His Excellency Dr. Heinrich-Dietrich Dieckmann, Ambassador of the Federal Republic of Germany, Dr. A.M. Khusro, President, Federation of Indo-German Societies in India, Dr. F. von Welck, First Counsellor, Embassy of Germany and distinguished friends, it is an honour to be with you this evening and speak on the Bose - Einstein Lecture Series. Bose and Einstein both were great Scientists, who not only made significant contribution but gave a new dimension to scientific thought. Satyendra Nath Bose as a young scientist had sent a paper on photon statistics to the celebrated scientific journal, NATURE, for publication. Its Editor, in his wisdom, rejected the paper and pointed out that Bose omitted an important characteristic of photons. Bose then sent this paper to Einstein for his comments and in this omission by Bose, Einstein found a solution to a longstanding problem in the theory of light. Therefore, this paper is known as Bose Einstein Statistics. It was the greatness of Einstein that he had only appended his name as the second author even though Bose was a very young lecturer in India.

Dr. Bose's name stands on a very high pedestal in the field of theoretical physics. His work on Bose-Einstein Statistics, his prediction of bosons -- intra-atomic particles not obeying Pauli's principle and condensation of matter at temperature approximating to absolute zero are the shining examples of his great scientific genius. Now in 1995 S.N. Bose's prediction regarding the possibility of a *sui-generis* state of matter at a temperature infinitesimally close to absolute zero has been proved to be correct by the experiments performed at the University of Colarado. Had this successful experiment come during the life-time of Prof. Bose, he would have definitely become a Nobel Laureate.

Satyen Bose was not only a physicist, but he was also a versatile genius. He used to visit the University of Allahabad because one of my teachers, Prof. Kedareshwar Banerjee, was his favourite student and I had the good fortune of remaining in attendance to this great genius. He used to come and stay in that very house at Allahabad in which I now live. So, I have a very special affiliation with Bose.

Prof. Bose could handle the problems of numismatics as easily as he could handle the problems of physics. He could handle the problems of palaeobotany with as much ease and facility as he used to teach physics. He was well versed in the ancient Indian literature and in Indian philosophy. He was a versatile genius and I offer my salutations to him.

At the beginning of the twentieth century, which also heralded a new era in physics, Einstein's intellectual contribution

resulted in giving a new direction to science. His two articles published in 1905 initiated two revolutionary trends of thought. His special theory of relativity and an entirely new method of interpreting the electromagnetic theory were responsible for laying the foundation of modern physics particularly the quantum theory. His papers published in the early years of the twentieth century produced new concepts - a break from the classical physics.

Einstein tried to integrate mechanics and electrodynamics. This resulted in the development of Special Theory of Relativity and produced revolutionary changes in the concept of space and time of Newtonian physics. According to Einstein space and time were not different entities. Space was not three dimensional and space and time together constituted a four dimensional space-time continuum. Thus one could not talk of absolute space and absolute time. Both space and time become symbols which one uses to describe his experiences and observations. This leads to the inescapable conclusion that the entire frame-work of classical physics undergoes a radical change where not only space and time lose their meaning but also mass becomes a form of energy. Another fundamental postulate of Einstein's theory was the constancy of the velocity of light 'C' which occurred in the mass-energy relationship as $E=mc^2$. Einstein in 1915 attempted to include gravity in the ambit of special theory of relativity. In this new frame-work gravity has the effect of curving space and time. This new theory known as General Theory of Relativity propounds that wherever a body like stars

possessing huge mass exists the space around it becomes curved. Remembering that time is inextricably connected with space, it is as well affected by matter. In ultimate analysis space and time do depend upon the distribution of matter and the concept of empty space becomes redundant. Although the general theory of relativity has not yet been fully confirmed yet it remains by far the most accepted theory and is being used to explain the description of the universe. Thus Newtonian physics which was based on solid bodies moving in an empty space valid in our daily experience finds it extremely difficult to conceive a situation where these concepts are not applicable. Later, the concept of solid bodies was shattered in the realm of atomic physics.

In the theory describing the phenomena on the basis of field theory matter connot be separated from the curved space. Matter and space thus are inter-dependent and parts of an integrated whole. This is something radically different from Newtonian physics and leads to a notion of unity rather than fragmentation. It is this concept which raises new questions regarding the nature of reality. I salute to the genius of Einstein who opened new horizons for understanding the relationship between objects and their surroundings.

One finds a striking parallelism between Einstein's concepts and the Eastern thought where Time and Space have been described as illusory. This is illustrated by the following passage from Madhyamik Karika – the celebrated Buddha scripture :

"It was taught by the Buddha, oh Monks, that .... the past, the future, the physical space.....and individuals are nothing but names, forms of thought, words of common usage, merely superficial realities".

