SUMMARY, COMPARISON AND CONCLUSION

In this chapter I shall first summarize the key ideas of the theory, then give a list of astrophysical problems, which can be answered by the new theory and compare these answers with the explanations given by the conventional models. At the end, I shall present some philosophical reflections.

The ideas of the new theory have evolved from the empirical observations of the cosmological and terrestrial phenomena at different scales, which are available in different wavelengths - from the microwaves and radio waves, to the x-rays and the gamma-rays. The study includes the sizes involving the entire observable universe of billions of light years in dimension, to the vortices of air, water, fire and rocks, which we observe in Earth's biosphere. The ideas are guarded against theoretical speculations, freed from attachment to the mathematical framework, which the modern physicists have got used to during the last century. The search for an understanding has been made with an open mind, without being impaired by the established views, or the fashionable ideas prevailing among the scientists working in famous academic institutions. While analyzing the observations in different wavelengths, different graphic softwares have aided in viewing the universe in an unconventional way. The old method of visualizing the universe in rainbow colors, are constrained by the limitations of the human eyes, and the way the human brain interprets such data. With the help of the computer it is possible to overcome this limitation, and extract much deeper information from the digital images. The ideas of the book have been extracted from such unconventional data analysis.

The main findings can be summarized as follows: The structures in the universe are built in very similar ways, irrespective of how big, or how small the objects may be. The mechanism behind the formation of the structures in the cosmos are driven by the kinematic energies of turbulence, which churn gaseous and dusty media, as well as the magnetic forces which are generated by the ionized particles, created by the heating and the impact of radiation of the swirling gases and dusts. The main mechanism behind the formation of structures in the universe is magneto-hydrodynamic turbulence.

In contradiction to the conventional view, which considers turbulence as a manifestation of chaos, it turns out to be an embodiment of an immensely complex order. This order hides in a network, woven by filaments and knots, which move in the turbulent media. The pattern seen in this network is universal in all scales, wherever one may observe it. It unveils the

same pattern seen in the largest cosmic bodies in the structures of the vortices of water, air or fire occurring in our immediate surrounding. Thus the pattern seen in the scale of millions or billions of light years can be seen in the scales of meters, centimeters, or even smaller dimensions.

The pattern, which appears universally in all scales, is a fractal. The universe can be viewed as a fractal ornament, which is made of its own replicas in smaller and smaller dimensions. If one breaks down the ornament into smaller pieces, and picks up the broken pieces, one will see once again the entire pattern in those smaller units. One may continue breaking the smaller pieces into even smaller pieces as many times as one may desire. The minutest structures will still carry the image of the whole. It contradicts the scientific view cherished since the dawn of science. The modern science has led us to believe that by breaking the larger structures into smaller and smaller units, we should arrive in the end at the fundamental constituents of matter, which the particle physicists are set to explore. However, in the universe things seem to work differently. By breaking the large pieces into smaller and smaller units one can not get rid of the complexity of the whole. The complexity of the large structure appears in the same way in all scales.

This unfathomable fractal structure, which is the foundation of the order in the universe, appears to us as chaos. When all the smaller pieces of similar complexities are assembled together to construct larger pieces, which are in turn assembled together to form even larger pieces, and so on, and thus the system is built in ascending scales, to an observer, who is able to view the details in higher resolutions, the system will appear so complex that he or she will consider it as totally chaotic system. This is why turbulence appears as a chaotic phenomenon.

However, turbulence can be understood as an orderly build up of a fractal design, which possesses a particular geometric structure, which weaves knots of coiled and intertwined filaments. By embedding this design in scales after scales one can generate the chaotic structure, which one observes. The dynamics of the turbulence lies in the understanding of the geometry of this design. In turbulence, irrespective of whether it occurs in gas, fluid, plasma, or molten metals and rocks, the flow paths follow the similar pattern, as if they are destined by the nature to follow an order. In contradiction to the prevailing view that matter has the ability to fill all regions of space, which is continuously connected at every points with their neighboring points, the universe moves through a network of a fractal arrangement of matter and void. Matter never fills all points of space. So the application of differential geometry in describing the nature of the universe, as done by the conventional theory, seems untenable. As the sizes of the fractals depend on the units of measurements, with which one may set out to explore the object, the questions of the finiteness and the infiniteness of the universe depends on the units with which one explores it.

Not only the question of the expanse of the cosmos in space, but also the question of the predictability and unpredictability of events occurring inside the fractal network of flow depends on the observer, and larger the scale at which the observations are done. The

smaller the observed objects, and larger the region through which the objects move, the predictions of the flow path turn more and more difficult. After some limits it may appear as a system which can only be understood by using the theory of probabilities. However, at the foundation of this system lies the fractal order, which possesses global properties similar to the properties in the local regions. Thus, in the universe, the questions of the global and local, or macro and micro phenomena are intricately connected and inseparable from each other.

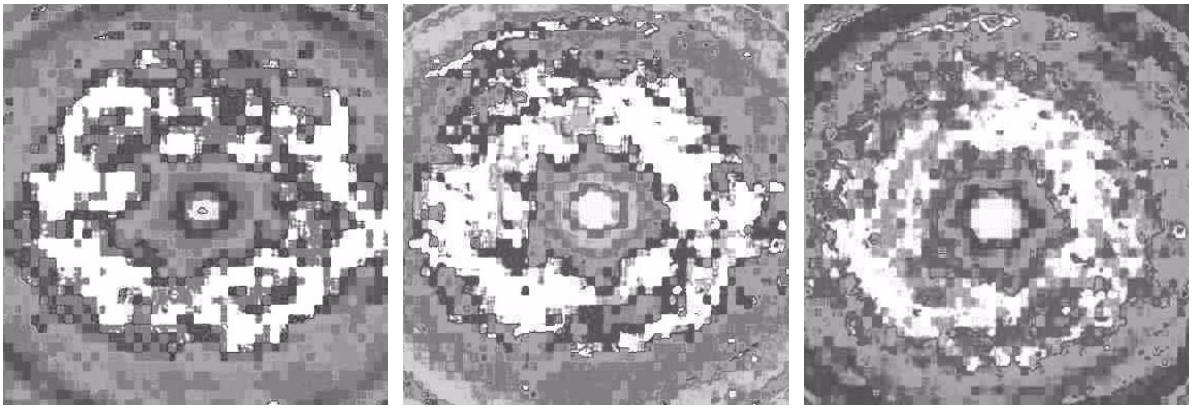
Everything in the universe are entangled with one another. Nothing can be studied as a separate local phenomenon independent of the rest of the events occurring in the global scale. Anything, which may happen at one place, is a consequence of the events, which are occurring at different places globally somewhere else. The universe acts like a organic whole, where everything depend on everything else for their existence. The things may die or disappear at one place in order to bring regeneration at other places. Similarly, things may be born and generated locally, only at the expense of something dying and decaying somewhere else in the system.

One may imagine the universe to be an ornament, which is studded with pulsating jewels,. The jewels emitting different intensities of light, are arranged to create the universal cosmic pattern. When viewed in the scale of the galaxies, these jewels are the stars. When viewed in the scale of the superclusters of galaxies the jewels are the galaxies and so on. In any scale one may observe the cosmos, these jewels grow and evolve, and then decay and become extinct. It happens everywhere throughout the ornament, which appears as a pulsating arena of life and death. While the intensities at one place grow, it can only happen at the expense of decay of intensities at other places in the ornament. The energies only flow from one place to the other. The death here means life there, and vice versa. Thus the whole ornament fluctuates everywhere. Though it fluctuates, and the jewels may become dimmer, or brighter at different places, the pattern, through which the energies flow through space throughout the body of the ornament, remains unchanged. The filaments by which the beads are connected with each other may become brighter, or darker with the fluctuations and may thus reveal a constantly fluctuating illumination of the pattern of the jewel. At one moment, only some parts of the pattern may remain illumined. By watching the pattern at different moments of time, one can view the real nature of the ornament. Wherever in the universe, and in whatever scale one may study this ornament, the design remains eternally the same.

