Spirituality of Physics

1. Introduction

Gentle wavelets of lake Gennesaret were lapping on the shore on a fine morning. Jesus got into one of the boats, the one belonging to Simon Peter, and taught the crowd on the shore. After his teaching he told Peter to put out into deep water and to lower his nets for a catch. Though Simon Peter had been at it all night long and caught nothing, he did as he was told. The result was that he caught such a large number of fish that the nets were at breaking point. Simon and his companions managed to fill two boats until they nearly sank. At this moment Peter fell at the knees of Jesus and told him: Lord, leave me, for I am a sinner (LK 5:8). In the presence of Jesus, Peter was filled with a sense of awe and wonder and at the same time a sense of sinfulness. It is the same spirit when the 32nd General Congregation (No. 11) of the Jesuit Order defines a Jesuit (or any religious for that matter) as 'a sinner yet called to be a companion of Jesus'. A man/woman of God knows his/her limitation (sinfulness) and still a sense of awe and wonder is the dynamic force which works within him/her to be a follower of Jesus. This is the core of spirituality. You feel sinful (small) in God's mighty presence and the fact that you were chosen even before you were conceived in the womb of your mother (Is 49:1); you were created in the image and likeness of God (Gen 1:26); you were called by name (Is 45:4); you are carved on the palm of God's hands (Is 49:16); you are the apple of His eye (Deu 32:10); and the assurance that Yahweh will not forget you even if your own mother forgets you (Is 49:15), and He will protectingly carry you as an eagle up on his pinions (Deu 32:11), fill you with the feeling of awe and wonder. This then is spirituality in daily life. The same is reflected in the words of Newton. He was once asked what he thought about his contributions to

Physics. He replied with all humility: I feel like a child collecting pebbles along the sea shore. Newton, whose principles govern the macro-universe so accurately, felt his limitedness in the face of Nature and in the presence of the Almighty and at the same time was filled with awe and wonder as a child on the shore of an immense sea.

Very often physics and spirituality (theology) are depicted as two aspects of the same reality. For example, it is said that physics can explain *'how'* the universe functions, but only theology (spirituality) can explain *'why'* the universe should exist. The *'how'* of the universe is reflective (eg . God, as the clock-maker, set the universe in motion and left it to run by itself) whereas the *'why'* of the universe is affective (God's incarnation in the world). "Physics" is *finding* the truth and "spirituality" is *doing* the truth. Pascal was a brilliant theoretical physicist but he was also a mystic and he worked for the poor of Paris till he died. Thus every human being is the meeting point of both physics and spirituality, since physics deals with the *'matter'* and clarifies the *'here and now'* (immanence) of reality and spirituality deals with the *'spirit'* and inspires insight about The Beyond (transcendence), viz. the ultimate reality. The experimental aud reductional method of physics is enriched and enlivened by the intuitive method of spirituality. As the mind is raised by physics, the heart is raised by spirituality and thus one reaches ever closer to God (van den Beukel, Ferguson, Capra and Steindl-Rast, Fox, and Sheldrake).

Here we discuss the aspects of spirituality and those of physics and how every human being becomes a meeting point for both streams of force, viz. truth of mind (physics) and truth of heart (spirituality) and finally we realize how physics turns out to be anonymous spirituality. (In the discussion, 'physics' will mean 'science' in a broad sense and 'spirituality' will mean 'theology' to a certain extent).

2. Spirituality

2.1 Elements of Spirituality

The spiritual potential of humanity is freedom - Freedom to think and act for the common good of all. And this realization is the basis and foundation of spirituality. According to Hitchcock (p. 28) :

i) Spirituality is both a *goal* and a *process;* the *vision* (of the divine) is the goal, but we *work* at the process.

ii) Although there is no spirituality without discipline, spirituality is not the master of a *particular* discipline.

iii) Spirituality is not specifically religious, though it may be facilitated in a religious context.

iv) Spirituality "proceeds" on many levels at once.

