ISSN: 2277-5536 (Print); 2277-5641 (Online)

QUANTUM CHAOS AND NON-LINEAR STATISTICAL MECHANICS OF COMPLEX BIS PROCESSES IN THE FOUR DIMENSIONAL WORLD

Deepak Kumar*@, Tuhin Dutta*, Madan Mohan Bajaj* and Sobinder Singh#**

* Department of Physics, Singhania University, Rajasthan, India.

*** Department of Physics and Astrophysics, University of Delhi, Delhi, India

#Department of Applied Sciences, Maharaja Surajmal Institute of Technology, Guru Gobind Singh Indraprastha University, Delhi, India.

(E-mail:*@deepakm256@gmail.com; **tuhindutta38@gmail.com;***madanmohanbajaj@rediffmail.com; ****sobinder_singh@yahoo.co.in)

ABSTRACT

BIS means breakdown of integrated system. EP waves are generated due to the annihilation of living creatures.BIS effect leads to BIS manifold. In simple words, killing of living creatures leads to unexpected serious catastrophes and chaotic situations everywhere. As a consequence the topology of the universe changes. These consequences, we represent by the symbol M and we prounce it as the BIS manifold. BIS manifold is the result of the perturbations, disturbances and destructions created by weak, moderate, strong and extremely strong BIS processes. In our present research paper we will study the statistical mechanics of the complex BIS processes leading to quantum chaos.

KEY WORDS: breakdown of integrated system, EP waves, statistical mechanics.

1 Origin of BIS manifold:

We will now show how the n-dimensional BIS manifold originates.

Suppose n= number of dimensions in which we are studying the impact of BIS processes

m^n=n-dimensional complete minimal immersed submanifold of a complex BIS process in n-dimensional. Euclidean space□ $^{n+p}$

$$\int_m (|\nabla f|^2 - |A|^2 f^2) \geq 0, \forall f E C_0^\alpha (m) \tag{1}$$

(All values of the function f are elements of the set C_0^α of the BIS manifold M)

$\int_m$ =Integral for the BIS manifold

□ =Euclidean space

□$^{n+p}$ =(n+p)-dimensional Euclidean space

n+p = Total number of dimensions.

$m^n(n \geq 3)$= an n-dimensional complete immersed

$\frac{n-2}{z}$ super stable minimal submanifold in an (n+p)-dimensional Euclidean

2 Rigidity of minimal submanifold of BIS processes

In the present work, we shall study the rigidity of minimal BIS submanifolds with flat normal bundle of complex BIS processes.If the second fundamental form of M satisfied some decay conditions, then M is an afine plane or a catenoid in some Euclidean subspace.

3 BIS Processes are very strong. EP Waves penetrate in 4π Geometry

In one or two dimensions, we see their consequences immediately with naked eyes. Only we have to have open and analytic brain and we should not close down our eyes to the fundamental laws of physics (Newton's third law of motion etc.). Impact of BIS processes in 3-dimensions can also be realized by examining the vertical scale.But consequences of BIS processes in n-dimensions are more pronounced.

4 BIS processes in Regional wars and world wars

Wars tells us, what BIS process do in 4-dimensional (x,y,z ict). Let us consider a number δ . If

$$0 \leq \int_m (|\nabla f|^2 - |A|^2 f^2) \geq 0, \forall f E C_0^\alpha (m)$$

If $\delta_1 > \delta_2$, δ -Stable implies, δ_2-Stable
Therefore M is stable means M is δ -stable.
Two conditions, when BIS manifold becomes hyperplane
(i) M is a stable complete miminal hypersurface in (n+1)-dimensional Euclidean space, $\square^{n+p}$

(ii) $$\lim_{R-\alpha} \frac{1}{R^{2+2q}} \int_{\frac{B(2R)}{B(R)}} |A|^2 = 0, \qquad q < \sqrt{\frac{2}{n}}$$

δ -super-stable minimal submanifolds in $\square^{n+p}$ with flat normal bundle.
Three situations when BIS manifold becomes An Affine Plane
Let M^n(n≥3) be a δ -super-stable complete immersed minimal submanifold in $\square^{n+p}$ with flat normal bundle of BIS processes.