It resembles an arena where there exists no time. The local fluctuations, which one may see, generates the impression of the flow of time to the local observer who is watching the ornament in his or her own surrounding. An observer, who is outside the local region and able to view the whole structure globally at different stages of the fluctuations, will observe a network, which does not change with the flow of the so-called time. At all moments it will remain the same - as if, the so-called time is embedded inside a timelessness design.

What we associate with time at a place is caused by the transport of matter and energy occurring from one place to the other, which drive the fluctuations. However these

transitions from place to place, occur with a hidden purpose existing in the nature. The purpose is to sustain the timeless design everywhere in all scales. By causing this transitions the universe maintains the perfect order, where death and decay are the other names of life and growth.



FLUCTUATIONS OF FLOW THROUGH THE UNCHANGING NETWORK

The above images taken from the Jovian north polar storm show how the filaments, which weave the cosmic design, fatten and shrink with the passage of time. When the frames taken at the interval of several days are superimposed over each other one can see the universal pattern, which does not change with time. Only the filaments forming the design oscillate in strengths. These oscillations generate outflow and inflow at the same time.

The universe can be compared with the mythical Phoenix, which rises from its own ashes. It recreates itself at different places by consuming itself at other regions. It dies and regenerates at the same time. Death, here and now, is life there and then. The Phoenix never completely incinerates into ashes, or never can be fully incarnate. It is half ash, and half living at all times. From its ashes it grows as life, while life turns into ashes at the same time. Thus it keeps an eternal balance between death and life. It is its way of creating the universal image in all structures, that it creates. One can see the same Phoenix even in its smallest cells, living and dying in the same way. Thus it sustains an order and a perfection, which suffuses the entire universe.

As said, the universe creates itself from itself. It is a creation process where the universe regularizes all inflows and outflows in such manner that when things flow out from one place, other streams flow into the emptied place in order to bring renewal and reinvigoration of structures once again. While things flow out from a local arena, things return as inflow by passing through intricately intertwined paths in the complex global network. When streams, which flow out, return to reinvigorate the structure, which is expelling material as outflow, the system seeks to self regulate the conditions of its existence. In systems where the amount of outflow is balanced by the amount of inflow, long lasting structure are formed.

The entire universe could be such a system, where the inflow and outflow are critically balanced. The universe self-creates itself by channeling back into itself all that have flown out from it.

So, the universe does not work as a repulsive, or an attractive system alone. It always works by bringing into actions both the repulsive and the attractive forces at the same time. It always, and everywhere, generates attraction and repulsion, which are critically balanced against each other. This repulsive and attractive mechanisms work in the way one may observe it in the dynamics of turbulence.

Turbulence is driven by outflow from the centre, and inflow towards the centre. It follows a universal dynamics, which can be understood by studying the geometric structures of the system. The velocity field, which appears in turbulence, follows the geometric pattern. From studying the geometry one can predict the directions and velocities of the average flows through the pattern observed in one particular scale. In each descending, and ascending scales, the pattern carries the same structure of the velocity field. When one tries to follow a test particle it soon becomes intractable because of the enormous complexity that develops when several scales are resolved in the observations. However, the turbulence can be understood by studying the velocity field, which possesses one to one correspondence with the geometric pattern of the network.

The universe is a critical system finely tuned between attractive and repulsive forces, which generate oscillations between order and chaos. The filaments and knots, which form in the turbulent system, provide the mechanisms of the dynamics which cause the oscillations. The knots act as reservoir of energies, which accumulate inflowing material up to a critical limit. During this period of accumulation, or aggregation the order in the system grows, and the knots evolve from loose or open state to closed and tight systems. This knot tightening brings evolutionary changes in the cosmic objects. However, the knots can not be tightened forever. After reaching a critical point of tightening they break down causing dispersive flows outward. These outward flows throw the system out of its orderly state into disorder. As the disorder grows the system reacts back in order to halt the disorderliness. The system achieves this by generating knots in the system once again. Thus the repulsive flows halt, and the attractive forces set in again. This process repeat and the structures oscillate between order and disorder.

The evolutions and growth, as well as the process of the decay in the universe can be understood from this knot dynamics. The cosmic structures, whether they are planets, or stars, or galaxies, or clusters of galaxies, or superclusters, or clusters of superclusters, all grow, evolve and decay following the same dynamics of the knot tightening and break up. Thus the universe uses a universal mechanism in creating and destroying itself.

This mechanism creates morphological evolutions. When a structure takes its birth, the knot remains as an open agglomeration of filamentary structures spread over the cosmic pattern. As it tightens a three-dimensional knot structure forms at the centre. This 3D-knot remains

enveloped by flatter disk-like structures around it. There exists a very specific evolutionary order, which all cosmic structures follow, as they turn from a two-dimensional disk to a 3D-knot at the centre. This process is universal for all structures in the universe.

The order, which the cosmic structures follow in their evolutions, involves a very particular sequence of steps. At their seeding, the structures are more disorderly, and may appear irregular in their morphologies. As the order increases, the structure develop spiral arms, which emerge as the result of outflow from the centre. As the structure grow further the spiral arms tighten around the central cores, which start forming 3D-knots. The structures grow by accreting material from the surrounding. With it the spiral arms get more and more tightly packed around the central 3D-knot, which become more and more pronounced. Reaching an evolved stage of formation, a set of ring structures develop around the central 3D-structure. The universal cosmic pattern surrounds the centre and holds the rings and the 3D structure, like a mother-of- pearl holding a pearl in its womb.

This “pearl” lies at the heart of a 3D-spiral structure. The three spiral arms, which emerge from the centre, form a 3D- structure resembling a 3D torus knot. Inside this knot lies the “pearl”. In the stellar scale these “pearls” glow as stars surrounded by nebulae. In galaxy scales they appear as bulges at the galactic nuclei. In clusters they are supermassive elliptical galaxies at the hearts of the clusters and so on. Whatever may be the scales of the cosmic structures, the order in which the comic design enwombs rings, which in turn enwombs a 3D-spiral, which in turn holds the “pearl” at its heart, remains universal.

In fact, the universe repeats this process wherever it creates and destroys objects. Like in the evolutionary process of growth, which I have described, the decay of the structures too follow an orderly sequence. After the growth comes to a halt by reaching the critical limit, the structures start decaying. This decay process generates instabilities in the ring structures, because of the intense outflows coming from the centre. The rings break and smoulder, and are dispersed outwards creating a halo of smaller structures which fly around the central bulge, like the globular clusters moving around galactic nuclei. The central knot also breaks down, by ejecting jets in the opposite directions. The heads of these jets are like corks of champaign bottle with two opening mouths blowing in two opposite directions. This process leads to the loosening of the spiral arms, which have remained tightly packed inside. Thus, in such a decay process, one observes expansion of shells. In the stellar world they appear as phenomena known as supernova. Like the stars, the galaxies, clusters, and superclusters too decay in the same way. While they decay the central objects may eject smaller structures. In the galactic scale, these objects appear as high-velocity objects, known as quasars.

The quasars may also break into pieces by ejecting even smaller structures, which in turn can eject even smaller structures and so on. The decay may occur as a cascading chain of breakdown of structures in smaller and smaller scales. The astronomer Halton Arp had first noted this cascading breakdown of structures ejected from the centre of the Seyfert galaxies, and meant that quasars are nothing but structures ejected from galactic nuclei. When such

quasars break apart, they may create enormous outpouring of Gamma-rays. Such quasars, known as BL-Lacerate objects, are the host galaxies where the strongest gamma-ray bursts may occur.