The goal of spirituality is the realization of the identity between 'I' and 'Thou'. 'Thou', which is the divine, is often elusive. And hence the process consists of an ongoing evolution of consciousness. The ultimate consciousness is of Jesus calling God 'Abba, Father' (Mk 14:36). And this ultimate consciousness needs discipline - yoga, prayer, meditation, contemplation - without which the process does not become effective and meaningful. And this process unfolds the mystery about the matter-spirit relationship. This might be realized in a realigious context (God breathing life into matter in the creation of the first human beings making them in His image and likeness!) or in a non-religious context (such as in physics where electrons in atoms are in constant motion as though they are alive!).

2.2 Effects of spirituality

The effects of spirituality may be compared to the ripples caused by a stone dropped in the middle of a pond -

The wavelets spread out and finally reach the shore of the pond. In the same way the origin for the effects of spirituality to be felt is the individual human being and then it spreads from the individual outwards through one's fellow-human beings (social) embracing all in humankind irrespective of nationality, race, ethnic or religious affinity (global) and eventually becoming trans-global (universal) and finally touching and embracing and becoming one with the God of infinity. Within oneself one feels that he/she has been called to become one with divine vision and begins to realize that he/she could do that not alone but only in the company of others - one's fellow human beings. As this realization takes strong roots one begins to see that the globe and even the entire universe becomes the 'via media' for his/her union with the ultimate Reality, viz. God. Thus the effect of spirituality is a transformation within oneself permeating through the globe and finally the entire universe. And it is here that the process and goal become one and the same and this stage is independent of religion. Here matter has become pure spirit and matter merges with/becomes the Spirit - *Jivatma* gets dissolved into the *Paramatma* - The *Purusha* gets merged with the *Prakruti*.

3. Physics

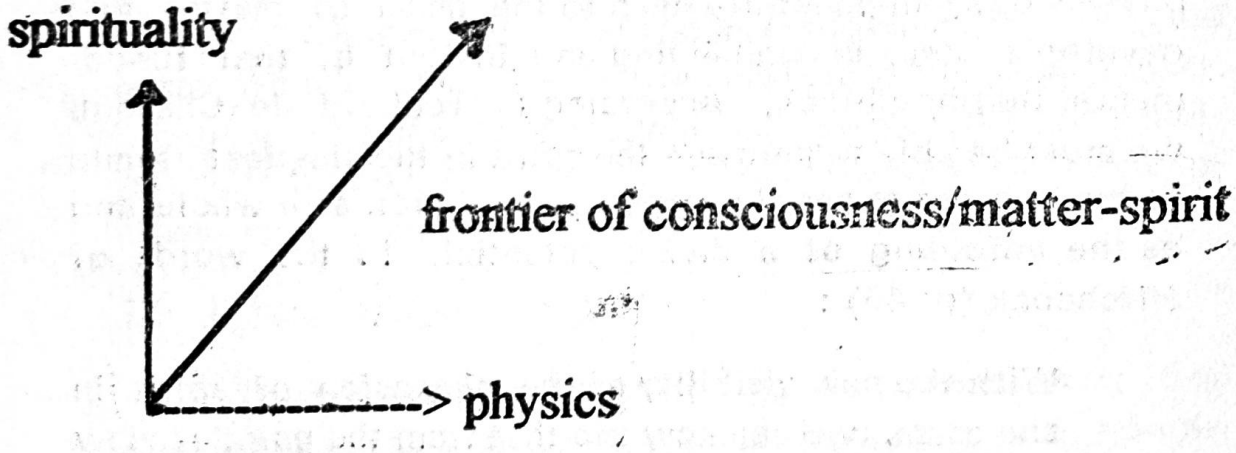
3.1 Elements of Physics

The building blocks of the universe are atoms. In physics one can penetrate deep to the heart of matter and develop a clear understanding and insight of that fundamental building block. According to Teilhard de Chardin, we must be able to perceive the spirit in the simplest atomic forms in order to see the sweep of evolution as a whole and as the unfolding of a divine potential. In the words of Hitchcock (p. 45) :

> With the new visibility of the dimension of spirit in the atom, we can now see that from the point of view

of physics, the physicist cannot avoid dealing with spirit, but must take account of the spirit aspect of spirit-matter, its patterning and dynamism. We don't any longer have the *intellectual luxury* of cutting spirit off from "matter" *if* we are a part of the natural realm. A physicist will avoid doing anything intentionally mysterious with "spirit", but we also recognize that our "models" evolve toward greater and greater depth and subtlety. The case, as we now understand it, amounts to a *spiritual imperative*, even for physics itself.