(i) If M is $\delta\left(>\frac{n-2}{n}\right)$–super-stable and

$$\lim_{R-\alpha} \frac{1}{R^{2+2q}\delta} \int_{\frac{B(2R)}{B(R)}} |A|^{2\delta} = 0,\ q < \sqrt{\left(\frac{2}{n}-1\right)\delta^{-1}+1}$$

then M = an affine plane.

(ii) If M is $\delta\left(>\frac{n-2}{n}\right)$–super-stable and

$$\lim_{R-\alpha} \frac{1}{R^2} \int_{\frac{B(2R)}{B(R)}} |A|^{\frac{2(n-2)}{n}} = 0,$$

M = a catenoid in some Euclidean subspace = an affine plane.

Let M^n be an n-dimensional minimal immersed submanifold in $\square^{n+p}$. We choose an orthonormal frame e_1, e_2, ...e_{n+p} in $\square^{n+p}$ such that, restricted to M, the vectors e_1, e_2, ..., e_n are tangent to M. And we shall denote the second fundamental form by h_{ij}^{α} Then we have $|A| = \sum (h_{ij}^{\alpha})^2$ and

$$2|A|\triangle|A| + 2|\nabla|A||^2 = \triangle|A|^2 = 2\sum (h_{ij}^{\alpha})^2 + 2\sum (h_{ij}^{\alpha})\triangle h_{ij}^{\alpha} \quad (2)$$

By eq. (3) and (2), we have

$$\sum (h_{ij}^{\alpha})\triangle h_{ij}^{\alpha} = -\sum (h_{ik}^{\alpha}h_{jk}^{\beta} - h_{j}^{\alpha}h_{ik}^{\beta})(h_{il}^{\alpha}h_{jl}^{\beta} - h_{ji}^{\alpha}h_{il}^{\beta}) - \sum h_{ij}^{\alpha}h_{kl}^{\alpha}h_{ij}^{\beta}h_{kl}^{\beta} \quad (3)$$

Let M be an n-dimensional immersed minimal BIS submanifold in $\square^{n+p}$ with flat (n+p)-dimensional Euclidean manifold $\square$ =Eucledean manifold (n+p) = total no. of dimensions.

$$|A|\triangle|A| + |A|^4 \geq \frac{2}{n}|\nabla|A||^2 + E \quad (4)$$

where $E = \sum_{\alpha\neq\beta} (\sum_{i,j} (h_{ij}^{\alpha})^2)(\sum_{i,j} (h_{ij}^{\beta})^2)$ is nonnegative

Since M has flat normal bundle, we have $h_{ik}^{\alpha}h_{jk}^{\beta} - h_{jk}^{\alpha}h_{ik}^{\beta} = 0$ .Therefore, from (2) we obtain

$$\sum (h_{ij}^{\alpha})\triangle h_{ij}^{\alpha} = -\sum h_{ij}^{\alpha}h_{kl}^{\alpha}h_{ij}^{\beta}h_{kl}^{\beta}$$

For each α H_α the symmetric matrix (h_{ij}^{α}), and $S_{\alpha\beta} = \sum h_{ij}^{\alpha}h_{ij}^{\beta}$. Then the (pxp) matrix ($S_{\alpha\beta}$) is symmetric. It can be assumed to be diagonal for a suitable choice of e_{n+1}, ...e_{n+p}. Thus we have from

$$\sum (h_{ij}^{\alpha})\triangle h_{ij}^{\alpha} = -\sum S_{\alpha\alpha}^2 = -\sum_{\alpha}\left(\sum_{i,j}(h_{ij}^{\alpha})^2\right)^2 \quad (5)$$

on the other hand,

$$|A|^4 = (|A|^2)^2 = \left(\sum_{\alpha}\sum_{ij}(h_{ij}^{\alpha})^2\right)^2 = \sum_{\alpha}\left(\sum_{ij}(h_{ij}^{\alpha})^2\right)^2 + E \qquad (6)$$