The structures not only break down into pieces, they may also merge together. Smaller structures may merge to form larger pieces. This process of cascading breakdown, as well as merging, are seen in all turbulences in nature. The universe is created by both breakdown into smaller structures and merging of smaller structures into larger units. While somewhere in the global arena it may fall apart into pieces in some other arena it may assemble the fallen pieces into larger structures. Universe works in both ways: while it builds it breaks.

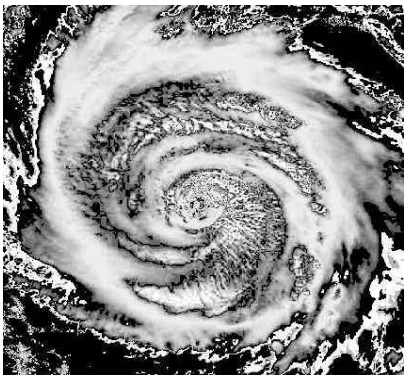
The essence of the structure formation in the universe can be summarized as spiral hierarchy, duality and the dynamics of knot formation. I have already mentioned about the knot dynamics. The duality involves the interactions of two spiral vortices. When two such vortices of equal strengths merge together they generate a structure which consists of shells made of similar left and right side envelopes. These double structures are tied together at the top and the bottom by two complex knots - like ribbons tying two bow shaped structures together into a circular shape. The smaller shells are embedded inside the larger ones, which in turn are embedded inside even larger shells and so on. Each shell structure hides the universal network. Thus the fractal embeds its own replicas in descending scales. At each level of embedding one can observe similar tying of dual envelopes by knots at the top and the bottom. As they evolve the inner shells turn into circular rings, which enwombs the 3D-spiral and the central 3D-knot at the heart of the spiral.

With the evolution of structure, when the central knot tightens, the “ribbons” which bind the dual envelops may break after the critical stage is reached. These knots may blow away from the top and the bottom as cork screws of a champagne bottle. With it, jets blow out in two opposite directions from the centre. This appears to be a generic phenomenon pertaining to the deaths of the cosmic objects in all scales.

The existence of the dual envelopes assures the supply of fuels from one side to the other. The material from one bow shaped structure move over to the other bow shaped envelop, and create motions which resemble a rotational motion of the whole system. It functions like Yin and Yang, which are dependent on each other for their individual existence, and at the same time are inseparable parts of the whole, which is formed by the unity of the two into one. Like this, all structures in the universe are created from duality.

While the disks are made of shells with dual complementary structures, the inner structure at the core may consist of three-armed spiral, which twist to form a 3D-shape, possessing three ejection mouths. In this inner world, the trifoldness may replace the duality. In other words, inside the world bound in the duality there exists a trifold world. This trifold world results from the twisting of three-armed spirals. The x-ray emissions from the heart of the galactic nuclei result from the ejections of material from the mouths of such 3D- structure at the centre. These ejections in turn become the spiral arms of the galaxies.

Much of this mechanism of the formation of the structures by ejections and inflow may be understood as purely kinematic dynamics pertaining to turbulence and the magnetic fields which develop as the results of the motions of the ionized particles. The most central of all is the existence of the spiral in nature. The very existence of the Cosmic Design is synonymous with the existence of this spiral, which decides the destiny of matter and its network in the void. Instead of calling it a spiral force one can also view it as the dynamics generated by the fractal design which exists everywhere in all scales as the unchanging entity, which acts as the foundations of existence of all.



In this universe the so called vacuum is not an empty space devoid of energy or stress. In fact, there exists no such thing as the void which we conceive in the conventional sense. Instead, what exists is an arrangement of different magnitude of stresses in the so-called space. Mathematically such stresses can be described as regions of different singularity strengths. The matter arranges in space according to the singularity strengths existing in different regions. Thus some regions become more filled with matter than other areas, and the arena where the universe exists appears as a network of matter, which is intertwined with void (less filled with matter).

Is the space, the bearer of the geometry, itself the source of the stresses that it generates on matter, or the matter, flowing through the universe, creates the stress and acts as the originator of the geometric pattern? Or, does there exist an external agent which moves through space and generates the stresses, which dictate the matter and the void to arrange with respect to each other to form the universal design? May be it is both - a synthesis of two aspects of the nature as one. One is the form receiving aspect of nature, which, when acted upon by the energy, takes form by developing and distributing stresses in it, and the other is the energy which realizes itself in existence only by acting upon the form receiving medium. In the absence of the one, the other has no reality. So the geometry and the dynamics can not be separated from each other. The Cosmic Design and the Spiral Force are two aspects of the same duality, which lies at the foundation of all existence.

This theory based on the foundation of spiral dynamics and fractal, is very different from the conventional theory which has dominated the understanding of the universe during the twentieth century. In the tables below I have compared the explanations of the cosmic phenomena provided by the models based on the standard cosmology, and this new theory.

About the nature of creation of the universe

The new theory	Conventional theory
1.There does not exist any such entity called time which moves from the beginning to the end. The universe has no beginning, or end. It is a self-created entity which exists in a timeless arena. The experience of time arises due to the observations of the fluctuations caused by perpetual growth and decay, which occur locally everywhere in the universe. These local fluctuations occur in order to sustain the timeless design at all scales and everywhere in the universe. Experience of time is a phenomenon related to the local observer.	1.The time in the universe has started with an explosion. Before that moment nothing can be said about time or the universe. Time moves as an arrow from the past to the future.
2. The physical dimension of the universe has remained the same forever. It was never smaller than what it is now, or will ever be greater than its present size in the future. It is in a stable state of oscillation driven by contraction and expansion occurring at all times.	2. All masses and energies in the universe were concentrated at a singular point when the explosion occurred. After this big-bang the universe has expanded for more than thirteen billions of years before it has reached the present size.
3. The large scale structures like galaxies, clusters, superclusters have existed eternally in the universe. The way we observe the universe today had been the same always. The changes we observe around us are caused by the local fluctuations, which cause death and regeneration everywhere. The universe exists as incarnation of an eternal order, which self-sustains its existence by regenerating itself from its own decay. The structures die and decay and outflows and inflows occur from everywhere with the sole purpose of sustaining the eternal order, which is revealed in the same way in whatever scale one may observe its existence.	3. The universe has evolved from a ball of radiation and elementary particles of immense temperature to the present form where clumps of structures like galaxies, clusters etc. have formed as the result of the expansion, which cooled down the radiation ball and generated condensation of gases into cosmic structures.
4. The universe seen in the visible wavelengths constitutes only a small fraction of the total mass present in the universe. The largest amount of mass remains invisible as radiations and plasma and in the form of very cold non-luminous dark clouds of ordinary gases. There does not exist any dark matter of exotic kind.	4. The nature of expansion of the universe depends on the total amount of mass available in the universe. It is believed that the most amount of mass in the universe remains hidden in the form of dark matter. However, there is no definite clue about the nature of this dark matter. There exist many candidates of dark matters categorized in two main classes: cold dark matter and hot dark matter.
5. The observed recession of the galaxies around us can be explained from the fact, that we find ourselves near the centre of a vortex structure, which we observe as our local universe. The outflowing motions from the centre of the vortex can explain the observed recessions and the peculiar velocities observed.	5. The observed recession of galaxies around us is a proof that the universe must be expanding, as results of the explosion.

New theory	Conventional theory
6. The so called Cosmic Microwave Radiation arises due to the emission from the cold gases which fill our local universe made of several local superclusters.	6. The observed Cosmic Microwave Radiation is a proof of the validity of the big-bang theory. The CMBR is a relic of the primordial fireball, which has cooled down to 3 deg K at present due to the expansion of the universe.
7. The fluctuations in CMBR are caused by the hot plasma in the interclusters and intergalactic medium. The interactions of the emissions from the cold gas with the hot ions cause shifts in radiation temperatures and show up as the observed fluctuations.	7. The fluctuations in the Cosmic Microwave Background Radiation tell us about the initial fluctuations in space-time, which was generated by the primordial explosion, and which got amplified with the expansion, causing inhomogeneties in an originally homogeneous universe.