It is this 'matter-spirit' that Teilhard expounds in his book "The Divine Milieu": "By means of all created things, without exception, the divine assails us, penetrates us and moulds us." According to him the whole material world is a setting for a profound, mystical vision of God (Henderson, p. 88). As Teilhard expressed it in his book "The Future of Man", if spirituality is seen to raise the human being to higher consciousness in a vertical dimension and if physics is seen to move the human being forward on a horizontal plane within the boundaries of the material world, then the obvious frontier of consciousness (matter-spirit) involves a movement both upwards and forwards. This can be depicted as given below (Henderson, p. 104 - figure adapted) :



But the pursit of physics itself is seen as a spiritual endeavour and according to Toohig 'physics research is a fully legitimate spirituality, a valid, mainstream approach to God.' Prior to Galileo, mankind was philosophically the centre of the universe and the earth was physically the centre of the universe. The latter was questioned and set aright by Galileo. The universe was governed by Newton's laws till the advent of Einstein's work at the beginning of the 20th century :

> Newton's unique contribution is the second law, ie. the change of motion is proportional to the motive force impressed ($\mathbf{a} = \mathbf{F}/m$). Once a force law is known every detail of the motion can be predicted in Newtonian mechanics; everything can be calculated from first principles. The motions of the planets could not only be described, but predicted and their masses determined from the force laws. The laws that Newton formulated led to a connection, for the first time, of extraterrestrial and terrestrial bodies; the moon obeyed the same gravity that caused the apple to fall. The cosmos was no longer something mysterious but obeyed the same laws as earthly bodies. The universe is just a great deterministic mechanical system (Toohig).

A model of retlity had been produced in which everything seemed to be understood in terms of a few simple principles, a paradigm. But a paradigm-shift took place towards the end of the 19th century:

> In the new era in physice that begins at this time Newtonian mechanics gives way to relativistic mechanics, the wave theory of light gives way to wave-particle duality, quantum theory is born, and the determinism of classical physics gives way to Heisenberg's uncertainty principle (Toohig).

Einstein changed the face of physics by his three major contributions, viz. the quantum nature of light, the special theory of relativity, and the random motion of particles suspended in a solution (Brownian motion). We also see "Einstein driven by a desire to see ever more deeply into the mystery of the structure of the universe, proceeding by contemplative intuition to unveil the universal principles underlying phenomena - seeking simplicity beneath the complexity of appearance - and experiencing deep excitement/joy when those principles revealed themselves" (Toohig) which made him say, "Science without religion is lame, religion without science is blind." Bohr proposed the familiar model of the atom as a nucleus surrounded by whirling electrons. According to Heisenberg, Bohr "had reached his results not so much by calculations and demonstrations as by intuition and inspiration, and that he found it difficult to justify his findings before Goettingen's famous school of mathematics" - but the model Bohr proposed is true and correct. Commenting on the work of Einstein and Bohr, Toohig says,

> Bohr and Einstein...can serve as types of the physicists of the later period, in being absorbed in a search for an ever deeper understanding of the structures of the universe, proceeding from a deep faith in the existence of an underlying simplicity. Both proceed by contemplative intuition and with a confidence in the perceived visions.

And very often a physicist in his search for better understanding of the universe is led to the realm of spirituality, ie. from the '*how*' of the universe to the '*why*' of the universe, which is the 'transcendence' in physics. Hawking says in his book "Black Holes" that physics (and astronomy) "offered the hope of understanding where we came from and why we are here. I wanted to fathom the far depths of the universe. Maybe I have succeeded to a small extent, but

there's still plenty I want to know." "What else does a physicist do", asks Toohig, "who trusts his insights even when they involve fundamental changes in the accepted concepts governing that universe, for example, relativity? If this is accepting God then, as Rahner asserts, physics is an anonymous spirituality, a search for God." He further adds. "If physics research is at root a legitimate spirituality. if the evolution of physics is a self-communication of God. then it follows that the Church must expand its vision to learn from the progress of physics what it is that God is communicating."