As this century comes to an end, we find that human society has witnessed tremendous scientific progress and growth of unprecedented material affluence in many parts of the world on the one hand and a serious erosion of moral and spiritual values on the other. Mankind today is facing a multidimensional civilisational crisis which has engulfed almost all aspects of our lives - material and spiritual. All nations, whether rich or poor, are in fact nations with a troubled soul and are in search of a new paradigm. The question is how can science and spirituality reconcile and contribute to make this planet full of love and peace. Indian philosophy answered this question centuries ago and it would be my endeavour to place before you how modern science is converging to the same point where the ancient saints of India had reached and realised the Absolute Truth.

The Mundak Upanishad poses a question -- what is that O'learned, knowing which all this universe of objective experience, both external and internal becomes known --

Kasminnu Bhagavo Vijnate Sarvam
Idam Vijnatam Bhavati.

कस्मिन्नु भगवो विज्ञाते सर्वं इदं विज्ञातं भवति

This is a wonderful question. The question has been deliberated and answered in various ways and in innumerable

treatises, the shining among them is Adishankaracharya who was followed by great and learned Acharyas who interpreted the 'Truth' in many ways. This country, I think, is most fortunate to have great and learned saints and in the past hundred or hundred and fifty years we had Sri Ramkrishna Paramhans, Swami Vivekananda, Swami Ramtirth, Sri Aurobindo, Raman Maharshi, the Paramacharya of Kamakotipeetham and many others who not only experienced the Absolute Truth but revealed it to others. To sum up - the understanding of Brahman only can lead one to complete knowledge and this is something we must all strive for. But before proceeding further let us see what modern science has to say in this regard.

The scientific thought dominating the western mind for the past three centuries evolved as a result of the works of Galileo Galilei, Francis Bacon, Rene Descartes and Issac Newton. The foundations of scientific rationalism were laid when Galieo for the first time combined experiments with mathematics. Bacon propounded a clear theory of inductive procedure and Descartes declared, "all science is certain and evident knowledge". Descartes also constructed an entirely new system in which events were mathematically described. His statement 'Cogito ergo Sum' (I exist because I think) resulted in a fragmented human personality with "mind" separated from the "body" and functioning as a controlling authority of the body. Descartes with his analytical skill portrayed Universe and all the objects which constituted it as automata. This world- view received further support from the works of Issac Newton who

developed his machines on the basis of the Cartesian view of the universe and made it the foundation of classical physics.

Newton showed the western world that the Universe was rationally comprehensible. In fact Newton's statement, " I make no hypothesis (Hypothesis non fingo) became the foundation for the rapid development of experimental sciences particularly in physics and ultimately resulted in some of the most wonderful scientific and technological discoveries. The industrial revolution could only be propelled because of his discovery of laws of motions which demonstrated that Celestial bodies also obey the laws valid on our planet. Human mind could, thus , comprehend what till then was believed to be purely the domain of the divine. If Descartes developed the discipline of mathematical analysis and proved that Nature could be pictured as a Great Machine, it was Issac Newton who discovered the laws on which the machine operated.

The Newtonian world view was mechanistic, wholly deterministic and governed by the principle of causality. In Newtonian physics the position of a moving object at any future time could be predicted provided one had the requisite information about its present position and the laws governing its motion. Similarly its past position at an earlier time could be retrodicted. Thus, according to this concept the Giant Machine was operating like a pre-recorded tape where nothing could change and every event was predetermined right from the moment the Machine came into existence. All this required the existence of an extra-

terrestrial agency to set the machine in motion in accordance with some divine laws.

Some of the philosophical consequences of Cartesian-Newtonian approach can be summed up as under :

(a) The Universe is a Giant Machine and is governed by certain universal laws which can be discovered through experiments and rational understanding. By applying these laws one can extend the horizon of knowledge and can obtain further information about the nature or universe.

(b) There is an external world which exists apart from us which can be observed and measured in an objective manner without producing any change in it. This external world is impersonal and the observer can strive for " Absolute Objectivity".

The theory of evolution was developed as a result of certain researches in geology, biology and the work of Pierre Laplace and Immanuel Kant. In physics itself the discovery of the electromagnetic phenomenon was not compatible with Newton's mechanistic model. The biologist started questioning the validity of the Cartesian concept that the universe came into being as fully and perfectly constructed machine, they instead proposed an evolutionary paradigm in which the present day complex universe has evolved from simpler structures. Such a paradigm was also purely materialistic and also accepted the view that the evolution of the external world can be uniquely and objectively observed by an independent observer. The

spiritual elements were missing even in this approach. Despite these developments science continued to quantify and measure, improve its experimental techniques and the Newtonian mechanics continued to be the basis of all physics till Einstein arrived on the scene.