Large scale structures

New theory	Conventional theory
1. The structures in the universe has formed as the results of both splitting and merging processes, which occur in a turbulent vortex. The universe resembles an inhomogeneous soup made of filamentary and knotty structures. Everywhere and always the filaments and knots undergo dynamic evolutions causing fluctuations everywhere in the universe. The filaments split, bifurcate, coil, form knots as well as different parts of the filaments may merge and form newer filaments. The universe acts like a veritable organic system, where splitting go hands in hands with merging. This vortex universe is made of similar vortices at smaller scales. These smaller vortices are made of even smaller vortices, which in turn are made of even smaller vortices and so on. Thus the existence of smaller and smaller vortices cascade downward in descending scales. The structures we observe in the universe represent these vortices at smaller and smaller scales. They are organized in the same way, whether they are superclusters, clusters, or galaxies or stars, or planets or their moons. All structures can be understood from the point of view of the vortex dynamics.	1. The theory has great difficulties in explaining how the structures may have been formed in the universe. After the universe cooled down sufficiently, the ions could combine to form gases. From this initial gas clouds the structures in the universe have taken their present shapes. The great problem with this theory lies in explaining how an initially homogeneous universe could become so inhomogeneous as we observe. One introduces several unknown parameters like the vacuum energy or cosmological constant, the amount of dark matter of different kinds, and the spectrum of the primordial fluctuations to provide an explanation. Some argue that structures have formed by the splitting of a big clouds into smaller unit as results of gravitational instabilities. Some say that the structures have mainly formed through merging processes. There exists no clear consensus about structure formation.
2. The streaming motions of the superclusters observed in the local universe follows the velocity pattern of motions, which one may observe in the central part of a vortex wall, where materials move along spiral arms in particular directions.	2. The streaming motions of the superclusters towards particular directions are explained as the peculiar motions caused by the gravitational attraction of the superclusters towards huge centres of mass, called attractors. These attractions towards the attractors are believed to be slowing down the expansion of the universe.

New theory	Conventional theory
3. The phenomena of radio ejections, star formations, merging, x-ray structures, temperature profiles of the superclusters can be understood from the point of view of vortex dynamics. The central structures of the superclusters can be explained by the interactions of two spirals, which in turn will show the structure seen in the case of Perseus supercluster, when it has evolved and become more compact. Perseus supercluster reveals the central 3D-spiral at its core.	3. The superclusters are believed to be formed by the merging of galaxy clusters. The supercluster cores also show ejections of radio lobes, temperature drop towards the centre and x-ray emissions arising from shocks. One also observes the presence of star-forming blue galaxies in the central part. The black hole models fail to explain how the hot and cold gases flow in and out, or the accretion and ejections occur at the same time. The observed structure of the most x-ray intense Perseus cluster does not fit into the merging scenario.
4. The velocity profile of the motions of the galaxies in the cluster has a natural explanation in the vortex model.	4. The velocities of the galaxies in the clusters can not be explained without the assumption that most of the matter in the clusters hide as dark matter.

Galaxies

New theory	Conventional theory
1. The galaxies are created as smaller vortices inside larger vortex structures, which appear as clusters. They follow the hierarchical build up of structures seen in the vortex formation. The different morphologies of the galaxies observed in the cosmos can be understood from the way vortices form, grow and decay in nature. It is similar to the seeding of hurricane in the atmosphere, which then evolves as the hurricane grows in strength. The growth proceeds by accreting material from the surrounding. As the vortices evolve they turn from a disk-like flat object to a more three-dimensional round core. At the heart of the vortex structure a wall of rings develop, which define the boundary of the vortex wall. Inside this vortex wall the amount of void increases where the dynamics is driven by a 3D spiral. At the centre of this 3D spiral one can observe a 3D-knot structure, which is the source of ejections from the centre. This vortex model can explain the morphological evolutions of galaxies and the dynamics observed at the galactic nuclei.	1. The galaxies are believed to have formed as the results of density waves compressing the clouds and forming the density distributions, which have caused the appearance of the spiral arms. However, there exists no clear explanation about the origin of the density waves - how the waves are generated first of all. Moreover, there exists no unified theory about the evolution of the galaxies and the different morphologies of galaxies observed in the universe.
2. The velocities observed in the galaxies can be explained without invoking the existence of dark matter. The velocity profiles seen in galaxies of different morphologies follow the evolution of vorticities in the central part. The velocities observed in the spiral or elliptical galaxies can be understood as the evolution of vorticities concentrated at the centre in one case, and vorticities spread outward in the other case.	2. It is believed that similar to the motions of the planets around the sun, the stars studded in the arms of the galaxies rotate in a circular motion around the centre of the galactic nuclei. This motion is caused by the gravitational attraction of the mass concentrated at the centres of the galaxies. However, the velocities observed in galaxies can not be explained by this gravitational model without the assumption that most of the masses of the galaxies lie outside the visible boundaries of the galaxies as haloes of dark matter, which are not observed.

New theory	Conventional theory
3. The non-circular motions at the central parts of the galaxies have a clear explanation in the dynamics of the vortices. In the regions where rings form the motions turn circular. But outside the regions of the rings, the motions should show non-circular behavior, like the observed peculiar velocities in galaxies. In the centre of the rings spiral structures develop which do not show a circular motion.	3. The observed non-circular velocities in galaxies, which are known as peculiar velocities, can not be explained by the standard model of attraction by a central gravitational potential. There also exist examples of counter rotating disks in galaxies, which are difficult to explain in the conventional theories.
4. The galactic wind observed in the galactic centre can be explained as the dynamics of outflow from the central structure as they are seen in the vortices.	4. Within 100 pc of the galactic centre one observes galactic wind, like the coronal wind from the sun. This coronal mass ejection from the galactic centre is explained by the presence of supernovae. The explosions of supernovae are believed to expel the wind from the central part. Supernovae may occur in the regions of high star formation. So the galactic centre must be a place for high star-formation. However, the star formation rate at the galactic centre and the number of supernovae which may explode at the centre fail to account for the galactic wind. Dust temperature of the inner molecular clouds show that they are not thermally heated by star formation.
5. The observed rings which exist around the central region, which is relatively devoid of matter and contains a spiral structure, is a generic phenomenon observed inside the vortex wall. Therefore the phenomena observed at the very heart of the galactic nuclei have clear explanations in the vortex theory.	5. There exists a system of molecular filaments arranged in rings inside a few pc in the centre. These rings in turn are arranged around a central cavity which is relatively devoid of matter. Inside this cavity ionized streams flow in the form of a mini-spiral. This sequence of rings embodying a cavity where the spiral streams flow can not be explained by the conventional theory.
6. The ouflows from the heart of the galactic nuclei can be explained as the magneto-hydrodynamic phenomena in a turbulent vortex of hot plasma, where intense magnetic field has developed.	6. Intense winds blow from the inner mini spiral. These winds are dragged by intense magnetic field of millions of Gauss. There are shells of strong synchrotron radiation which appear to be expanding. These outflows from the centre are explained as caused by stellar explosions.
7. The central supermassive stars arrange themselves along three spiral arms emerging from the centre. They emerge as the results of the outflow from the galactic centre. The outflowing wind impinge on the dense surroundings and create the massive stellar structures.	7. The stellar densities increase towards the centre, which contains massive supergiant stars of young age. The formation of these stars are explained as the results of merging of smaller stars into supermassive entities. At the centre of these massive clusters lie an intense spot of radio emission, which is believed to be centre of the galaxy.