3.2 Effects of physics

There is always a sense of awe and wonder amongst the physicists. The moment the physicists think that they have comprehended the universe clearly and fully something crops up and challenges them! After Euclid's and Ptolomey's version of flat and limited universe in space, Aristotle came up with the physics of top to bottom, ie. everything is attracted particle by particle downwards and the bigger the object, the more is the attraction and the faster will be its fall downwards. And the earth was considered to be the centre of the universe. This geo-centric world-view was challenged by Copernicus; then Kepler came up with theories of planetary motion. Newton's principles ruled the world till Quantum mechanics came which proposed a new understanding of Nature. For the first time people were struck with awe and wonder to realize that Newton's laws hold good for macro bodies and quantum mechanics holds good for micro (subatomic) particles. The question whether such objects behave as particles or waves brought in the dual nature of objects. The 'uncertainty principle' became prominent. Finally understanding took a turn of deeper insight with the advent of the Theory of Relativity. The Theory of Relativity could also be called the Theology of Relativity, since it has changed the whole concept of human

life - political, religious and ethical views and values - relative to a given context. Thus there is uncertainty when something absolute is proposed.

Gilmore in his book "Alice in Quantumland" comments on this principle (p. 47) :

> What the Heisenberg uncertainty relations are telling us is that we are looking at things in the wrong way. We have a preconception that we *ought* to be able to measure the position and momentum of a particle at the same time, but we find that we cannot. It is not in the nature of particles for us to be able to make such a measurement on them, and the theory tells us that we are asking the wrong questions, questions for which there is no viable answer. Bohr used the word *complementarity* to express the fact that there may be concepts which cannot be precisely defined at the same time : such pairs of concepts as justice and legality, emotion and rationality.
>
> There is apparently, something fundamentally wrong with our belief that we *should* be able to talk about the position and momentum of a particle, or of its exact energy at a given time. It is not clear why it should be meaningful to talk simultaneously of two such different qualities, but it appears that it is not.

The Theory of Relativity has influenced practically all spheres of life-inner as well as outer (religious as well as social and political). In day to day life the ethical code is understood as 'situation ethics' - in a given context and time. Even the theology of the Incarnation can be understood as God relativizing Himself to become a human being so that mankind can understand, accept and come back to Him.

Even the Big-Bang theory which is now more and more accepted and the theory of evolution which has been reco-

gnized and accepted by the Church lead one into the sphere of spiritual milieu. According to the Big-Bang theory the whole universe exploded from an intensely hot body and as the various pieces were flung outward, the spinning pieces became parts of the universe. But now there are two forces, which are competing with each other, viz. the velocity (v) with which the universe is expanding and the gravitational force(g) which tries to attract everything closer together. At present

$$v > g$$

ie. the universe is still expanding. But the difference between v and g is slowly but steadily decreasing. That means there will come a time when

