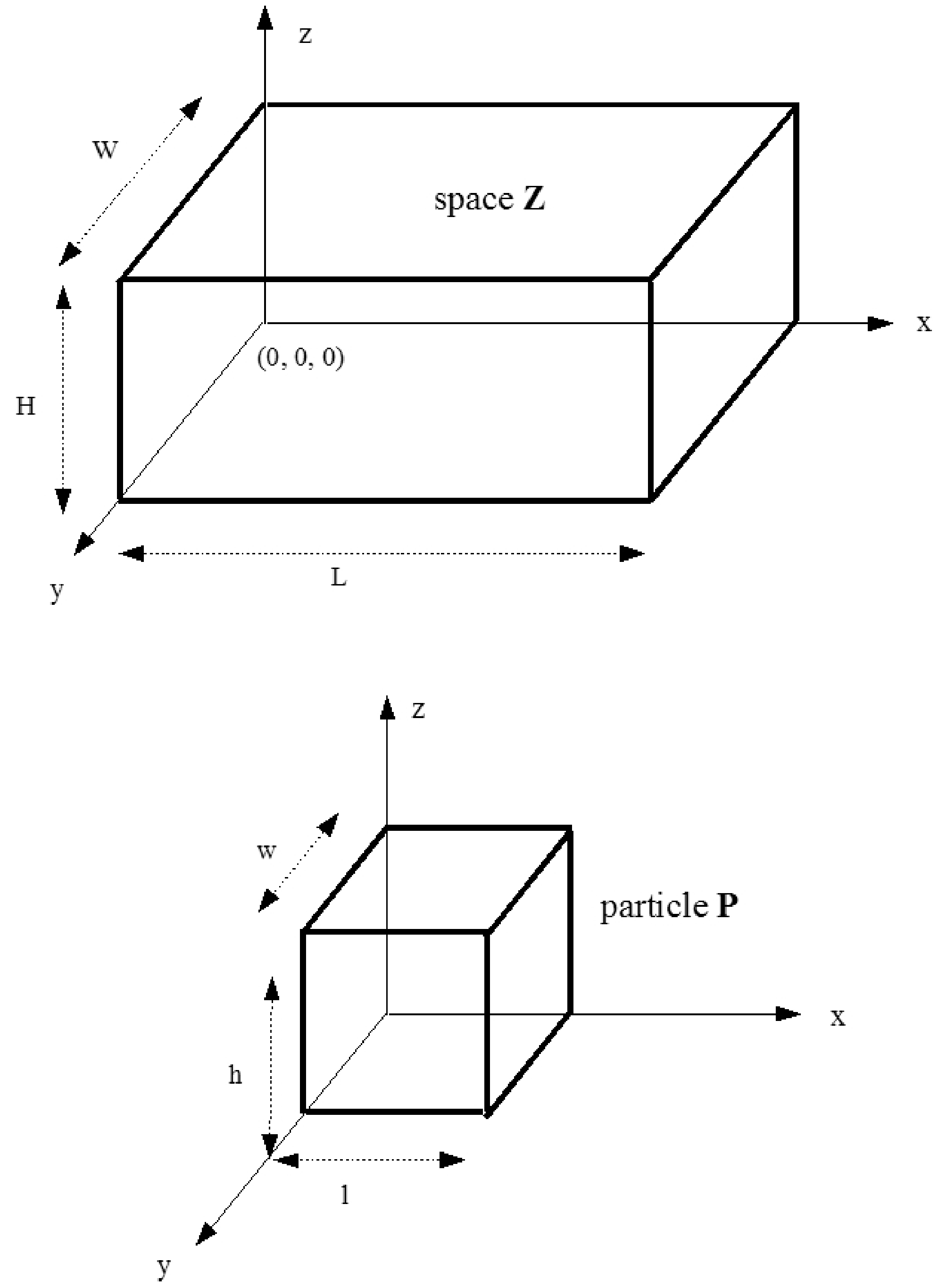


Figure 2: Space *Z* and particle *P*

2. Evidence of particle's dynamic structure

This section describes different observations which can indicate the existence of dynamic structure in particles.

2.1 X-ray spectrum of metal targets

X-ray spectrum can clearly show that the particles such as electrons are not of uniform density and may contain empty spaces. X-ray was discovered by the German physicist Wilhelm Roentgen in year 1895. Roengton found that a beam of high-speed electrons produces extremely penetrating type of electromagnetic rays when they strike a metal target. This newly discovered electromagnetic rays were named X-ray. Figure 3 shows the basic structure of the X-ray source. In the X-ray source, electrons having 50 to 100 keV energy, hits the metallic targets which is generally made of copper, tungsten or molybdenum.

The X-ray is produced as a result of collision between the high speed electrons and the atoms forming the metallic target. The atom is made of particles contained in the nucleus and the electrons orbiting around it. The X-ray appears as the energy that is lost during the collisions between the high speed electron and particles in the atoms forming the metallic target. Each material has its own unique X-ray spectrum consisting of following characteristics, which are also shown in Figure 4.

- λ_{min} which is the smallest wavelength of the electromagnetic waves in the X-ray spectrum. λ_{min} remains constant for all the metallic targets.
- Peak *A* of X-ray intensity at λ_A , which is regarded as the result of head-on-collision between the high speed electrons from the source and particles forming region *A* in the metallic target.
- Peak *B* of X-ray intensity at λ_B, which is regarded as the result of head-on-collision between the high speed electrons from the source and particles forming region *B* in the metallic target.

There are mainly three types of particles, electrons, protons and the neutrons which can forms the region *A* and *B* in the metallic target.