New theory	Conventional theory
8. One can observe a knot structure at the position of the SgrA*, which is the site for intense radio emission. This knot is very similar to 3D structures seen in the hearts of cosmic objects at many other different scales. Here the magnetic field strength is the strongest in the galaxy. The plasma whirl in this magnetic field like in a turbulent vortex driven by the magnetic drag, which causes intense radio emission.	8. The point of intense radio emission does not show emissions in x-rays or other wavelengths and remains hidden from the observational capacities. It is argued that this radio-emission is caused by the presence of a black hole at that position. A black-hole is believed to be devouring matter from the torus formed around it. As ionized gases fall through the intense magnetic field towards the womb of the black hole, they generate radio emissions. However, the presence of supermassive stars, and the intense nuclear wind blowing from the centre, do not fit into the theory of a black-hole at the position of the radio-emission.
9. The Keplerian motion of the star moving around SgrA* is caused by the similar dynamics which turn the planets in the solar system into orbits. The magnetic field generated by the central knot is the cause of the magnetic field drag which is turning the star into its orbit.	9. The motion of a star going around the centre of the strong radio emission in Keplerian orbit is observed. It is interpreted as the proof of the existence of a black-hole at the position of SgrA*. The black-hole is believed to devour material from the companion star which rotates around it.
10. The x-ray emissions observed at the centre of the galaxies mostly come from the regions where the massive supergiant stars are seen to agglomerate. The x-rays are created mostly by shocks generated by the ouflow from the centre towards the surrounding dense medium.	10. One should expect high x-ray emission from the position where a black-hole may exist. The low x-ray emission from SgrA* contradicts the fact.
11. The radio jets that emerge at the galactic nuclei follow the same principle of magnetic interactions as in all other cases where one may observe jets from the centre. It can be understood as magnetic hydrodynamic phenomenon in a turbulence of fast moving plasma, inside which the central object rotates.	11. Radio jets moving at high speed in opposite directions are seen in the nuclei of evolved galaxies. The formation of these jets are explained with a black-hole model. The plasma falling towards the black hole is believed to remain entrapped in a disk around the black-hole, like a magnetosphere trapping the charged ions. This creates a complex entanglement of magnetic lines of force in the disk. By some unknown mechanism this complex entanglement generates the outflow from the disk. With this outflow the magnetic fields untangle themselves and returns to a stable state of rotation around the black hole. The way this entanglement and disentanglement of magnetic field lines may occur can not be explained.
12. In contradiction to the conventional view, there are several examples where one can see that the quasars are objected ejected from the centres of massive galaxies. The high velocities of the quasars arise from the nature of the ejection from the centre. The ejections of these objects occur due to the tightening of the 3D knot structure, which break after reaching a critical stage and then resumes its stability by ejecting high velocity objects from the core. Thus it has a natural explanation in the model of the vortex dynamics. The quasars are not any mysterious super-luminous objects which have risen in the early phase of the creation of the universe.	12. Quasars are star-looking objects generating high energy activities. Some quasar also produce radio jets. They are mostly observed to move with very high velocities. According to the big-bang theory high velocities correspond to larger distances from us. Therefore these quasars are believed to be the objects arising in the very early stage of the formation of the structures in the universe. Since they are very far away, their apparent large luminosities have inspired the theorists with the idea that they must be mysterious objects in the early universe, which produce immense amounts of emissions. The mechanism of these emissions are explained by the presence of supermassive black-holes at their centres.

Stars, supernovae and gamma-ray bursts

New theory	Conventional theory
1. The stars form in cold molecular gases, where turbulence play the major role. In the core of the molecular gases the spirals form and the clouds generate the three armed structures. With the increasing strength of the turbulent clouds inner cores may get ionized and the spiral arms made of molecular ions are entwined with a strong magnetic field. This strong magnetic field drives the formation of the 3D-knot structure, which develops as a star. Accretion driven by the magnetic forces make the star grow, while at the same time, the stars blow out jets along the directions of the magnetic poles. This model of turbulence can explain the observed star formation rate in galaxies.	1.The stars form inside cold dense molecular gas when the densities of the gases become high enough to activate gravitational collapse. As the clouds collapse they heat up and, if the mass of the collapsing cloud is big enough, they may initiate a thermonuclear burning in the core. This sets the stage of the formation of a star, which is called protostar. The protostars then accrete matter from the surrounding clouds by using their powers to attract gases by the gravitational forces, and grow. After some millions of years they develop into stars. However, this model of formation of stars have great difficulties in explaining the rate at which the stars form in galaxies. Star formation is many times less than predicted.
2. All stars develop magnetic fields around them. The magnetic properties of the stars and their rotations decide the formation of the disks around the stars. The spiral magnetic fields may channel the bi-polar flows from the rotating stars into toroidal flow which form the disks. From these disks the stars may accrete matter. Thus outflows from the stars return as inflows to the stars. After a while the outflow and inflow channels both wrap around the inner 3D structure and appear as stars. In such stars one can observe the 3D spiral which blows plasma towards the surface of the stars, from where the plasma returns to the central spiral again.	2. The protostars develop disks around them. The disk material fall into the stars, until all material in the disk are emptied by this process of accretion, or blown away by the fiery stellar winds which increase as the stars grow.
3.The star formation occurs in clouds agitated by the expulsions of material blowing out from the centre of the star forming clouds. The regions, where the outflowing wind strike the surrounding clouds, become the regions where stars take their births. All star formations are associated with outflows from a larger structure, which often reveals 3D spiral formation and its motions.	3. Stars may form as results of supernova explosions, which create shocks in the surrounding gas clouds. The shocks compress the gas and generate the conditions of gravitational condensation.
4. The decays of stars follow the evolutionary sequences of the growth and death as in all comic objects. The outflows from the inner 3D-spiral structure fuel the outer shells, which are formed by two bow shaped envelopes tied by knots at the top and the bottom. These envelops form the surface structures of the stars from where material flow back toward the spiral core. Strong magnetic fields of the stars assures the mechanism of the inflow and the outflow. In more massive stars, where fuels burn faster, this mechanism may get out of balance and the shell formation may get disrupted, which cause cataclysmic changes in the interiors of the stars. These phenomena generate supernovae and hypernovae.	4. The normal stars start dying after all its hydrogen fuel are burnt up, and turned into helium ashes. When the helium burning occurs it becomes very hot and the heat expels the outer shells. The outer shells, as they expand to enormous sizes, cool and the star turns into the phase of a red giant. The outer shells blow away as nebulae and the star shrinks back and becomes a white dwarf. More massive stars face a dramatic fate. They burn quickly and then explode causing supernovae and hypernovae. However, the dynamics of explosion are not understood.

New theory	Conventional theory
5. The type II supernovae are caused when the knots tied at the top and the bottom, and holding the two envelopes in the stars together loosen and the internal structure in the star undergoes a chaotic turmoil. In stronger supernovae the jets blown from the central spiral may completely disrupt the shell structures, as they ply through the stellar interiors. When the knots at the top and the bottom fly away as ejecta from the dying star one may observe the type I supernovae. The knots fly away in two opposite directions as high velocity ejecta while leaving the starry shells to expand. These ejecta are found in regions far from the expanding shells. This scenario is unlike the scenario of core collapse, which is proposed by the conventional theories.	5. Supernovae are classified in two classes: Type I and Type II. The type II occurs in hydrogen rich environment, like in the denser parts of the spiral arms of the galaxies. The type Ia are seen in more metal rich environments, like near the bulges of the galaxies. The type II are understood as the results of fast burning and instabilities generated by large gravitational forces in young stars, which end up in catastrophic explosions. The type I are older stars which have gone through the normal evolution of stars. When such a white dwarf star forms a binary with a red giant, the red giant may devour parts of the white dwarf and increase in mass. When the mass of the giant star crosses a critical limit it may explode and fling the accompanying star into oblivion.
6. The strong gamma-ray bursts and the weak gamma-ray bursts may have different origins. The weak bursts occur at the centres of formation of stellar clusters. When the ejecta moving from the centre slam on the surrounding shells one sees the optical and x-ray flares. On the other hand the stronger bursts occur in BL Lacertae and Blazars, which are high velocity ejecta from the centres of galaxies. The BL Lacs and Blazars are different classes of quasars, which possess very high variabilities in optical, infrared and radio emissions. They are seen in an environment of dwarf blue galaxies, where star formation rates are high. BL Lacs and Blazars themselves eject structures. The strong gamma-ray bursts are phenomena which arise from such ejections.	6. The sudden intense flares of gamma-rays lasting from milliseconds to seconds, which are known as gamma-ray bursts, were first believed to be caused by the merging of neutron stars. After a gamma-burst was detected in a place where a supernova took place, it is now popular to explain the gamma-ray bursts as phenomena associated with hypernovae, caused by the explosions of hypermassive stars. The explosions expose black-holes surrounded by disks and followed by jets. When the jets slam into the surrounding medium they create optical and x-ray flares.