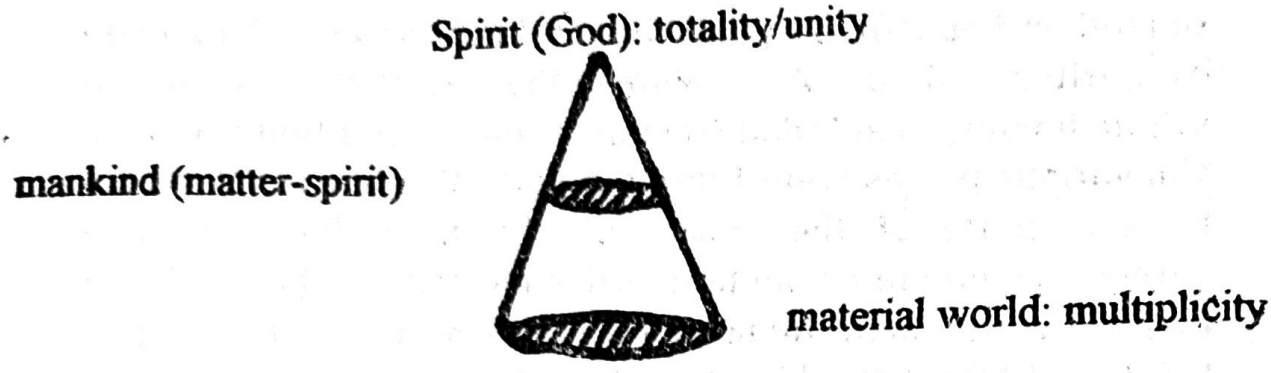
$$v = g$$

and then onwards it would be

$$g > v$$

ie. the gravitational force will begin to take over. Then the implosion of the universe will begin. The universe will fold, so to say, on itself and as the size of the universe becomes smaller and smaller, the density of the universe will increase and the temperature will rise enormously. This is the beginning of black-hole from which nothing, not even light, will escape. And at this stage, it is probable that there will be another explosion (Big-Bang) which will be the birth/rebirth of another/same universe. This makes one understand the creation by God very profoundly.

The evolution process, according to Teilhard, is far from over. Human being is ascending from the multiplicity of matter to the totality (unity) of Spirit (God). Teilhard illustrates this in his book "Christianity and Evolution" as given below (Henderson, p. 101) :



Physical evolution leads to intellectual evolution which in turn ushers in spiritual evolution which is growth in consciousness. Conseiousness reaches its culmination when one reaches the Omega Point, ie. Jesus, who has reached the ultimate consciousness when he called 'Abba-Father' and realized that He and the Father are one (Jn 14:9). And we are following in the footsteps of that process of ascending consciousness from matter to spirit.

The byproduct of evolution is the understanding of mankind's role in the universe. There is a paradigm shift from the concept that mankind is the ruler over the universe with the authority to subjugate the universe (Gen 1:28) to the concept that mankind is the steward of the universe. ie. the human being is responsible for the welfare of the whole universe and each human being is the custodian of the environment with the imperative to search and find God in the Creation (Gen 2:15).

'Matter' is classified, in physics, as macro - and micro-bodies. Micro objects possess particle as well as wave nature. The wave nature presupposes amplitude (of the wave) which in turn implies the probability of finding the particle. But quantum mechanics cautions, through its uncertainty principle, that the position and momentum of a particle cannot be accurately and simultaneously determined. The effect of physics is seen in uncertainty and relativity in all walks and in all stages of life and leads into the realm of spirituality where one experiences the transformation of matter into spirit. Thus physics opens up the vistas of spirituality.

4. Meeting point of physics and spirituality

There are some common features between physics and spirituality (in general between science and theology) (Bube, p. 51f) :

i) Both are based on faith commitments : On the one hand a faith commitment to the intelligibility of the world and on the other hand a faith commitment to God as revealed in Jesus Christ.

ii) Both develop descriptions of reality based on convincing evidence. Evidence is obtained in physics through sense and objective interaction with the world whereas the spiritual interaction is based on biblical revelation and human/subjective experience within the context of a personal relationship with God. But neither establishes conclusions as the result of proof - in physics 'uncertainty principle' and 'relativity theory' and in spirituality *'neti, neti'*.

iii) Both deal with description of reality. In physics the reality is tested by human sense interaction with the physical world, whereas spirituality involves human experience at the present moment in the context of history (eg. history of salvation) that deals with the ultimate reality.

iv) Both phsics and spirituality provide us with a partial description of a part of reality. Neither provides us with a complete or absolute description of reality. While physics gives insight into the actual physical world, spirituality gives insight, based on the biblical knowledge and revelation in Jesus Christ, into our life in and with God. Hence both give us a true glimpse of *what reality is like*.