Hence from (1), (5) and (6) we have

$$2|A|\Delta|A| + 2|\nabla|A||^2 = 2\sum(h_{ijk}^{\alpha})^2 + 2E - 2|A|^4 \qquad (7)$$

Since $\sum\left(h_{ijk}^{\alpha}\right)^2 = |\Delta A|^2$, from the above equality we get

$$|A|\Delta|A| + |\nabla|A||^2 = |\nabla A|^2 + E - |A|^4$$

$$\therefore |\Delta|A||^2 - |\nabla A|^2 = E - |A|^4 - |A|\Delta|A|$$

For M, Xin [13] gave the following estimate:

$$|\nabla A|^2 - |\Delta|A||^2 \geq \frac{2}{n}|\nabla|A||^2$$

Combining with (7), we obtain

$$|A|\Delta|A| + |A|^4 \geq \frac{2}{n}|\nabla|A||^2 + E$$

Proof of Theorem 1.1 for any €>0 and a>0, let $u = \left(|A|^2 + \varepsilon\right)^{\frac{\alpha}{2}}$, then

$$\Delta u = u(\Delta \log u + |\nabla \log u|^2)$$

$$= \frac{au}{2}\left(\frac{\Delta|A|^2}{|A|^2+\varepsilon} - \frac{|\nabla|A|^2|^2}{(|A|^2+\varepsilon)^2}\right) + \frac{ua^2|\nabla|A|^2|^2}{4(|A|^2+\varepsilon)^2}$$

$$= au\left(\frac{½\Delta|A|^2}{|A|^2+\varepsilon} + (a-2)\frac{|A|^2|\nabla|A||^2}{(|A|^2+\varepsilon)^2}\right)$$

$$\geq au\left(\frac{\left(1+\frac{2}{n}\right)\Delta|A||^2 - |A|^4 + E}{|A|^2+\varepsilon} + (a-2)\frac{|A|^2|\nabla|A||^2}{(|A|^2+\varepsilon)^2}\right)$$

$$= -au\frac{(|A|^2+\varepsilon)^2}{|A|^2+\varepsilon} + au\frac{2\varepsilon|A|^2}{|A|^2+\varepsilon} + au\frac{2\varepsilon^2}{|A|^2+\varepsilon} + au\frac{E}{|A|^2+\varepsilon}$$

$$+au\left(\frac{\left(1+\frac{2}{n}\right)(|A|^2+\varepsilon)|\Delta|A||^2 -}{(|A|^2+\varepsilon)^2} + \frac{(a-2)|A|^2|\nabla|A||^2}{(|A|^2+\varepsilon)^2}\right)$$

$$= -au(|A|^2+\varepsilon) + au\frac{E}{|A|^2+\varepsilon} + \left(\frac{2}{n}+a-1\right)au\frac{|A|^2|\nabla|A||^2}{(|A|^2+\varepsilon)^2}$$

$$= +au\frac{2\varepsilon|A|^2}{|A|^2+\varepsilon} + au\frac{2\varepsilon^2}{|A|^2+\varepsilon} + au\frac{\left(1+\frac{2}{n}\right)\varepsilon|\nabla|A||^2}{(|A|^2+\varepsilon)^2}$$

$$\geq -au(|A|^2+\varepsilon)+au\frac{E}{|A|^2+\varepsilon}+\left(\frac{2}{n}+a-1\right)au\frac{|A|^2|\nabla|A||^2}{(|A|^2+\varepsilon)^2} \tag{8}$$

Where we apply (3) in Lemma 1. It follows from (8) by directly computing that

$$u\Delta u \geq -au^{2+\frac{2}{a}}+au^{2-\frac{2}{a}}E+\left(\frac{2}{n}+a-1\right)a^{-1}|\nabla u|^2 \tag{9}$$