Planetary system and the nature of gravity

New theory	Conventional theory
1. The formation of the planets take place parallely with the formation of the stars. When the inner spiral, which gives rise to a 3D knot, turns into a 3D star, the surrounding material may arrange into ring like shell structures. As the star grows in strength and the stellar wind becomes more and more intense, the rings may become unstable and break into smaller pieces. Except the larger chunks the smaller pieces may blow away, or vaporize in the stellar heat. The larger chunks get trapped in the magnetic field of the star and are dragged by the magnetic forces around the stars. These objects form the planets. They are vortices moving around the star. Such vortices are very efficient separator of dusts, which sink in the cores. As the dust sink deeper the density increases and the dust grains melt and coalesce inside the planets' cores. The temperature increases at the core and heavy elements melt and create a flow of molten lava, which move in spiral form in the interior of the planets. These central lava spiral blow out lava towards the surfaces of the planets. Very similar to the plasma dynamics in the sun, the molten lava, rising to the surface, sinks back towards the core in order to keep the inner dynamo of the planets running without a halt	1. The gravitational force is considered to be the main force behind the formation of the planets around the stars. The planet formation in believed to occur in the disk of gas and dust which form around the protostar. If the protostars' gravitational force accretes the disk material quickly, then no planet will be formed around such stars. In cases where this accretion process proceeds slowly, the tiny grains of dusts in the disk collide with each other to form planetesimals of the sizes of asteroids. Under the gravitational attractions of these rocks the rate of planetesimal growth accelerate. These larger rocks possess gravitational attractions to pull more dusts and gas towards them and thus may merge to form protoplanets. The protoplanets attract gas around them and become large gas planets. The inner planets are results of the merging of rocky pieces. Some collision may also break the rocks into pieces, creating the belts of small rocks and dusts as the asteroid belt in the solar system. This conventional model has very big problem in explaining how the dust grains may create the large rocks. Collisions of objects of the sizes of centimeters and meters should break things apart, instead of coalescing.
2. The planets move through very hazardous environments around the stars. In our planetary system highly turbulent plasma wind blow from the sun's coronal atmosphere and flow towards the planets. The speed of the solar wind increases to millions of kilometers an hour when it reaches the orbits of the planets. This wind creates a spiral plasma sheet, which rotates with the sun, like the water particles moving in a garden sprinkler. The planets are affected by the magnetic pressure and attractive pull, which appears when the magnetic field lines, which form the spiral pattern, are stretched outward. The role of the magneto-hydrodynamic turbulence in the solar system could be more pronounced than so far envisaged.Though planets possess stable orbits and follow Kepler's laws, the solar system could be a chaotic system, where resonances among periodic motions of the planets and their satellites are related to this chaotic dynamics.	2. The force of gravity is believed to be causing the planets to move in orbits around the stars, where turbulence in the interplanetary medium play no role. The observed slowing down of the spacecrafts Pioneer 10 and Pioneer 11, and the bore hole gravitational anomalies observed may indicate the need for a new interpretation of the force of gravity than the conventional notions.
3, The fractal construction of the planetary rings as seen in Saturn may be explained as the rings which form around the central 3D spiral in cosmic structures. which is intimately related to the magnetic field. The spokes and dust ejections from the discs are magnetically driven phenomena.	3. The fractal structures observed in the rings of the giant solar planets have no explanation in the conventional theory based on the idea of the gravitational force.

New theory	Conventional theory
4. The planets are embedded inside spiral structures made of plasma, which are entrapped along the magnetic field lines. The interactions of the rotating poloidal magnetic field and the toroidal magnetic fields around the planets may create rings where motions of several spirals remain hidden.	4.The observed spiral motion in the outer ring of Saturn has no explanation. It is a mystery.
5. The gravity as observed in the atmosphere of the Earth can be simulated by the help of a spherical capacitor. On Earth the ionosphere around it acts as the outer plate while the charged surface of the Earth acts as the inner plate of the capacitor. The atmosphere above the Earth plays the role of the dielectric filling the space between the inner and the outer plates, at different temperatures. The so-called force of gravity could have some relation with the electromagnetic stress which develops in the dielectric medium. The temperature of the plates, the properties of the dielectric medium and the amount of charges on the plates decide the force, which the denser material in the medium feels towards the inner plate. There are claims that one can generate gravitational impulses by rotating high temperature superconductors at very high speed.	5. The force of gravity which we experience in the biosphere where we live, is caused by a fundamental force, which is distinct from the electromagnetic force. This force arises due to the curved dent which Earth has created in the space-time around it. Gravitational fall of an apple means that it is falling freely in a curved four-dimensional space-time. The force of gravity is equivalent to falling freely in an accelerated frame.
6. There exists a correlation between the terrestrial magnetic field anomaly and the gravitational field anomaly both on Earth and the Southern hemisphere of the Mars crust. The correlation of magnetic and gravitational anomalies with the regions of volcanic rocks on Earth and Mars are even more pronounced. The solar eclipses affect Earth's magnetic field as well as cause erratic behavior of Fucault's pendulum. They may indicate a connection between magnetic phenomena and gravity.	6. Conventional theory refutes any possible connection between the electromagnetic field and the gravitational force.

CONCLUSION

The universe has not been born at any particular moment of time, and will not die out after it has existed for a period of time. It has neither any beginning nor end in time. The time, what we observe locally around us by studying motions of things, while they change positions in space, or by observing fluctuations of matter content at a position in space, is bound to a timeless fractal design, which exists everywhere. This design is the foundation of existence of everything in all scales - how small or big the structures may be. Thus behind all happenings in the universe there exists a timeless network of matter and void. Time manifests due to motions and fluctuations occurring in an eternally unchanging fractal network, which is spread in the same way at every corners of the universe. This timeless design is the foundations behind all fluctuations and motions, creating the reality experienced as the flow of time. Things move from place to place, or things grow or die at different places, with the sole purpose of sustaining the unchanging pattern of distribution of matter and void, which imprints the image of the global universe in the local scale. Without this fluctuations and transport there will exist no growth, or decay of things - in other words,

there will exist no life or death. In such a universe, frozen everywhere without any motion or time, there will exist no purpose for things to exist as impotent and sterile beings.

The motions and fluctuations are the signs of its potency to create and destroy and regenerate itself from the ashes of its own death and decay. But, what is the reason of creating itself from itself by sinking and disappearing in itself again and again without any halt? What is the meaning of this perpetual coming and going in the universe?

It is the only way the universe can realize its existence, which is bound into a duality: Universe is neither void, nor it is only filled with matter. It is bound in the void and the matter by forming an entangled network of both, which remains eternally unchanged. By the union of this dual the matter and energy manifest as existence filling the void. One is the form receiving aspect of the existence and the other is the energy which gives form to the formless void. By enacting on the void, the energy in the universe creates the dynamics of its existence, and the reason for its becoming and being. The reason for the universe to exist lies in the presence of the energy and the void that suffuses everywhere. And they exist as dialectally bound dual forming a union which we see as incarnation in all. The duality of form and no-form, energy and void are the foundations on which it has come into form, from a world without any form.