The energy of the X-ray E_{Xray} can be represented as the difference between the kinetic energy of the high speed electron before and after the collision with the particles contained in the atoms in the metallic target:

$$E_{Xray} = 1/2*Km_{e1}*(v^2_{Before}-v^2_{After}) \quad (11)$$

where,

K: Constant

m_{e1}: Mass of the electron in the source.

v_{Before}: Velocity of the high speed electron before the collision.

v_{After}: Velocity of the high speed electron after the collision.

E_{Xray} is a function of λ and from the X-ray spectrum it can be claimed that:

$$\lambda_A \neq \lambda_B \quad (12)$$

$$E_{\lambda A} \neq E_{\lambda B} \quad (13)$$

$$v_{AfterA} \neq v_{AfterB} \quad (14)$$

where,

v_{AfterA}: Velocity of the high speed electron after collision with the particles forming region *A* in the metallic target while emitting electromagnetic waves of wavelength λ_A

v_{AfterB}: Velocity of the high speed electron after collision with the particles forming region *A* in the metallic target while emitting electromagnetic waves of wavelength λ_B

The collisions between particles relevant to λ_A and λ_B are head-on-collision and the radius of electron and nucleus having a relationship below:

$$r_A \neq r_B \neq r_{Electron} \quad (15)$$

Where,

r_A: Radius of the particles forming region *A*.

r_B: Radius of the particles forming region *B*.

$r_{Electron}$: Radius of the electron

Le's assume that the collisions between the particles in the process of emission of X-ray, is like the collision between two solid balls. It can be said that as the energy lost by the high speed electron (or energy emitted as a form of X-ray) is different between the two types of the partices, the material characteristics of the electrons and nucleus are different at two regions *A* and *B*. One of the commonly known material characteristics which impact the energy transfer function is the hardness of the external surface of the objects. Paying attention to this characteristic, it can be claimed that:

$$h_A \neq h_B \quad (16)$$

Where,

$h_{Nucleus}$: Hardness of the particles forming the region *A* in the metallic target.

$h_{Electron}$: Hardness of the particles forming the region *B* in the metallic target.

As the hardness of any material can be result of density of the material, it can be claimed that:

$$d_A \neq d_B \quad (17)$$

Where,

d_A: Material density of the particles forming the region *A* in the metallic target.

d_B : Hardness of the particles forming the region *B* in the metallic target.

As the material density is different for two different particles, it can be claimed that the different particles may contain empty spaces or are the material distribution in the spherical shape of the particle is not uniform. If peak λ_A and λ_B is unique for each element in the X-ray spectroscopy, it can be used as an argument that the structure of elements as electrons, neutrons and the protons is unique for each type of element, when it is assumed that the mass of a type of particle is same for all the elements.

2.2 Matter density of particles forming material

The comparison of mathematical calculated matter density in different particles can help indicate the possibility of mass density distribution being not uniform. The density of the proton and the electron can be calculated using fundamental physical constants from National Institute of Standards and Technology:

Proton rms charge radius r_{proton}: $0.875*10^{-15}$ m

Proton mass m_{proton}: $1.673*10^{-27}$ kg

Classical electron radius $r_{electron}$: $2.818*10^{-15}$ m

Electron mass $m_{electron}$: $9.109*10^{-31}$ kg

The comparison of the average density of electron and the proton can be calculated as:

$$p_{electron} = (3*m_{electron})/(4\ \pi\ r^3_{electron}) \quad (18)$$

$$p_{proton} = (3*m_{proton})/(4\ \pi\ r^3_{proton}) \quad (19)$$

$$p_{electron} / p_{proton} = (m_{electron} / m_{proton})*(r_{proton} / r_{electron})^3 \quad (20)$$

Using above fundamental physical constant values the ratio between the density of the proton and the electron is calculated.

$$p_{electron} / p_{proton} = 1.63*10^{-5} \quad (21)$$

The calculated values shows that the matter forming the electrons has different average mass density compared to the matter forming the proton. The calculated value shows that some particles are easily capable of contracting or reducing its three dimensional state compared to the others.

2.3 Tunneling of light

Assuming that the photon is an particle with non-zero mass, and is confined to a three dimensional space like particles like electron and protons. The photon structure should be able to collapse and expand again, if the concept of particle having a dynamic shape is correct. In the collapsed shape, the photon should not be observed. Such behavior of the photon can be observed in the case of Frustrated Total Internal Reflection as shown in the Figure 5. As shown in Figure 5, the light gets reflected at the hypotenuse face. However, when another prism is brought near to the first prism, some part of the light tunnels through the second prism and the light cannot be observed in the gap between the two prisms. According to the concept of this work,

- Photon is a particle with non-zero mass.
- Photon has a three dimensional structure.
- Photon senses the environment and collapses its three dimensional structure resulting in the disappearance of the photon between the gaps of the two prisms.
- Photon senses the environment and can bring the collapses structure to the original dimension.

2.4 Weak Interaction

In weak interaction, the mass of the nucleus changes and one type of element changes into another type of element. The typical decays are:

$$^{14}_{6}C \rightarrow {}^{14}_{7}N + e^- + \underline{v} \quad (22)$$

$$^{12}_{7}N \rightarrow {}^{12}_{6}C + e^+ + v \quad (23)$$

Here, v stands for neutrino which was proposed by Pauli in 1930 and was thought to have the following properties:

- No electric charge.
- Rest mass which is very small compared to the electron.
- A weak interaction with the matter, thus making it very hard to detect.
- A spin of 1/2

In 1979, Noble Prize was awarded to Abdus Salam, Sheldo Gold and Steven Weinberg for developing a theory called Electroweak Theory. The electroweak theory suggests that the weak and electro-magnetic interactions have the same strength at very high particle energy. Thus, two interactions are the two different states of the same interaction. Photon and three bosons are the field particles that play a central role in the weak interaction. The mass of bosons is given as:

- $W\pm$ has mass 85 times that of proton.
- Z^0 has mass of 97 times that of proton.