Let q≥0 and $f\,\varepsilon C_0^\infty(M)$. Multiplying (9) by $u^{2q}f^2$ and integrating over M, we obtain

$$a\int_M u^{2(1+q)-\frac{2}{a}}f^2E+\left(\frac{2}{n}+a-1\right)a^{-1}\int_M|\nabla u|^2u^{2q}f^2$$
$$\leq a\int_M u^{2(1+q)+\frac{2}{a}}f^2+\int_M u^{2q+1}f^2\Delta u$$
$$=a\int_M u^{2(1+q)+\frac{2}{a}}f^2-2\int_M u^{2q+1}f(\Delta f,\nabla u)$$
$$-(2q+1)\int_M u^{2q}f^2|\Delta u|^2,$$

Which gives

$$a\int_M u^{2(1+q)+\frac{2}{a}}f^2E+\left(2(q+1)-\frac{n-2}{na}\right)\int_M|\Delta u|^2u^{2q}f^2$$
$$\leq a\int_M u^{2(1+q)+\frac{2}{a}}f^2-2\int_M u^{2q+1}f\langle\nabla f,\nabla u\rangle \tag{10}$$

Using the Cauchy-Schwarz inequality, we can rewrite (10) as

$$\left(2(q+1)-\frac{n-2}{na}-\varepsilon'\right)\int_M u^{2q}f^2|\nabla u|^2+a\int_M u^{2(1+q)-\frac{2}{a}}f^2E \tag{11}$$

On the other hand, replacing f by $u^{(1+q)}f$ in the δ-super-stability inequality (4), we have

$$\delta\int_M\left(u^{\frac{2}{a}-\varepsilon}\right)u^{2(1+q)}f^2\leq\delta\int_M|A|^2u^{2(1+q)}f^2$$
$$\delta\int_M\left(u^{\frac{2}{a}-\varepsilon}\right)u^{2(1+q)}f^2\leq\delta\int_M|A|^2u^{2(1+q)}f^2$$

$$\leq 2(1+q)\int_M u^{(2q+1)}f\langle\nabla f,\nabla u\rangle$$
$$\therefore\delta\int_M\left(u^{\frac{2}{a}-\varepsilon}\right)u^{2(1+q)}f^2$$
$$\leq(1+q)(1+q+\varepsilon')\int_M u^{2q}f^2|\nabla u|^2+\left(1+\frac{1+q}{\varepsilon'}\right)\int_M u^{2(1+q)}|\nabla f|^2 \tag{12}$$

(1) When $\delta>\frac{n-2}{n}\,If\,2(q+1)-\frac{n-2}{na}\varepsilon'->0$ then introducing (11) to (13), we obtain

$$\left[\left(2(q+1)-\frac{n-2}{na}-\varepsilon'\right)\delta-(1+q)(1+q+\varepsilon')a\right]\int_M u^{2(1+q)+\frac{2}{a}} f^2$$
$$\leq\left[\left(2(q+1)-\frac{n-2}{na}-\varepsilon'\right)\left(1+\frac{1+q}{\varepsilon'}\right)+\frac{(1+q)(1+q+\varepsilon')}{\varepsilon'}\right]$$
$$x\int_M u^{2(1+q)}|\nabla f|^2+\varepsilon\left(2(q+1)-\frac{n-2}{na}-\varepsilon'\right)\delta\int_M u^{2(1+q)} f^2 \quad (13)$$

(i) If a= δ, taking q < $\sqrt{\left(\frac{2}{n}-1\right)\delta^{-1}}+1$, we see that

$$\left(2(q+1)-\frac{n-2}{n\delta}\right)\delta-(1+q)^2\delta>0, \quad (14)$$

and then we can choose ε >0 sufficiently small so that

$$\left(2(q+1)-\frac{n-2}{n\delta}-\varepsilon'\right)\delta-(1+q)(1+q+\varepsilon')\delta>0,$$