The world of physical matter and that of spiritual consciousness meet at the juncture when matter becomes life. In the universe, atoms form molecules (inorganic and

organic), at some point life becomes manifest, then the level of consciousness grows into soul and the ultimate consciousness level is the identification with the Omega Point and submerging into THE Consciousness. The vital question is when does matter become life and when does life become spiritual (ie. conscious)?

4.1 Correspondence Principle

Here one sees a correspondence principle between physics and spirituality at work : Matter, as physics proposes, consists of atoms and spirit is of consciousness.

i) An atom is made up of an inner core called nucleus containing positive charges (protons) and neutral particles (neutrons with the exception of hydrogen which has no neutron) and an outer shell which is practically empty containing negatively charged particles (electrons). With respect to the electric charge, a cell which is the building block of life is the reverse of an atom. A cell contains a negatively charged inner core enclosed within protoplasm which contains positive charges.

ii) The next concept is : What is essential between a pull from above (spiritual) and push from below (material cum spiritual efforts)? - God's grace or human work! It is clearly brought out in the two schools of religious thoughts regarding salvation : a) 'Cat-School'; and b) 'Monkey-School'. By analogy, the mother cat/monkey is God and the kitten/baby-monkey is a human being. The kitten has very little choice in its moving around. The mother cat takes the little one in mouth and goes from place to place. But in the case of the little monkey, if it wants to go from one place to another it has to hold on to the mother monkey and the monkey jumps from tree to tree! The former represents God's grace as sufficient and the latter insists on human work for one's salvation. Both have to go hand in

hand. The spiritual grace from above is reached by material efforts from below. Both do not contradict each other but they grow one into another - interwoven, so to say.

4.2 Complementary Principle

Science and religion in general are seen by some as complementary to each other. According to Fritzsch, who is a physicist, the role of science is to explore and to explain natural phenomena. But describing phenomena is not sufficient Therefore religion has to provide an intutive sense of unity and purpose of the cosmos (Bender and Leone, p. 55f). According to Einstein, "Though religion may be that which determines the goal, it has, nevertheless, learned from science, in the broadest sense, what means will contribute to the attainment of the goals it has set up" (Bender and Leone, p. 93). Applying it to physics we can say that physics can discover intelligible causes for the functioning of the universe, but finds it difficult to discover meaning; whereas spirituality gives meaning to existence but cannot find a reason to it.

The complementarity is very vividly and convincingly seen from the process as one grows from the matter-level (or material level) to the spirit-level (or spiritual-level) : one transforms from impersonal to personal in consciousness; one moves from the knowledge of creation to the consciousness of ongoing evolution; one takes off from the basic structure of material being and merges with a process of becoming. Van Till et al (in : Science Held Hostage, Inter Varsity Press, Downers Grove, 1988) would say, "Scientific creationism is a folk science which claims scientific evidence for its scenario of a recent creation by divine fiat" (Bube, p. 88). And the relation between physics and spirituality is intrinsically dynamic. Both have to coexist. And according to Bube (p. 90) :

The Christian *starts* with the conviction that God is active in creating and sustaining the natural world quite independent of any scientific inputs. When he asks, "*How* is God acting" he then seeks to arrive at a scientific description in natural categories as his legitimate scientific activity.

43. Convergence

As has been, physics and spirituality converge upon the same view of the reality, ie. vision of God in the concrete world, a sense of awe and wonder in the august presence of the Almighty even in the tiniest particle in the universe, viz. atom. In his book "The Tao of Physics," Capra indicates how contemporary physics confirms what the essence of religion holds sacred, especially in the East. Such a convergence is based on the most substantial commonality (Jones, p. 174), since the natural world is considered to have the same values as human beings (Bube, p. 162).

Further, the results of pure and basic physics find their applications in technology As technology gets more and more advanced, applied physics also becomes more and more sophisticated. This 'science-technology spiral' (van den Beukel, p. 171) affects society at all levels especially at the level of human consciousness of being fair to all in the universe. Otherwise, so many of the social evils, such as discrimination, marginalization and suppression of fellow-human beings creep in, which in turn corrupt the mind and heart leading to the death of one's spiritual advancement in the company of one's fellow humans. And again physics' findings and applied technology are responsible for the moral standard of our age. The findings of physics, especially about the nature of elements and the universe, indicate "a direction toward truth and away from falsehood, toward knowledge and away from ignorance, toward beauty and away from ugliness, attaching a value to these directions" (Ferguson, p. 87).