As evident from the Equation (22) and Equation (23), the field particles which are thought to mediate the weak force are larger than mass of carbon and nitrogen. Thus, there exist no possibility of $W\pm$ and Z^0 being formed from the mass contained in carbon and nitrogen, according to traditional science. Thus one of the possibilities about creation of field particles is peeling of skin from the neutron or proton which forms hollow but larger field particles of $W\pm$ and Z^0. Such hollow field particle will have much larger area compared to a spherical shaped particle fully filled with uniform density. Having a larger surface area enables these field particles enables to capture or release large number of field particles thus giving the same effect as the particle with larger mass.

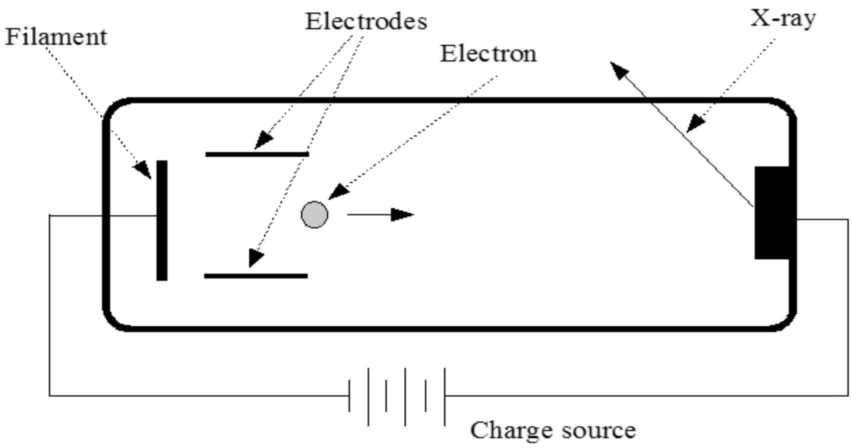


Figure 3: X-ray source based on Compton Effect

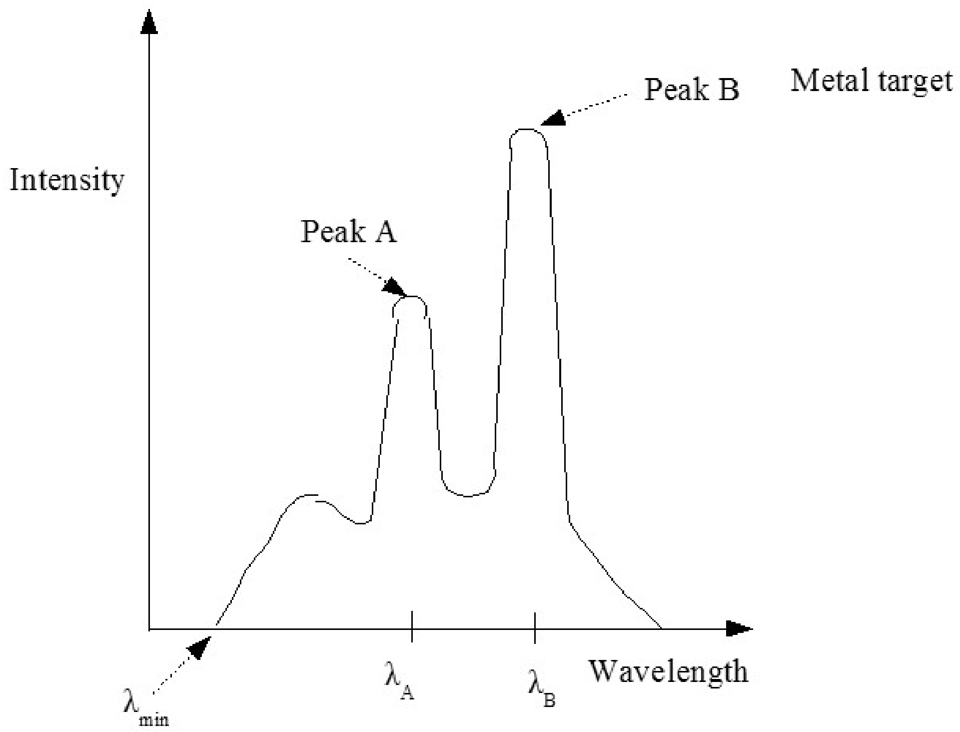


Figure 4: X-ray spectrum of metal target

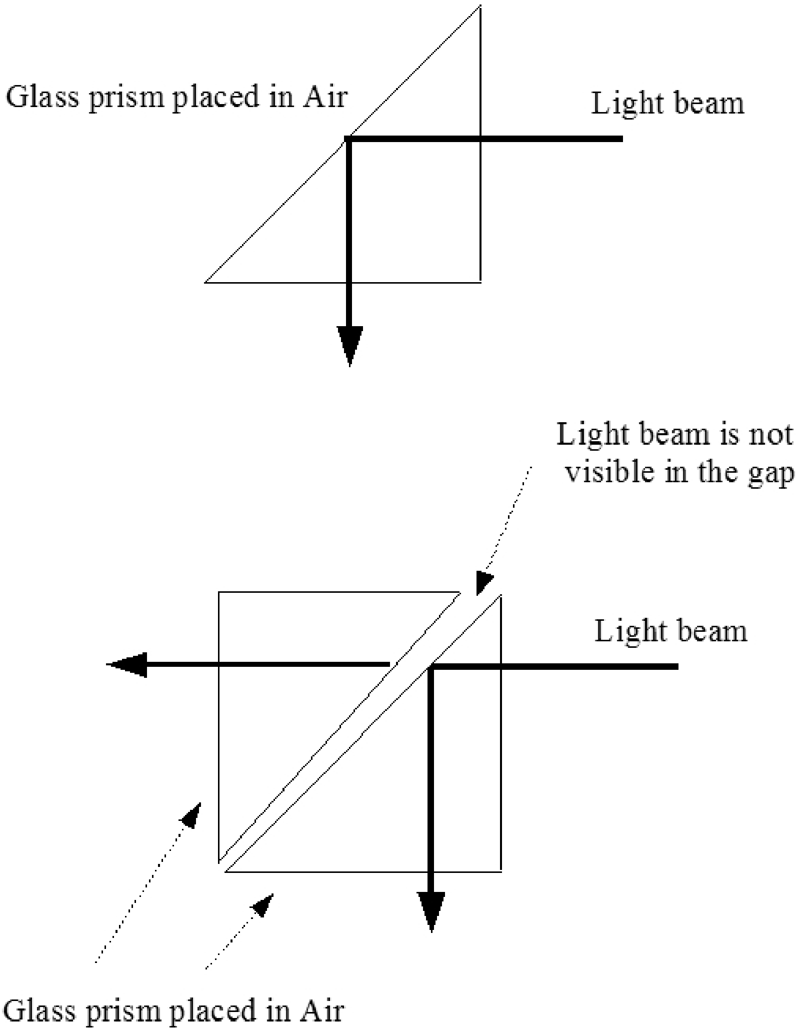


Figure 5: Frustrated Total Internal Reflection

3 Types of dynamic change in particle's dimensions

This section looks at the possible mechanism which can enable particle change their three dimensional structure. As the science has not reached to the level, where the structure of the particles could be directly observed, this work is unable to verify which type of particle dimension mechanism actually works.

Change in the dimension of particles with uniform density