After the successful experiments of JC Bose the distinction between the animate and inanimate has disappeared. Bose started investigating the responses of non-living like metals and the animals. He discovered the fatigue of metals and then moved on from physics to physiology. In 1901, May 10, J C Bose demonstrated all his experiments in England. Scientists saw with wonder the similar curves of muscles and metals, when they were responding to the effect of fatigue, stimulation, depression and poisonous drugs. He made the following remark after completion of his demonstration :

"I have shown you this evening autographic records of the history of stress and strain in the living and the non-living. How similar are the writings ! So similar indeed that you can not tell one apart from the other. Among such phenomena, how can we draw a line of demarcation, and say, here the physical ends, and there physiological begins? Such absolute barriers do not exist ..... It was when I came upon the mute witness of these self made records, and perceived on them one phase of pervading unity that bears with in it all things - the mote that quivers in ripples of light, the teeming life upon our earth and the radiant sun that shine above us - it was then that

I understood for the first time a little of that message proclaimed by my ancestors on the banks of the Ganges thirty centuries ago. "They who see but one, in all the changing manifoldness of this Universe, unto them belongs Eternal Truth- unto none else, unto none else".

Further, let us have a look at what James Lovelock says about the planetary ecosystem and what makes it tick. He says that (a) planetary ecosystem is an entity where co-evolution is an accepted fact, (b) where highly integrative functioning is a key feature and (c) where we can not study one feature in isolation from others. The sum is, not only that every thing is connected; but that we can understand the true nature of what we do only by checking the relationships generally within its higher level contexts.

Examples can be multiplied to prove Bose's thesis, the Vienese biologist Raoul France, Clean Backster of America, the Japanese scientists Dr. Hashimoto and many others confirmed what J C Bose had demonstrated. The mechanistic world view can not explain this interconnectedness of organic and inorganic.

Since the beginning of the 20th century science has made advancements revising many concepts. Heisenberg's principle of uncertainty had given a deeper insight in understanding the behaviour of sub-atomic particles. The strict cause and effect relationship breaks down in their domain. The determinacy of the Newtonian model in the Universe is replaced by indeterminacy in the sub-atomic world.

Science today is confronted with certain questions which it earlier considered to be outside its domain. But as a result of some of its own discoveries intellectuals are asking, `Is matter related to consciousness in any manner? If so, then what is the nature of this relationship. It all began sometimes around 1924-25 when Louise de Broglie put forth the hypothesis of matter waves. Erwin Schrodinger - the father of wave mechanical model proposed his new equation which relpaced Newton's equation of motion for a free particle in case of electron. Then came W Heinsenberg with his Principle of Uncertainty and stated that if you are certain about the position of a moving perticle like electron you are uncertain about its momentum and vice versa. The natural corollary of Heisenberg's principle of uncertainty was : a) that you cannot know exactly what a fundamental particles is; b) that in subatomic world the strict law of cause and effect breaks down; and c) that the strict division between an observer and the observed withers away. The efforts to discover the ultimate reality through experiments are, therefore, meaningless. The classical concepts were thus no longer tenable in the subatomic world. The phenomena in this domain are statistically describable, it is impossible to describe the behaviour of one particle with certainty.

Modern physics is now dealing with this new paradigm of quantum mechanics. The central question is : what is it that quantum mechanics describes. The answer generally accepted is known as Copenhegen interpretation. This interpretation simply states that the quantum mechanics is about correlations in our experiences. It is about what will be observed under

specified conditions. Einstein, however, opposed this till his last. His famous statement, 'that he did not believe in dice playing God, expressed his disagreement with the probabilistic interpretation of quantum mechanics.'

The most startling consequence of the Copenhagen Interpretation was that the physicists under pressure of their own findings were forced to accept that a complete comprehension of reality lies beyond the capabilities of rational thought. It is significant that Einstein never agreed with this. However, the quantum mechanical paradigm unhesitatingly stated that the new physics was not based on "absolute reality" but upon us. The world "out there" was inseparable from the observer 'in here'.