Let $\varepsilon\to 0$, it follows from (14) that for $\sqrt{\left(\frac{2}{n}-1\right)\delta^{-1}}+1$ the following inequality holds:

$$\int_M u^{2(1+q)+\frac{2}{\delta}} f^2 \leq C^1\int_M u^{2(1+q)}|\nabla f|^2, \quad (15)$$

where C_1 is a constant that depends on n, ε' and q. We now try to transform (15) the right hand side involved u in the power two. For that, we use Young's inequality:

$$ab\leq\frac{\beta^s a^s}{s}+\frac{\beta^{-t}b^t}{t},\frac{1}{s}+\frac{1}{t}=1, \quad (16)$$

where β>0 is arbitrary and 1<s<∞,1<t<∞. Let r, 0<r<2+2q, be a number yet to be determined. By using (16) we obtain

$$u^{2+2q}|\nabla f|^2=f^2\left(u^{2+2q}\frac{|\nabla f|^2}{f^2}\right)=f^2\left(u^{2+2q-r}u^r\frac{|\nabla f|^2}{f^2}\right)$$
$$\leq f^2\left(\frac{\beta^s}{s}u^{s(2+2q-r)}+\frac{\beta^{-t}}{t}\left(u^r\frac{|\nabla f|^2}{f^2}\right)^t\right)$$

(17)

We now choose r to satisfy the following equations:

$$s(2+2q-r)=2+2q+\frac{2}{\delta},rt=2,\frac{1}{s}+\frac{1}{t}=1$$

This is indeed possible, and the solution is

$$r=\frac{2}{1+q\delta},t=1+q\delta,s=\frac{1+q\delta}{q\delta}$$

Using these values and the fact the β may be made small, from (15) and (17) we obtain

$$\int_M u^{2+2q+\frac{2}{\delta}} f^2\leq C_2\int_M u^{2\frac{|\nabla f|^{2+2q\delta}}{f^2q^{\delta}}} \quad (18)$$

ISSN: 2277-5536 (Print); 2277-5641 (Online)

Where C_2 is a constant that depends on n, **ε’**,β and q. Now we use the arbitrariness of f to replace f by $f^{1+q\delta}$ in (18) and obtain

$$\int_M u^{2+2q+\frac{2}{\delta}} f^{2+2q\delta} \le C_3 \int_M u^{2|\nabla f|^{2+2q\delta}}$$

(19)

Let f be a smooth function on (0,∞) such that f ≥ 0, f =1 on [0, R] and f=0 in [2R,∞] with $|f'| \le \frac{2}{R}$. Then considering f o r, where r is the function in the definition of B(R), we have from (19)

$$\int_{B(R)} u^{2+2q+\frac{2}{\delta}} \le \frac{4C_3}{R^{2+2q\delta}} \int_{B(2R)\setminus B(R)} u^2 \qquad (20)$$

Let $R \to +\infty$ by assumption that $\lim R \to \infty \frac{1}{R^{2+2q\delta}} \int_{B(2R)\setminus B(R)} |A|^{2\delta} = 0$, from (20) we conclude |A|=0, i.e., M is an affine plane.

(ii) If $a = \frac{n-2}{n}$, taking q=0, we see that

$$\left(2(q+1) - \frac{n-2}{na}\right)\delta - (1+q)^2 a > o,$$

and then we can choose ε’>0 sufficiently small so that

$$\left(2(q+1) - \frac{n-2}{na} - \varepsilon'\right)\delta - (1+q)(1+q+\varepsilon')a > o, \qquad (21)$$

Let $\varepsilon \to 0$, it follows from (14) that the following inequality holds:

$$\int_M u^{2+\frac{2n}{n-2}} f^2 \le C_4 \int_M u^{2|\nabla f|^2}$$

where C_4 is a constant that depends on n, ε’. Under the assumption that $\lim R \to +\infty \frac{1}{R^2} \int_{B(2R)\setminus B(R)} |A| \frac{2(n-2)}{n} = 0$, from (21) we conclude that |A|=0, i.e., M is an affine