Figure 6 shows the type of particle which is filled with the matter of equal density. The contraction and the expansion of the particle happen with the change in the distance of the smaller particles which arrange themselves to form the larger particle as shown in Figure 7.

Change in the dimensions of hollow particles

Figure 8 shows the mechanism of change in the dimensions of the particles which are hollow from inside. The thickness of the external layer of the particle changes, which results in the change of three dimensions of the particle.

Change in the dimensions of multilayer particle

Figure 9 shows the mechanism of the particle which contains multiple layers. The change in the distance between the different layers of the particle is responsible for the change in the dimensions of the particle.

Change in the dimension of origami particle

Origami means folded paper. Origami is a traditional Japanese art, in which a piece of paper is converted into shapes of different objects without cutting the piece of paper into different size papers. There is a very strong possibility that most of the particle may be formed through the flat sheet structure and which changes their folds dynamically to form different shapes to adjust the area with pores which is exposed to the external environment. Figure 10 an exemplary structure in which the external surface folds its external layer to change its dimensions dynamically.

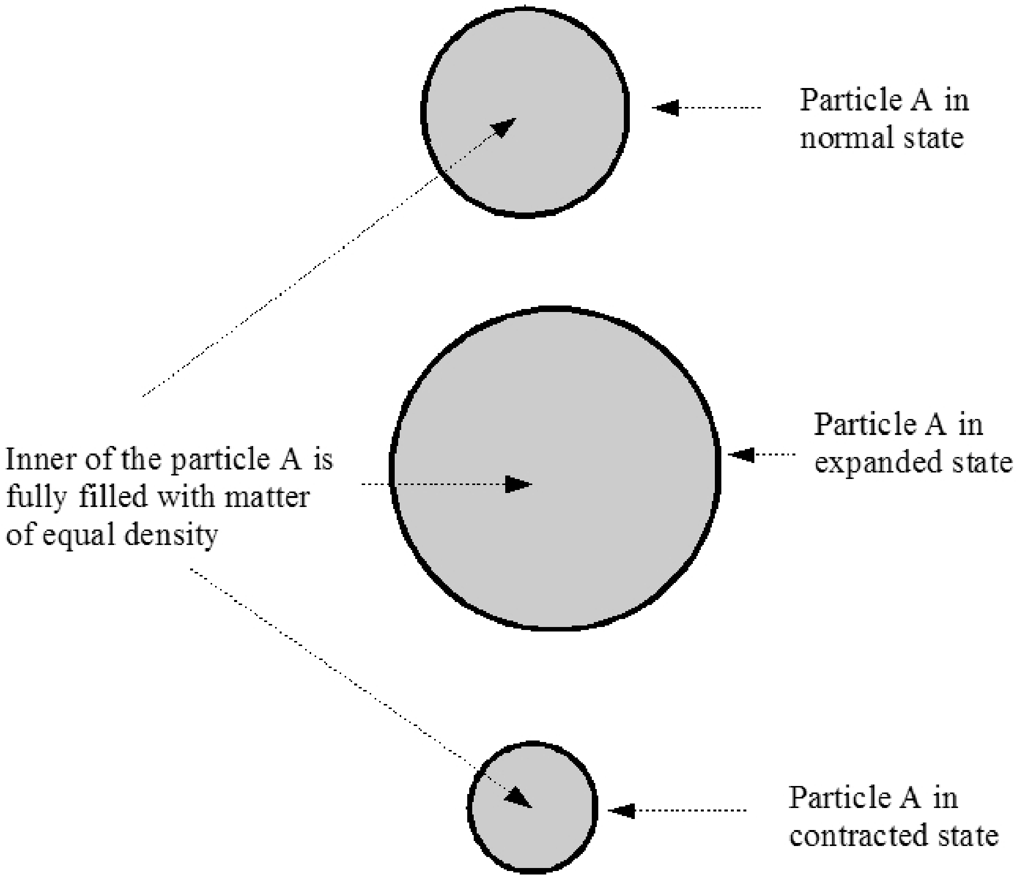
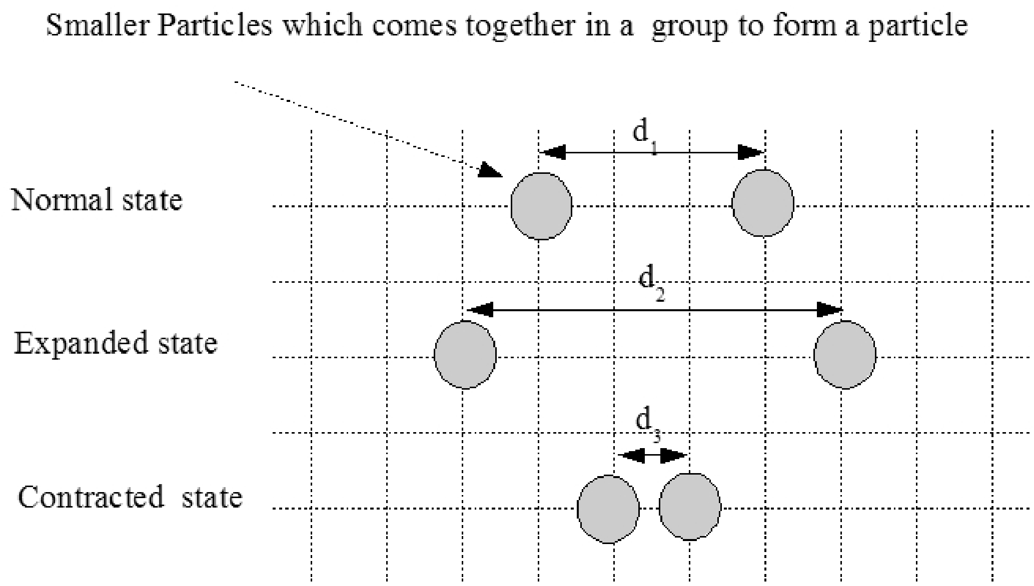