Einstein who believed in causality could not accept Heisenberg's uncertainty principle. In order to disprove Einstein, Boris Podolsky and Nathun Rosen published a paper "Can Quantum Mechanical Description of Physical Reality be Considered Complete? " The authors postulated that if principle of uncertainty was correct that causality does not hold good in the domain of the sub atomic world then it will lead to a strange paradox that two same kind of sub-atomic particles must some how be simultaneously connected, even if they remain separated at enormous distances. How is it that these two particles communicate with each other instantaneously even at distances which electromagnetic waves take few seconds to travel. Do they possess some sort of consciousness. Until 1936 no such phenomenon was known to exist hence Einstein concluded that Heisenberg was wrong. But the strange pehnomenon did exist was proved by successful experiments

in 1972 by David Bohm, in London, Clauser and Freedman in USA and a team of Alain Aspect in Paris in 1982. The impossibility of superluminary connections as propounded by the theory of Relativity is no longer valid. Hence "ar interconnectedness in events taking place at space like distances is valid".

J S Bell, a physicist at the European Organisation for Nuclear Research (CERN) gave a mathematical formulation of the EPR effect. The astounding implication of Bell's theorem is that "at a deep and fundamental level, the separate parts of the Universe are connected in an intimate and immediate way". In 1975 Jack Sarfatti stated, 'not only superluminal connections exist but they can be used in a controllable way to communicate messages". Henry Strap, in 1975 said, "Bell's theorem is the most profound discovery of science".

The most startling consequence of all these discoveries is that the Cartesian concept of reality as parts joined by local connections does not fit in the Quantum Mechanical Paradigm. Henry Strap again concludes by saying "the theorem of Bell proves, in effect, the profound truth that the world is either fundamentally lawless or fundamentally inseparable". Bell's theorem implies that whatever happens in one part of the universe on a single entity has an effect which can be detected in any other part of the universe on a similar entity. Accordingly Kapec Bell's theorem has laid the foundation for the neodeterminism or superdeterminism in science. The initial conditions cannot be changed. The Universe could not be anything but what it is.

David Bohm suggested that quantum physics demands a new order.'Instead of starting with parts and showing how they work together, we start with the whole'. This is also in consonance with Bell's theorem. The separate parts of the universe are not separate parts. Says Bohm,"Parts are seen to be in immediate connection, in which their dynamical relationship depends, in an irreducible way, on the state of the whole system (and indeed, on that of broader systems in which they are contained extending ultimately and in principle to the entire universe). Thus, one is led to a new notion of unbroken wholeness which denied the classical ideas of analyzability of the world in to separately and independently existent parts....."

Explaining his hypothesis of apparently random subatomic phenomena, David Bohm says, "Particles may appear in different places yet be connected in the implicate order. Particles may be discontiguous in space but they are contiguous in the implicate order." Matter according to Bohm is a form of the implicate order as the vortex is the form of the water - it is not reducible to smaller particles. Like "matter" and every thing else, particles are forms of the implicate order. The question which arises now is "what is the implicate order"?

As Gary Zukov says, "The implicate order" is the implicate order of that - which - is. However,'that which is' is the implicate order. This world view is entirely different from what we are using in classical physics." In the words of David Bohm "Description is totally incompatible with what we want to say."

Says Gary Zukov "Because of the deep rooted Greek notions in the western mind, it is unable to comprehend this new paradigm. The Greeks believed that only being is. Therefore, Non-Being is not. Actually in the new paradigm Non Being also is. Both Being had Non Being are `that which is.' Everything even "emptiness" is that which is. "In Bohm's physics, there is nothing which is not "that which is.". Bohm's theories have striking parallelism in Eastern thought, in the Upanishadic statements.

The Chandogya Upanishada gives a dialogue between Svetaketu and his father. When Svetaketu returned home after learning Vedas for twelve years, his father asked him "Svetaketu have you asked for the knowledge by which we hear the unhearable, by which we perceive the unperceivable, by which we know the unknowable." What is that knowledge asked Svetaketu? His father Uddalaka said, "That knowledge is knowing that which we know all." And further explaining the father pronounced, "In the beginning there was Existence, One only without a second. Some say that in the beginning there was non-existence only, and that out of that the Universe was born.

But the question is how could existence be born of non-existence? In my opinion in the beginning there was Existence alone - One only. He the One thought to Himself: Let me be many, let me grow-forth. Thus out of Himself he projected the Universe, and having projected out of Himself, the Universe, he entered into every being. All that is has its self in Him alone.

Of all things He is the subtle essence. He is the truth. He is the self. And that, Svetaketu, THAT ART THOU.