In concrete, the convergence should primarily take place in human beings - to start with the understanding of one's role in the universe especially responsibility for the upkeep of the environment. Here also is a paradigm-shift. It is the understanding that mankind is not the lord of the universe but only the custodian (Gen 1:26-30) for the Lord says : "The land shall not be sold in perpetuity, for the land is mine..." (Lev 25:23). As the steward of the universe one has the utmost responsibility to improve the environment and not to destroy it or desecrate it, since the moral faithfulness of mankind is linked with the condition of the earth in Hosea 4:1-3 and Isaiah 24:4-6. This view of 'new cosmology' arises from the findings of modern physics which mandates us to save the world by declaring it to be really spiritual. Thus the concept of spirituality now takes wing to cover the entire universe. It is not any more me, my spirituality and my salvation but it is rather it is our world (universe), universal spirituality and universal salvation.

4.4 Physics as spirituality

A final synthesis of physics and spirituality indicates the need to develop the concept of physics as spirituality. This physics-spirituality is based upon major insights available through modern physics and physical interpretation. This new spiritual/religious concept wholly rests upon the revelations of modern science, the insights of which will be incorporated into old belief systems to revitalize them and provide physics-basis for moral and religious problems (Bube, p. 135f). Thus physics paves the way to find and recognize God in the elements/beings in the universe.

As one follows the historical developments in physics one can easily see the spiritual imperative in physics. As the physicists are trying to find the "unifying force" of the

various available forces in the universe, viz. strong force (within the nucleus of an atom), weak force (nucleus-electron interaction), electromagnetic force (light, etc) and gravitational force, the fundamental unity and identification of "matter-spirit" is seen as the fundamental understanding. This is the spiritual imperative and the other form of spiritual imperative, according to Hitchcock (p. 232), is to draw implications of the concrete indications which we have, that *something greater* is operating in spirit-matter, whose presence fills us with awe and wonder at our own limitedness.

5. Conclusion

The spirituality of physics consists in the ascending level of consciousness of God's presence which is at work in the created beings in the universe. For example, as one comes to understand the evolution process, in the context of creation, based on the knowledge of matter (elements) and spirit (life) one understands that life is dormant in the e ements which bccomes prominent as the consciousness of the living being grows up. This consciousness reaches its culmination with complete identification of one with the Creator and this takes place through knowledge, wisdom and consciousness :

i) Moses had a good knowledge about the laws of God and about the customs and practices of people and he was an administrator (Ex 18:16). His knowledge of God's laws helped him establish harmony and peace among his people.

ii) Solomon asked of God a discerning spirit and understanding heart (I Kg 3:9), ie. not mere knowledge but wisdom as well. Solomon wanted not merely the rational level but also the affective level in order to rule the people.

iii) In Jesus Christ, who grew in knowledge and wisdom finding favour with God and fellow human beings

(Lk 2:52), we see the highest state of mind and heart - 'Abba-Consciousness' (Rom 8:15, Gal 4:6, Jn 14 11) - the awareness and conviction that the father and he are one.

Physics paves the way to grow from knowledge of the universe into the wisdom of how the universe functions and to find God's presence even in an atom. Within the nucleus of an atom there are positively charged protons and neutrons which are electrically neutral. It is common knowledge and experience that like charges repel one another but within the tiny nucleus the like-charged protons are very much attracted towards one another with so much force that it is very difficult to separate them. This is a mystery and the origin of the spirituality of physics. This mystic phenomenon indicates that God's love is so forceful and so accommodative that whatever be the types of objects and beings, irrespective of polarity, national, religious, ethnic and racial diversity, they cannot escape from the embrace of God, who is the unifying force. This then is the spirituality of physics!

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