Figure 6: Spherical particle filled with uniform density matter



$$d_3 < d_1 < d_2$$

Figure 7: Distance between particles forming spherical body of uniform density matter

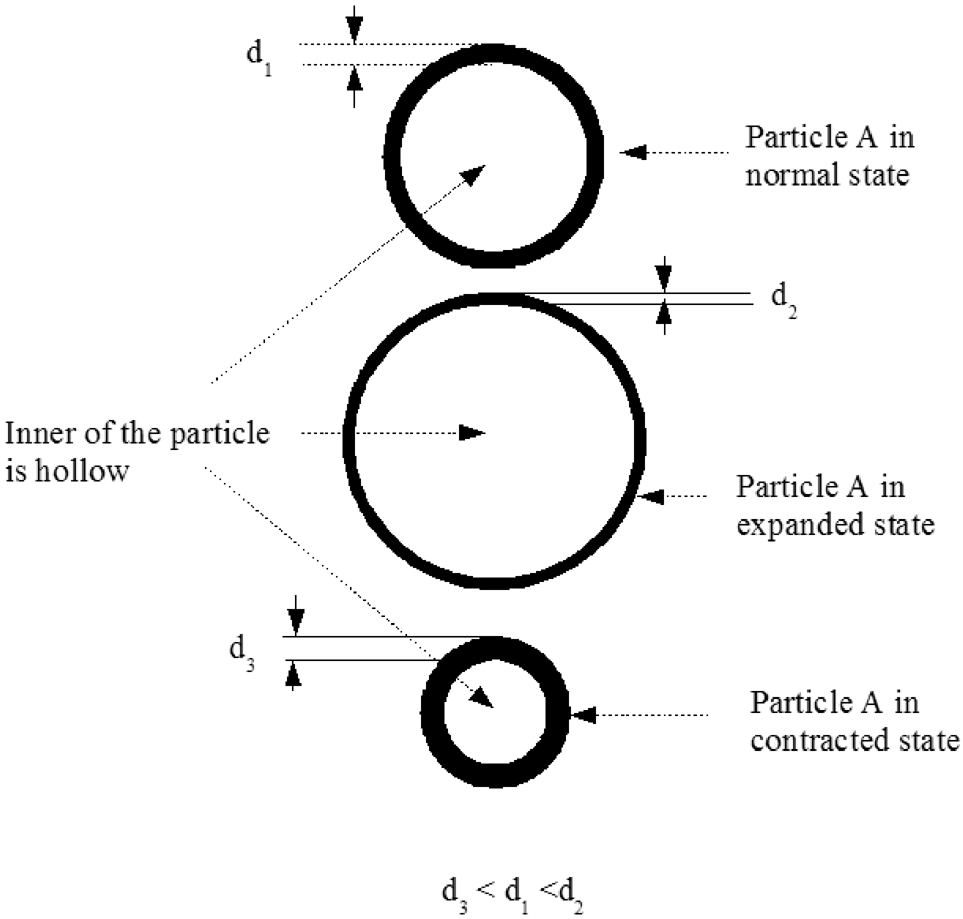


Figure 8: Change in dimension of particle with hollow inner

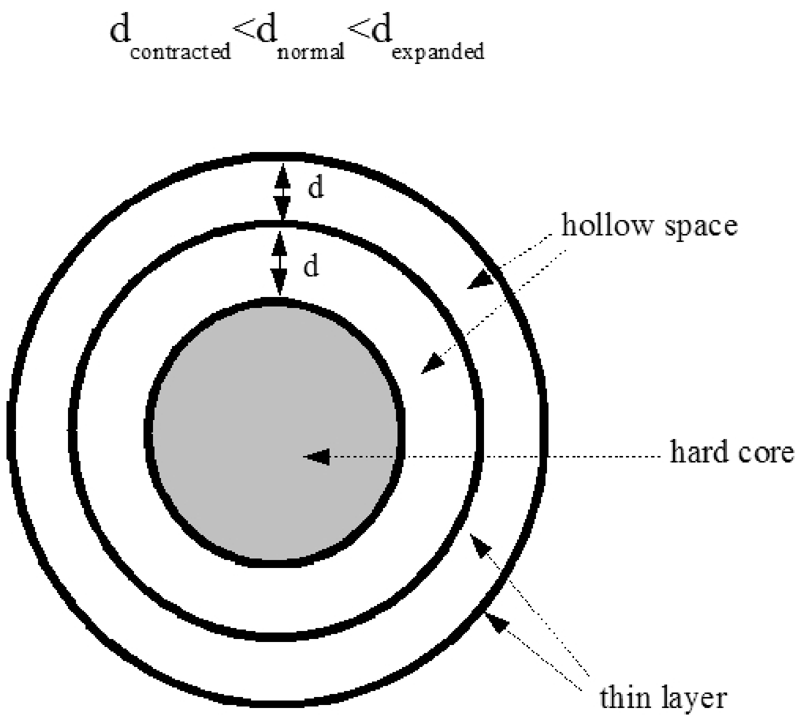