In the Brahad Aranyak Upanishad the sage informs king Janaka about the true nature of Brahman, "Brahman can be apprehended only as knowledge itself –knowledge; which is one with reality, inseparable from it. For He is beyond all proof, beyond all instruments of thought. The eternal Brahman is pure, unborn, subtler than the subtlest, greater than the greatest. By the purified mind alone Brahman is perceived. He who knows Brahman to be the life of life, the eye of the eye, the ear of the ear, the mind of the mind, - he indeed comprehends fully the cause of causes. In Brahman there is no diversity. He who sees diversity goes from death to death."

The quintessence of the Upanishadic thought is given by the following :

Sarvamidam Khalubrahman, Ahambrahmasmi, Tatvamasi

सर्वमिदं खलुब्रह्मं, अहंब्रंह्मस्मि, तत्वमसि

All this is Brahman, I am Brahman, so art thou, and *Yatpinde Tadbrahmande*

यत्पिंडे तत्ब्रह्मांडे

That which is in microcosm is also in the macrocosm

Anoraniyan, Mahatomahiyan

अणोरणीयान, महतोमहीयान

Brahman is all pervading, it is subtler than the subtlest and larger than the largest.

So we notice that the language which many modern physicists are using is converging to the language of spiritual leaders. Thus J C Bose said : "The vast abode of nature is built in many wings, each with its own portal. The physicist, the chemist, and the biologist come in by different doors, each one his own department of knowledge, and each comes to that this is his special domain unconnected with that of any other. Hence has arisen our present division of phenomena into the worlds of inorganic, vegetal and sentient. This philosophical attitude of mind may be denied. We must remember that all inquiries have as their goal the attainment of knowledge in its entirety."

After 28 years of his first demonstration in 1901, Bose summed up his findings in 1929 : "In many investigations on the action of forces on matter, I was amazed to find boundary lines vanishing and to discover points of contact emerging between the living and non-living. My first work in the region of invisible lights made me realise how in the midst of luminous ocean we stood almost blind. Just as in following light from visible to invisible our range of investigation transcends our physical sight, so also the problem of the great mystery of Life and Death is brought a little nearer solution, when, in the realm of the living, we pass from the Voiced to the Unvoiced."

The modern mind and the ancient sages from India speak almost the same language is strikingly evident from the following

two illustrations. In the words of Robert Oppenheimer `If we ask, for instance, whether the position of the electron remains the same, we must say 'no'; if we ask whether the electrons' position changes with time we must say 'no'; if we ask whether the electron is at rest we must say 'no'; if we ask whether it is in motion we must say 'no'. Now have a look on what Isa-Upanishad says :

It moves. It moves not.
It is far, and it is near,
It is within all this,
And it is outside of all this.

Thousands of years before the dawn of civilization, as we understand now, the learned had realised that it was the Brahman from which the whole universe and its beings arise; after arising in which they live; and at the dissolution into which they merge back.

Yato va imani bhutani Jayante, yena Jatani jivanti,
yat prayanti-abhisamvishant; tad vijijnasasva

tad Brahmeti (Taittiriya)

यतो वा इमानि भूतानि जायन्ते, येन जातानि जीवन्ति
यत् प्रयान्ति अभिसंविशान्ति, तद्विजिज्ञासस्व, तद्ब्रह्मेति

All our inquiries have, therefore, to be to the nature of Brahman because at the level of knowledge it is abstract and hidden deep within every being and is not generally perceived;

but it can be verily perceived with the help of intellect, sharp, subtle and one pointed by those who are adept in the perception of the subtle.

Esha Sarveshu Bhuteshu gudho atma na prakashyate;

Drishyate tu agryaya budhya sukshmaya sukshmadarshibhih.

एष *सर्वेषु* भूतेषु गूढ़ो आत्मा न प्रकाश्यते

दृष्यते तु अग्रय्या बुद्धया सूक्ष्मया सूक्ष्मदर्शिभिः

The choice of words here is extremely sensitive. One indeed needs a very fine and sharp perception to see that Atman, which is in every being. These are basic requirements too. Firstly devotion to truth, concentrated and concerted effort, perfect knowledge attained through constant control of extrovert desires, and practice of continence and other moral virtues.

Satyena labhyah tapasa hi esha atma;

samyak-Jnanena brahmacharyena nityam (Mundaka Up).

सत्येन लभ्यः तपसा हि एष आत्मा

सम्यक् ज्ञानेन ब्रह्मचर्येण नित्यम्

All through the philosophical literature we find that to understand the Brahman and Atman simple knowledge is not enough. One has to have complete control on ones desires and practice of continence and other moral virtues.