(iii) When $\delta = \frac{n-2}{n}$

Multiplying (10) by (1+q) and adding it up with (12), we obtain

$$(1+q)\left((1+q) - \frac{n-2}{na}\right)\int_M u^{2q} f^2 |\nabla u|^2 + a(1+q)\int_M u^{2(1+q)-\frac{2}{a}} f^2 E$$

$$\le (a(1+q)-\delta)\int_M u^{2(1+q)+\frac{2}{a}} f^2 + \int_M u^{2(1+q)} |\nabla f|^2 + \varepsilon\delta\int_M u^{2(1+q)} f^2 \qquad (22)$$

If (1+q) $a = \frac{n-2}{n}$, from (22) we obtain

$$\frac{n-2}{n}\int_M u^{2(1+q)-\frac{2}{a}} f^2 E \le \int_M u^2 |\nabla f|^2 + \varepsilon\delta\int_M u^2 f^2 \qquad (23)$$

Taking f as before, we have from (2.23)

$$\frac{n-2}{n}\int_{B(R)} u^{2(1+q)-\frac{2}{a}} E \le \frac{4}{R^2}\int_{B(2R)\setminus B(R)} u^2 + \varepsilon\delta\int_{B(2R)} u^2 \qquad (24)$$

If |A|>0, let $\varepsilon \to 0$ and then $R \to +\infty$, by assumption that $\lim R \to \infty \frac{1}{R^2}\int_{B(2R)/B(R)} |A| \frac{2(n-2)}{n} = 0$.From (24) we conclude that E=0. Then we obtain $\sum_{i,j} (h_{ij}^{\alpha})^2, \alpha = n+1, n+2, \ldots\ldots., n+p$ at least have p-1 zeros by (6). So it is easy to see from a theorem of [5] that M lies in a totally geodesic $\mathbb{R}^{n+1} \to \mathbb{R}^{n+p}$. Hence M is an $\frac{n-2}{n}$ stable complete minimal hypersurface in $\mathbb{R}^{n+1}$. Therefore we obtain *M* is a catenoid in some Euclidean subspace or an affine plane according to Theorem 3.1 in [11].

CONCLUSION

We have mathematically discussed the origin and topology of the BIS manifold in four dimensions. Successfully, the conditions under which the BIS manifold becomes hyperplane or affine plane have been derived. Using Cauchy-Schwarz’s inequality the structure of the BIS manifold has been designed and modified. Afterwards, using δ super-stability inequality the statistical processes occurring in the BIS space have been discussed.The role played by the BIS momenta on the macroscopic scales has been asserted qualitatively and quantitatively.

ACKNOWLEDGEMENTS

We are grateful to the Vice Chancellor of Delhi University for providing adequate research facilities in the campus. We pay our sincere gratitude to the Vice- Chancellor of Singhania University and the head of the department of Physics , Maharaja Surajmal Institute of technology, IP university for their great support in our research work.

REFERENCES

Cheng X and Zhou DT, Manifolds with weighted Poincare inequality and uniqueness of minimal hypersurfaces, *Comm.Anal. Geom.* **17**(2009)1-16.

Chern S S, do Carmo M and Kobayashi S. (1970). Minimal submanifolds of a sphere with second fundamental form of constant length, Functional Analysis and Related Fields, pp. 59-75 (Springer-Verlag) (1970).

Do Carmo M and Peng C K, (1970). Stable complete minimal surfaces in $\mathbb{R}^3$ are planes, *Bull, Am. Math. Soc.* 1: 903-906.

Do Carno M and Peng C K, (1982). Stable complete minimal hypersurfaces, Proceedings of the 1980 Beijing Symposium on Differential Geometry and Differential Equation, Vol.3 (Beijing, 1980) pp. 1349-1358 (Beijing: Sciences Press).

Erbacher J. (1971). Reduction of the codimension of an isometric immersion, *J. Diff. Geom.* **5**:333-340.

Fischer-Colbrie D and Schoen R, The structure of complete stable minimal surfaces in 3-manifolds of nonnegative scaler curvature, *Comm. Pure, Appl. Math.* 33 (1980) 199-211.

Fu H. P. (2010). Minimal submanifolds with flat normal bundle, *Kodai Math.* J. **33**:211-216.