Figure 9: Change in dimensions of particle with multiple layers

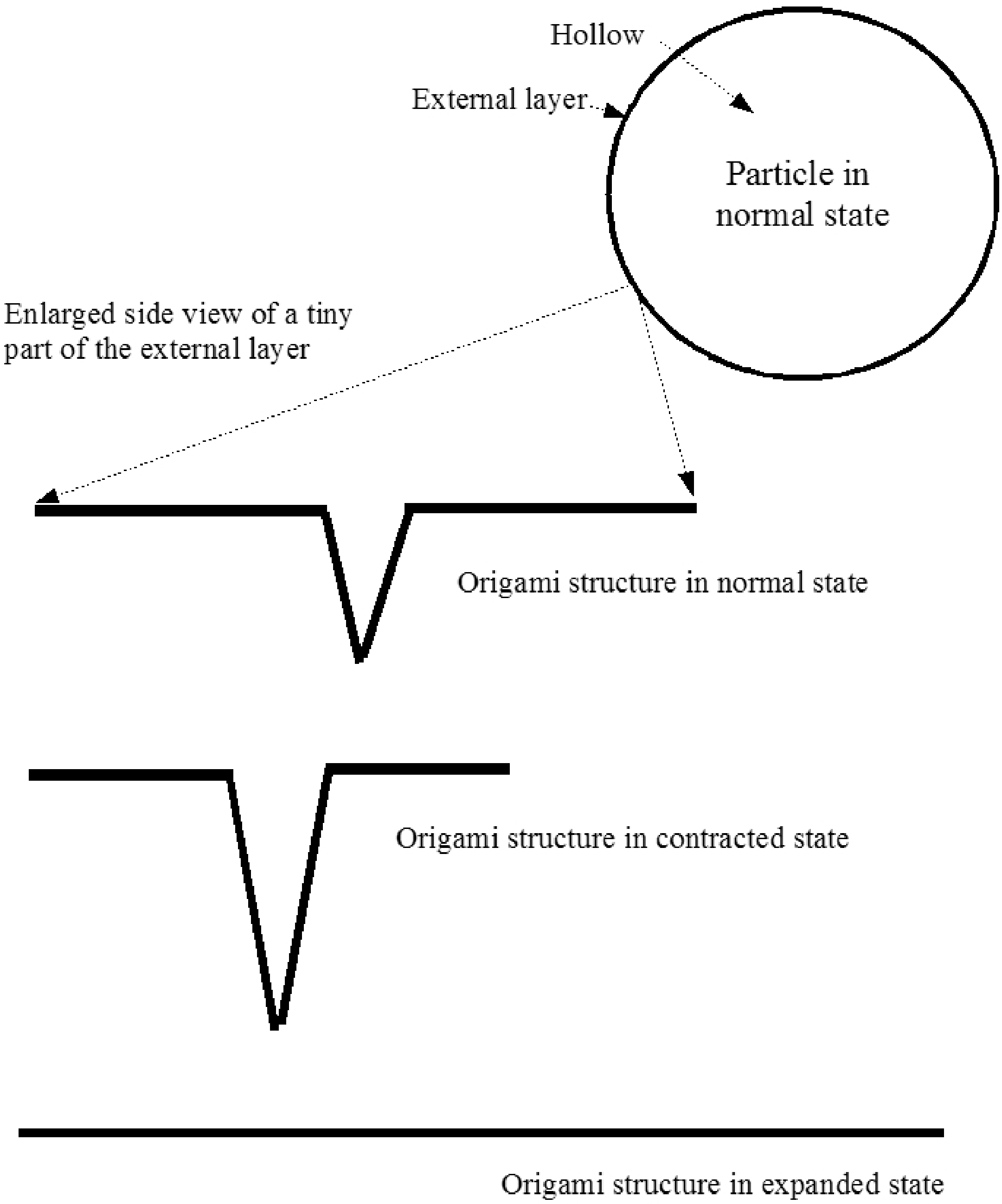


Figure 10: Change in particle dimensions due to origami structure

4. Physical effects due to dynamic change in the particle dimension

This section describes different physical effects which can be due to dynamic change in the particle dimension.