At this point it may be necessary that Brahman and Atman is the same one Infinite Reality viewed from the external and

internal points of view. To understand the Atman and Brahman mind is our basic instrument and as Adishankaracharya has said "The mind that has been well refined and rendered subtle by the study of the Shastras, that is Scriptures and Works dealing with Spiritual Science, and the teachings of a competent spiritual guide, and is well disciplined by the virtues of tranquillity of the mind and control of the senses, fortitude, withdrawal from extrovert desires, diligent conviction, and constant concentrate application to realize the truth, is the instrument for the realization of the inner verities and the Self (Atman)"

Shastra, Acharya-upadesha, shama-dama adibhih susamskritam manah atma-darshane karanam
(Commentary on Gita-Shankar)

शास्त्र आचार्य-उपदेशः, शम-दम-आदिभिः
सुसंस्कृतं मनः आत्म-दर्शने करणम् (शांकर गीताभाष्य)

Vedanta holds, as summed up by Swami Mukhyananda "that in the phenomenal state the universe is beginningless and endless, and evolves and involves cyclically in the Cosmic Consciousness by the force of the accumulated past impressions of the Souls for their experience and action during many different lives to gradually progress towards perfection, to realize their true nature as the Sat-Chit-Ananda. This can be illustrated empirically by our awaking and sleep cycles. When we go to sleep, all our stored knowledge and impressions become dormant, but retain the urge to come to the surface and

remanifest. As a result, after waking up we resume our previous thoughts and activities and grow in knowledge and experience. This process goes on in life while our physical bodies are subject to constant changes and pass through childhood, youth, old age and death".

A question may be asked how the Absolute becomes active and the whole universe acts accordingly. This energy has been explained as the Maya Shakti or the energy of illusion. To quote "Maya-Shakti is the innate, eternal, indefinable, and relativistic universe-manifesting power (anirvachaniya-shakti) of the trans-personal Absolute Brahman, which works spontaneously, just as light shines spontaneously. Maya does not affect Brahman, just as the heat of fire does not affect fire but only others; that is, Maya affects only its products. That is its relativity. Maya projects the universe through its two fold characteristics of Veiling-Power (*Avarana-shakti)*, comparable to Tamas of Prakriti, and Projecting-Power (Vikshepa-Shakti), comparable to the Rajas of Prakriti. (Sattva of Prakriti arises owing to the presence of the Atman as substratum). Through the operation of these two powers of Maya, on the one hand it veils the Reality or the real nature of Brahman/Atman, which is Existence-Knowledge-Bliss Absolute, and, on the other, simultaneously projects the Anatman (non-Self), the opposite or shadow of Reality, in a distorted manner. This is so because of the disturbed condition of its three Gunas, just as, for example, a concave or convex mirror distorts images. Maya projects the universe and its being

on the substratum of Brahman/Atman in the relative plane, within the framework of Space-Time-Causation (Desha-Kala-Nimitta) which are derived from Tamas-Rajas-Sattva. This it does without affecting the absolute nature of Brahman/Atman, just as a person is not affected by his distorted images projected by a concave or convex mirror. In the universe, which is within Space-Time-Causation, individuation takes place, and the nature of Brahman (Sat-Chit-Ananda) appears dichotomized into relative existence and non-existence namely birth and death, knowledge- ignorance, happiness, misery, etc.

Upto this point our discussion has been at a very subtle level. But it must be understood that spirituality and devotion to the Brahman has to be at the level of a common man and therefore, any discussion of Indian Philosophical Thought will not be complete without the devotional aspect of it. The knowledge as we have discussed so far cannot be complete without the devotion and at some point of time knowledge and devotion converge at the same point supplementing each other to follow two different paths to reach some goal namely realisation of Self.

As I said earlier the path of knowledge being difficult is restricted to a few. But the path of devotion, Byakti is available to one and all who wish to experience the divine love. Shankaracharya had established the Adwait Vedant or principle of non-duality and the following Masters enriched this knowledge through their own treatises. But Shankaracharya was also a great

devotee and his Saundarya-Lahari and other hymns are sung by millions everyday. Thus, pure knowledge has always followed the path of devotion to bring the unmanifest to the level of manifest. In devotion the abstract becomes concrete.

The Bhakti or devotion is supposed to have two sons Gyan-knowledge and Vairagya-renunciation. The knowledge without renunciation has no meaning. When knowledge is coupled with renunciation, the devotion takes form.

In this context I would refer to two great works of devotion in Indian philosophy. These are the Narad Bhakti Sutra and Bhagwat Mahapuran I will not go into the details but only touch upon the fundamentals. Narad says, "The devotion is indeed in the nature of Supreme love in the divine and the Supreme love of God is in the nature of immortality."