So, the very existence of the energy and the void is the reason behind the perpetual growth and renewal, and death and decay - the foundations of all coming and going which have created an arena of an eternal timeless existence. Without this energy nothing will appear and manifest, even void will not have any reality as a state separate from the beings made of energy and matter. The void realizes itself as the void because the energy manifests in form in the void. Where we see no form we call it a part of the void.

This duality exists, and without it nothing will exist. The existence of the duality is the precursor of the dynamics of the perpetual coming and going. Is the universe caught into a blind trap from which it can not escape? Or is there a purposeful reason behind this ever fluctuating and never halting process of life and death? As said, the universe can only manifest into existence in its duality, which brings dynamics of motions and generations of forms. When manifest the universe realizes itself in a perfect state, where order and chaos, attractions and repulsions, expansions and contractions are inseparable aspects of the same dynamics, which generate the image of the whole into its smallest constituent parts. Thus the purpose of its being is to manifest in all as the eternal unchanging order, which is created from the things it itself creates. In this universe there is no distinction between the creator and the creatures who rise to constitute the creator Itself. In this universe the Creator and the Creatures exist as One.

One may call this state of perfect order, this purposeful dynamics where the whole manifests in all, this self-realization by creating innumerable images of the same in all beings as the state of God.

SPIRAL AT THE HEART OF THE LOCAL UNIVERSE TO THE HEART OF A NEARBY GALAXY

A) Spiral at the heart of the local universe. We are near the center of this spiral where Virgo cluster (V) and the Local supercluster (LS) lie. To the upper left is Shapley supercluster (Sh). To the lower left is Perseus-Pisce supercluster (PP)

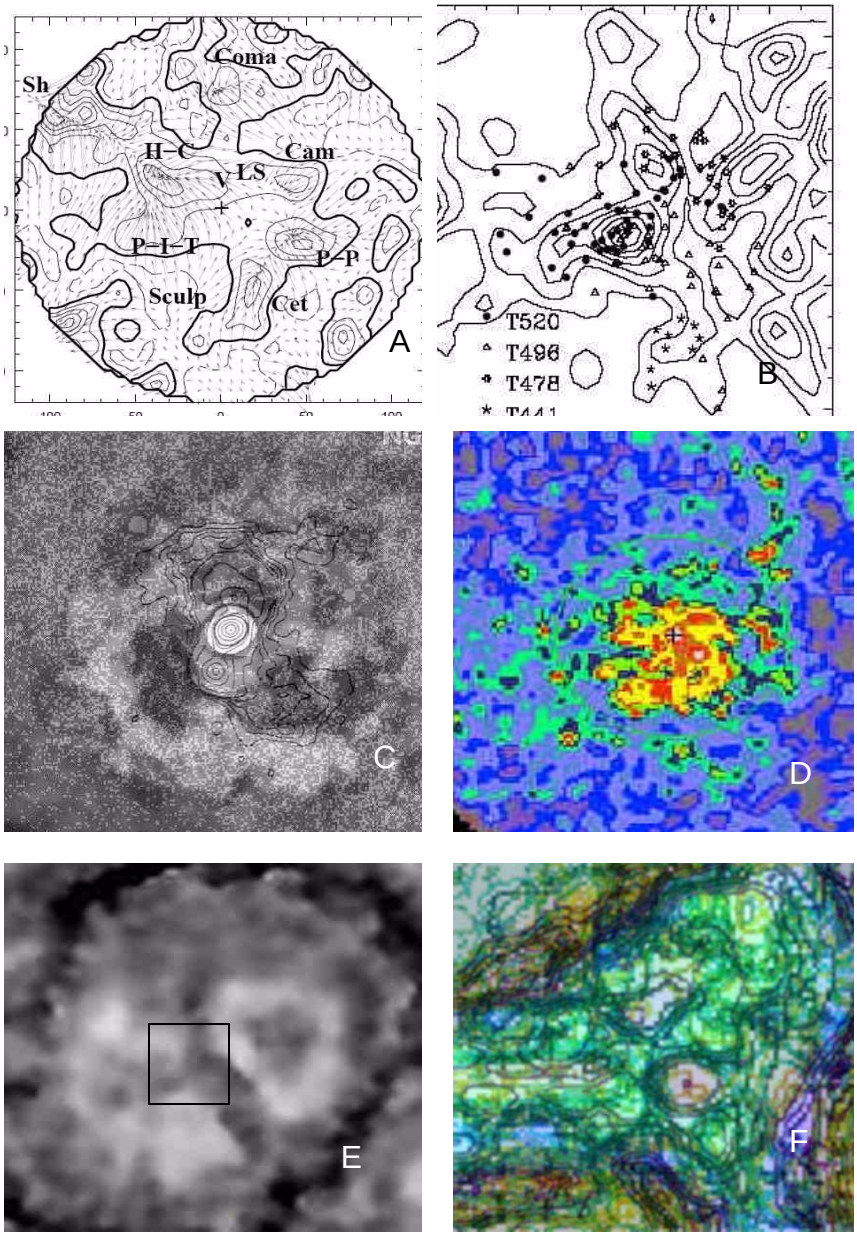
B) Spiral at the centre of the Shapley supercluster. Through the right side arms it is connected to the galaxy cluster Abell 3558 and the left side arm is connected to the galaxy cluster Abell 3562

C) The spiral at the heart of the Perseus superclusters. At the centre is Ngc1275

D) Spiral in the centre of Galaxy cluster Abell 3556

E) Spiral at the centre of the Whirlpool galaxy M51

F) At the heart of the minispiral in M51 there is a mini-mini-spiral encircled by rings. The region in the image corresponds to the black rectangle in the previous image



HERARCHICAL SPIRAL ARRANGEMENTS AT THE CENTRE OF THE MILKY WAY GALAXY

A) A mini-spiral inside a molecular ring at the heart of the MIlky Way galaxy.

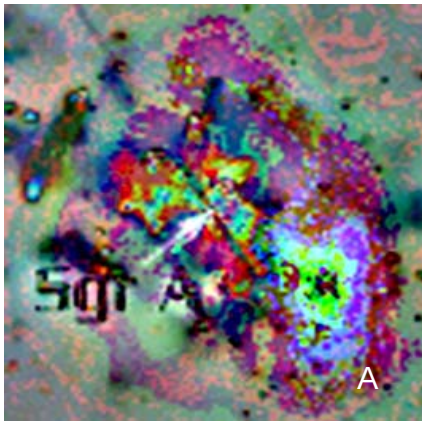
B) Ten times smaller spiral at the heart of the mini-spiral. This central mini-mini-spiral emits strongly in x-rays.

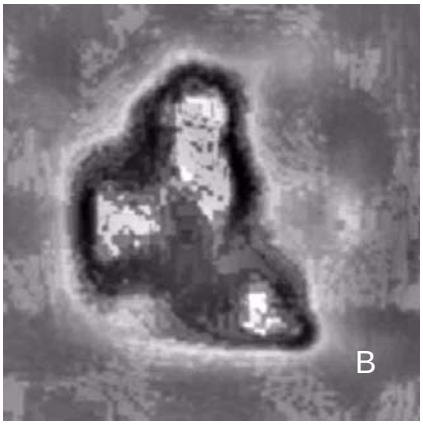
C) An even smaller spiral at the heart of the mini-mini-spiral. It is about ten times smaller than the mini-mini-spiral. The emissions from this spiral are mostly in radio waves. The strong radio-source SgrA* (marked by the cross) lies at the heart of this spiral. It is believed that a black hole may hide at that position.