4.1 Zeeman Effect

In 1896, Pieter Zeeman discovered that strong magnetic field changes the frequency of light emitted by glowing gas. This is called the Zeeman Effect and can be explained here as:

- Magnetic field is formed by gravitons.
- The photons confined in the gas atoms gain those gravitons and change their energy [2].
- This changed energy appears as change in the frequency of the emitted light.

4.2 Electron's energy level and radius of orbit

The relationship between the energy level of the electron and the radius of the orbit can be explained as:

- Bohr's Model of basic building block of matter is modeled after our solar system. Bohr Model assumes that the electrons jump from one orbit to another when their energy changes. However, in our solar system, the planets and the moon does not jump from one orbit to another frequently.
- According to this work, the particle are made of sheet like structure, which can take different dimensions and shapes like an origami. Changing the surface area that faces the field particles,can increase the energy of the particle without the need of moving to other orbit.
- The radius of the orbit, does not necessarily indicate the energy of the particle. The electron in the most external orbit can increase their surface area facing the field particles and can have the same energy as the the electron which exist in the most inner orbit.

4.3 Energy bands in metals

The energy bands in metals can be explained as:

- Energy band of a electron is defined by a minimum and maximum energy level.
- According to this theory of particle interaction, the energy of the particle is defined by the surface area that faces the flow of field particles.
- Energy band can be realized by a particle changing the surface area that faces the field particles within a specific range. If the particle is assumed to be a spherical shape, then there is a range of radius in which the particle changes its radius as shown in Figure 11.
- Forbidden band corresponds to the range of radius in which the particle does not keeps its radius for significant period of time. In Figure 11 the white space between two ranges representing conduction and valence band is the forbidden state.

The holes which are thought to exist in the semiconductor are excluded from explanation as:

- A number of electrons need to exist in proximity to each other over extended period of time. In other words position and velocity of electrons remain deterministic over a period of time.
- Heisenberg principle of uncertainty tells that the position and the velocity cannot be determined at the same time.

- Thus, the concept of hole is against the general understanding of the Heisenberg's law of uncertainty.

Change in energy bands happen when an impurity is added to a metal. The merging of messages from the metal and impurity can lead to the change in behavior. This change in behavior becomes evident as change in the range of allowed radius in the conduction and valence band.

4.4 Tunneling Phenomena

Tunneling Phenomena is the physical effect which helps particles penetrate through the barrier. Tunneling Phenomena is thought to be the underlying mechanism behind field emission, alpha decay and particle escaping from black holes. Tunneling Phenomena can be explained as:

- The particle reduce the surface area that face the streams of field particles.
- Reducing surface area facing the field particle, reduces the external force on the particle.
- This allows the particle to penetrate the barriers as shown in Figure 12.

The remaining question is why only a part of the particles are able to penetrate. The reason can be that the nature has created diversity in nature and not all are trained in exactly the same manner.

4.5 Superconductivity

Superconductivity is the phenomena due to which current pass through a material without losing much energy. Superconductivity can be explained due repetition of following two mechanisms:

- Electrons in the superconductor expand when it needs field particle as source of energy.
- After gaining energy, it contracts its dimension and thus reduce chances of collision with other particles.
- When it has ran out of energy it again repeats the above two steps.