Param premroopa, Amrit swaroopa cha

परम प्रेमरूपा, अमृत स्वरूपा च

Having attained devotion the being becomes perfect or becomes a siddha and what is the state one achieves after that? 'Having received the devotion of God, 'one becomes devoid of desires, he does not grieve, he is not jealous, he does not rejoice and he is not enthusiastic for self interest. In this state, the devotees become intoxicate in divine love, is in complete peace with himself, becomes silent and becomes united in Self. Such is the nature of devotion.'

Narad Bhakti Sutra, however, says that the nature of devotion is beyond description. It is like the taste of sugar enjoyed by the dumb. The devotion takes one to the state to Supreme bliss and highest spiritual experience which is called 'Bhooma.' This term has been used in several Upnishads as the highest plane of fulfilment. This has been defined in Chhandogya Upnishad. In this state you see nothing else, where you hear nothing else, nothing else you know and feel. That state is called Bhoon - The all pervading, the infinite, the eternal, the immutable Brahman. There where you see other things, where you feel and understand other things, that is finite and limited. That which is infinite Bhooma, is immortal.

Yatra Nanyatpashyati nanyatchrinoti
Nanyadvijanati sa Bhooma, Atha Yatraanyatpashyati
Anyatchhrinoti Anyatvijanati Tadalmpam Yo Vai Bhooma
Tadamritamath ydalpm Tanmartyam.

यत्र नान्यतपश्यति नान्यच्छृणोति
नान्यिद्वजानाति स भूभा अथ यत्रान्यत्पश्यति
अन्यच्छृणोति अन्यद्विजानाति तदल्पं यो वै भूमा
तदमृतमथ यदल्पं तन्मर्त्यम् ।

Most of us are propelled towards worldly happiness, because our experience is limited to the things that we have in some way come across. The divine experience does not come easily and, therefore, it is an abstract happiness. Who would be

interested in abstract happiness if one is able to experience the worldly one? But this enquiry to understand the nature of the divine opens a vista for another kind of experience and we start thinking, meditating and contemplating on the ultimate. Our attention to the Brahman has to be complete and is described as oil being poured from one container to another is uninterrupted and smooth so should be the concentration (*dharawat*). Once this happens, the divine comes to our heart.

The understanding of the divine makes one's heart pure. We feel a strange happiness which is unrelated to our daily existence and worldly happiness. As it happens, we are tied to this world with an unreal knot. Once the divine ray enters our heart, we are able to see that knot. As soon as we see it, we are able to understand the unreality of it. And then, as the Bhagwat says, this knot is untied. In other words, all the doubts, with which our whole thinking is conditioned, completely disappear. The cycle of Karmas (past actions) break and we are face to face with this Truth. Thereafter, nothing more remains to be understood. We become one with ourselves. All action ceases and there is nothing save peace and love. You are within the Lord and the Lord is within you. Not only that, the Lord follows the devotees. What a beautiful concept! Krishna says to his dear friend Uddhav in Bhagwat :

"O Uddhav! loving devotees like you are the dearest of all to me; even my son, Brahma the creator, Shankara, my real brother, Balram and my consort Lakshmi, even my Atman, my

own self, are not so dear to me as the devotees are. I constantly follow such devotees of mine who have no desire, and are only absorbed in meditating and contemplating upon me, discarding every thought of the world, who are free from attachment and aversion and have compassion for everyone, so that the dust raised by their feet may fall upon me and I may be sancitified thereby. Those who have renounced all acquisitions and possessions, who do not have any attachment, ego or vanity even in relation to their body etc., whose mind is imbused with exclusive love for me, who have reached a state of tranquility by renouncing all worldly desires, who because of their generous and exalted nature treat everybody with compassion and love and whose minds are totally unaffected by any desire whatsoever, experience the Supreme bliss which cannot be experienced by any other person as this supreme bliss can be experienced only by renouncing all expectations and desires." It is indeed an elating experience that the Lord follows the devotee for the dust of his feet in order to sanctity Himself.

Once a devotee asked for a boon from the Lord that he be given the power to live in the heart of everyone. The Lord asked him why he wanted to dislodge Him. The devotee said: "Lord, sitting in the heart of the people you are just watching. I will not watch, but ask for each one's pain to be given to me. I would want everyone to be happy." The Lord became very pleased because the devotee had reached another dimension

of sharing the pains and sorrows of others, which is the highest spiritual attainment.

I started with the words from Mundak Upanishad."What is that O'learned, knowing which all this universe of objective experience, both external and internal becomes known." The answer to this is that the knowledge of Absolute Truth of the Brahman can only lead us to love and peace and when this happens the Mundak Upanishad declares "when the Atman is realized as the Basic Reality in the Noumenal and the Phenomenal Existence, all the complexities within the 'heart' (mind) are resolved and all the doubts are rent asunder.....