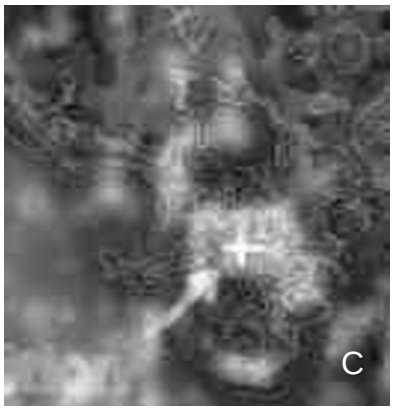
D) A more detailed view of the the same spiral which emerges from the central radio source sgrA*. The exact position of the radio source is marked by two arrows. Supermassive stars surround the centre of this spiral. IRS 16, which is helium star, is seen in the lower left corner.

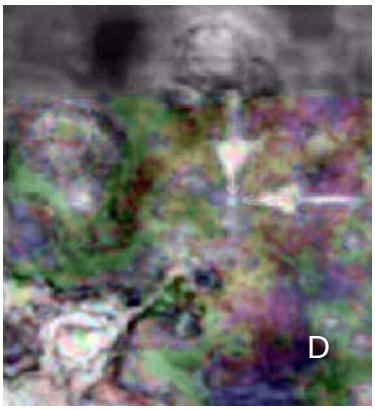
E) The directions and orbits of the motions of the stars near the radio source sgrA*

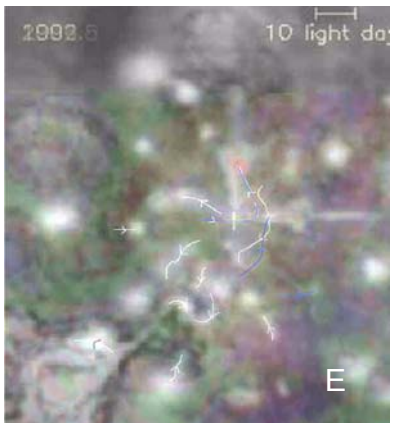
F) The star closest to the radio source is S2. It is seen to move in an orbital path similar to the planets' Keplerian motions. The detailed structure shows that the sgrA source is a 3D knot, which blows jets. The star S2 rotates around this knot structure, which could be a very massive star. There exists no black-hole at this position. The lower part of S2 is visible at the top middle part of the picture.

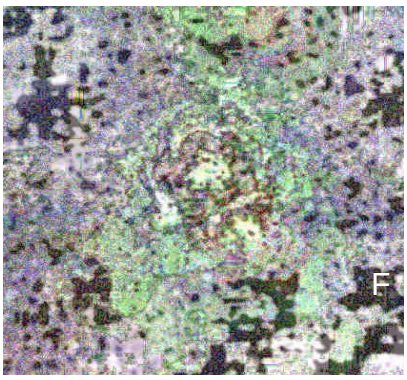












SPIRALS IN STAR, PLANET AND COMET FORMATIION

A) Spiral in the dense molecular clouds in Taurus, which is an efficient region for giving births to stars.

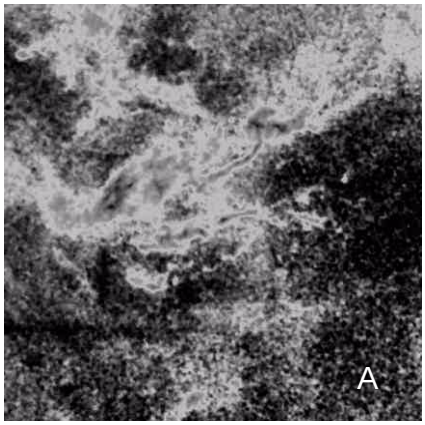
B) Spiral in the young star forming region L1551 in the south of the Taurus cloud complex. In this dark cold region one can observe formation of protostars.

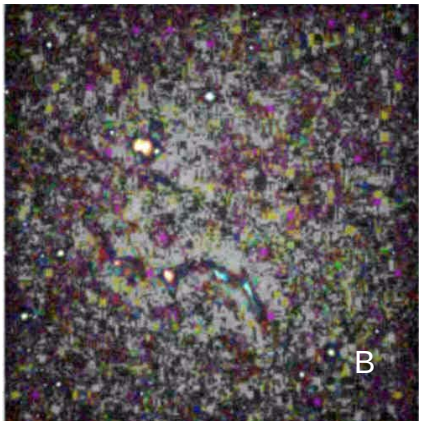
C) A star similar to our sun called GQ Lupi. Here first direct observation of a planet has been made. The position of the planet is in the right hand side (marked by a ring around. The star comprise of a spiral structure at its centre, which is surrounded by rings, which rotate around the central spiral.

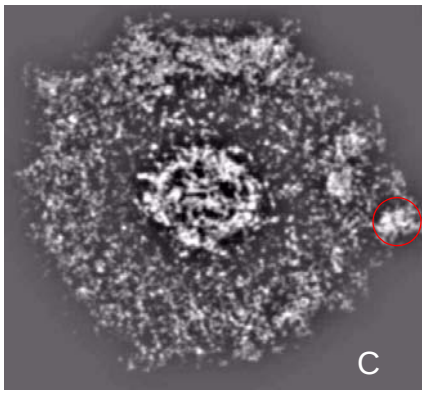
D) A spiral in Jupiter as seen in x-rays. The north and south poles are at the top and the bottom.

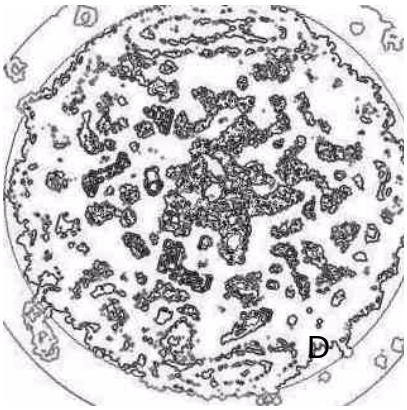
E) Spiral structure in Pluto

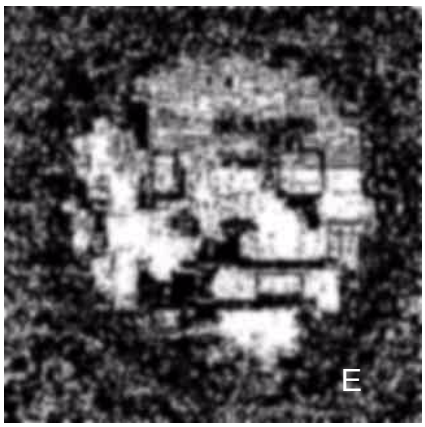
F) The spiral structure at the nucleus of the comet Hale-Bopp. The spiral arms arise due to outflow of gas and dust from the nucleus, which rotates.

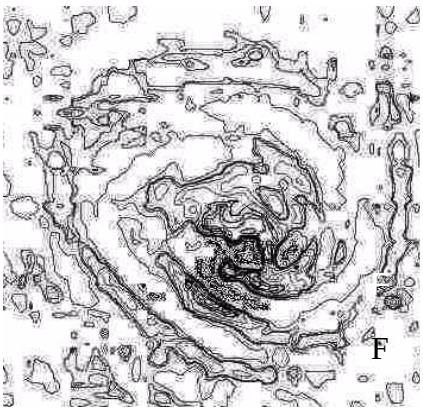












SPIRALS IN TERRESTRIAL ATMOSPHERE

A) Spiral in the centre of turbulence in mesospheric clouds on Earth. Dimension thousands of kilometers.

B) Spiral in the centre of turbulence in stratospheric clouds on Earth. Dimension thousands of kilometers.

C) Spiral at the heart of a hydrospheric turbulence in Andaman Sea causing a devastation in many countries in December 2004. Believed to be generated by an underwater Earthquake. Dimension: several thousand kilometers.

D) Spiral in the lithosphere formed in a metamorphic rock in Himalaya.

E) Spiral in the centre of the turbulence created on the surface of water by the walking of a freshwater spider.

F) The spiral growth of moss in microgravity inside spacecraft. Moss is believed to be sensitive to so-called gravitational force.