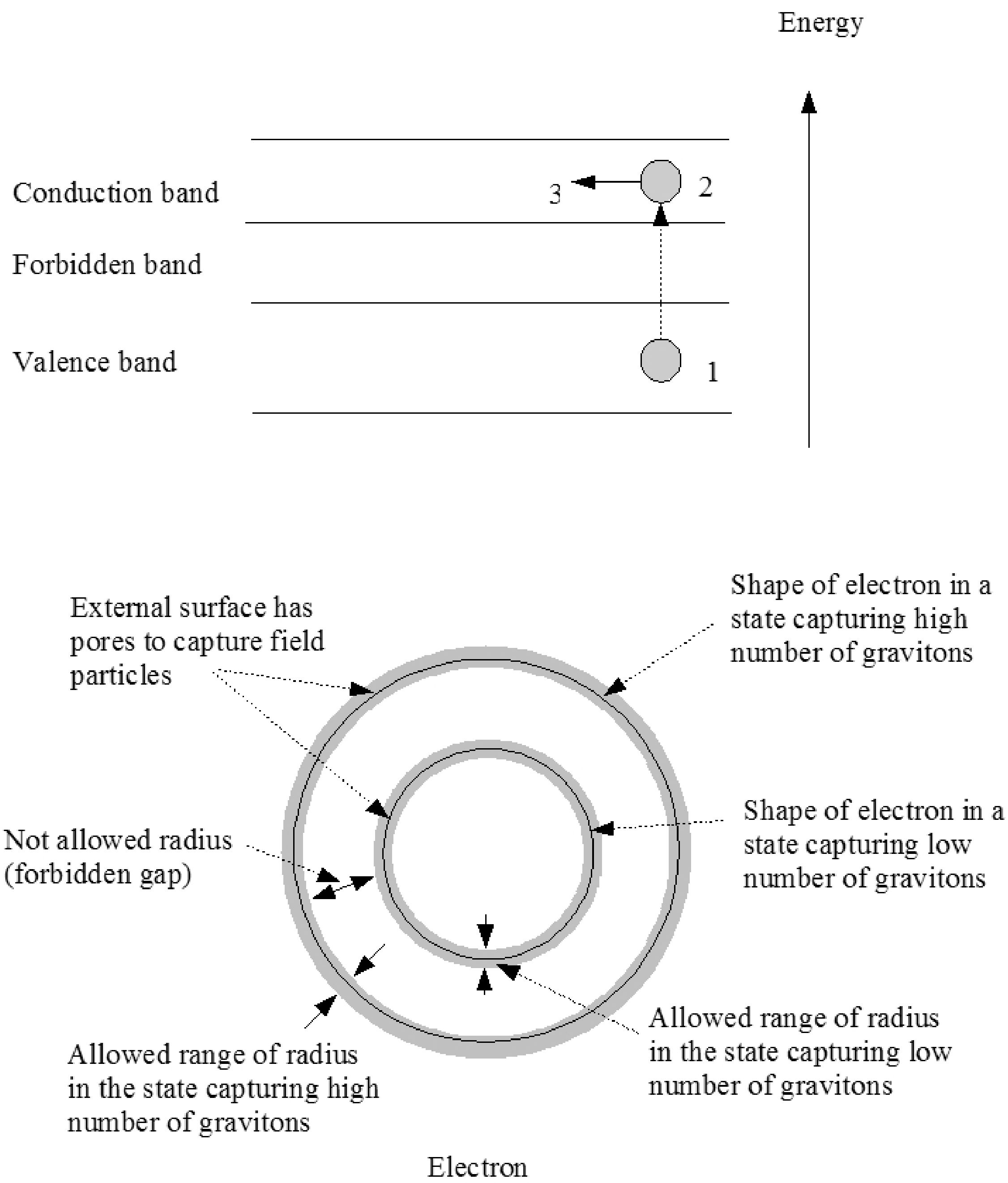


Figure 11: Relationship between shape and energy bands

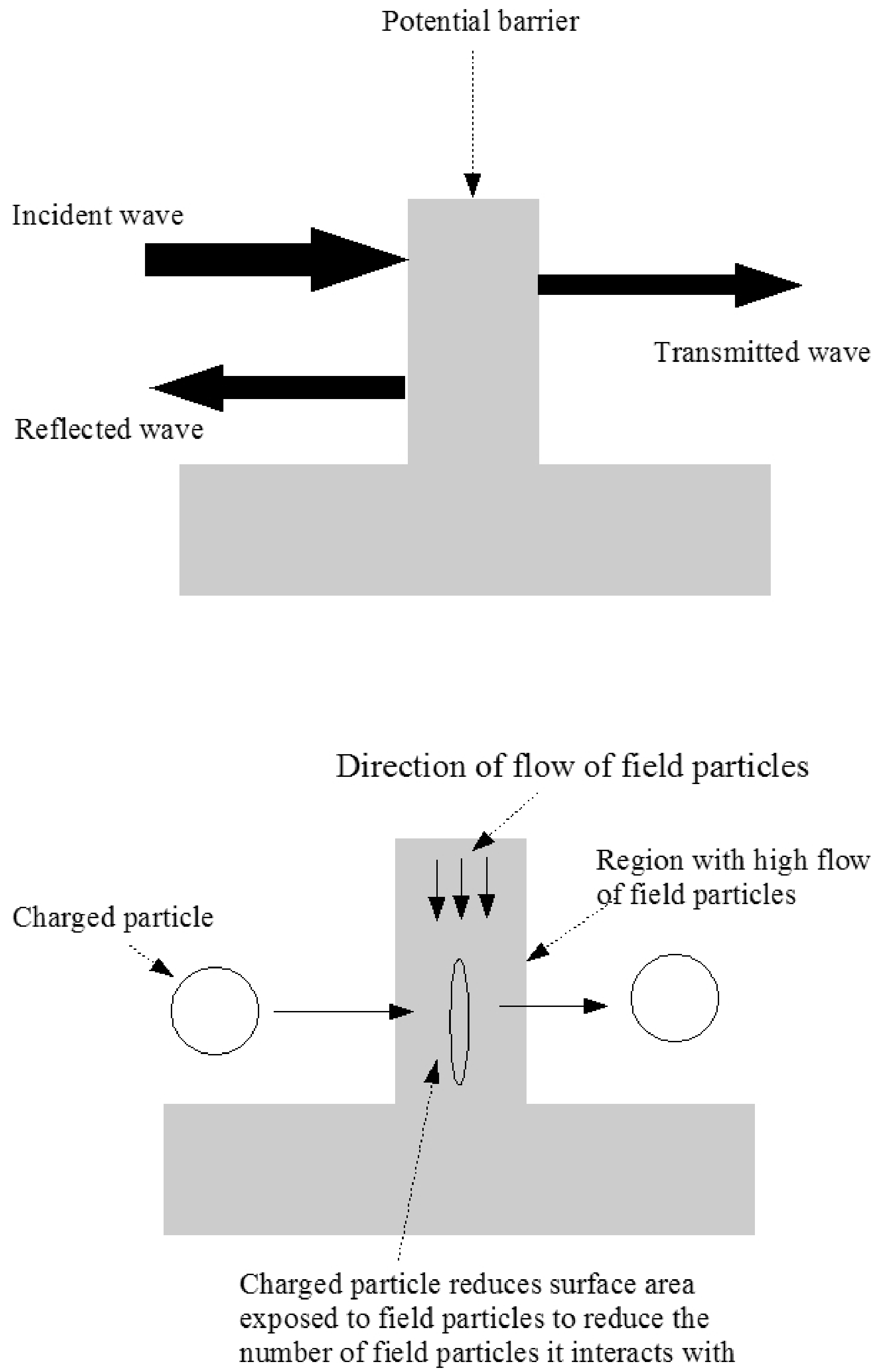


Figure 12: Tunneling Phenomena

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