Bhidyate hridaya-granthih, chhidyante sarva-samshayah,
kshiyante chaasya karmani tasmin drishte paravare.

भिद्यते हृदयग्रन्थिः छिद्यन्ते सर्वसंशयाः ।
क्षीयन्ते चास्य कर्माणि तस्मिन्दृष्टे परावरे ।।

Scientists to-day are discussing questions like "reality", "being", "non-being" etc. in almost in the same language which Upanishads and other schools of Ancient Indian Philosophy have done. Piet Hut in one of his recent papers (1995) while dealing with these issues has observed the following :

"Science that does not have any ethical implication can be useful, but cannot claim in any way to describe all of reality, since clearly some form of ethics is part of our world of experience. On the other hand, ethics as a set of arbitrary

commands, either ascribed to a superhuman source or to a biologically usefull set of general rules, is not satisfactory either.

"What is this world we are living in, and who are we? In order to come to terms with such questions, we can switch from an inquiry as to 'what' to a more revealing inquiry as to 'how'. 'How does this whole world arise in the way it does, in the way it appears to us? And how does our notion of who we are arise in that same experience in which the world appears as well?

"Asking such questions, we can find a tentative answer to what it means to say that somehing 'is'. There 'is' a cup, there 'is' joy, there 'is' form and function and value. Whatever appears, it has to make some form of sense to us, in order to qualify as something that 'is;'. Even utter chaos or non-sense presents a form of sense (namely : chaos, nonsense). So, for us, 'what is' is the direst result of identifications we have made.

"At any time, we can view anything in its 'being' aspect, as the role that is being played, as that 'what it is'. But we can equally well view it in its 'non-being' aspect, in its aspect of openness or emptiness. From the point of view of the play, the player underneath the role being played is simply not there. In a drama, there 'is' a king. The actor 'is not' within the rules of the play. Within the play the actor steps aside, disappears, to let the king show through. But when we step outside the play, the king has vanished, has completely lost his base, his foundation of existence. We then see that, at bottom, the 'king'

has been an empty notion all along something being played but not ultimately 'real' in any sense.

"It would seem that, instead, the actor is the real person, rather than the king. But what if the actor unexpectedly gets fired, soon after the play? Then the next layer drops. The actor disappears as well, and a jobless person appears instead. Is there a core that remains unchanged? Flesh and bones, or molecules, a life history constructed as a vast web of connected past events and relationships between events? Or are any and all of these in turn the results of further attempts at role playing and play interpretations? I suspect the latter. Let me try to sketch what that may mean.

"Stated in the most radical way, each subject or object, human or physical object or abstract idea or whatever, is playing a role. And what we identify as playing the role is itself playing a role. We are part of a great drama of role playing, wih roles within roles within roles — without anybody or anything 'home' underneath; without any stable and final foundation to bolt things down upon.

"There are interesting parallels with mysticism, though. If a scientist looks at the claims of a traditional religion, he or she is likely to be rather skeptical at the seemingly arbitrary boundaries that are acknowledged by the true believers of that religion. To take one example, the believer may claim that a particular temple ground is 'holy', and that there is a clear distinction in sacredness between what lies within the perimeter

of the temple area and what lies outside. The scientist may object that the molecules inside the temple are the same as those outside, and that no scientific analysis is likely to yield any measurable distinction that could justify the presence of a definitive limit, separating the sacred from the non-sacred.

"Such a scientific attitude would be very reductionist, and would probably not convince the believer. The scientist in turn might well be ready to concede a contextual value to the noti of sacredness. But it is interesting to take up the reductionist conclusion, and turn the tables. The first, naive, interpretation of the absence of a distinction between temple and non-temple would suggest that nothing is sacred. But this is only one way to react to the dropping away of a limit. There is an alternative: we may equally well conclude that everything is sacred. Rather than limiting appreciation to a particular spot, we can follow the examples of mystics of all ages, who have never tired telling us that there is no such thing as ordinary, finite, non-sacred things and events. Anything can be viewed in its proper aspect, as an open gateway to a boundless reality. It is here that scien and mysticism meet, in an outlook that is literally limitless".

Friends, it has been a nice experience speaking to you and I thank His Excellency Dr. Heinrich -Dietrich Dieckmann, Ambassador of the Federal Republic of Germany for giving the honour of speaking in the Bose-Einstein series of lectures, I also thank the distinguished audience for their kind indulgence.