

Number of microstates of dark DNAs in extra dimensions for normal and cancerous cells

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Recently, Hargreaves (*New Scientist*, Volume 237, Issue 3168, March 2018, Pages 29-31) has argued that some animal genomes seem to be missing certain genes, ones that appear in other similar species and must be present to keep the animals alive. He called these apparently missing genes by dark DNA. On the other hand, Sepehri and his collaborations (*Open Physics*, 16(1), pp. 463-475) has discussed that some biological events like DNA teleportation and water memory may be due to existence of some extra genes in extra dimensions. Collecting these results, we can conclude that origin of some cancers may be evolutions of dark DNA in extra dimension. To show this, we propose a model for calculating number of microstates of a DNA for a chick embryo in extra dimension and compare with experimental data. We show that number of microstates in extra dimension for a normal chick embryo is less than number of microstates for a cancerous chick embryo. In fact, extra microstates are transformed to four dimensions.

Keywords: Cancer, Dark DNA, extra dimensions, Water

I. INTRODUCTION

Recently, Hargreaves and his colleagues have encountered a dark part of DNA when sequencing the genome of the sand rat (*Psammomys obesus*), a species of gerbil that lives in deserts. In particular they wanted to study the gerbils genes related to the production of insulin, to understand why this animal is particularly susceptible to type 2 diabetes. But when they looked for a gene called Pdx1 that controls the secretion of insulin, they found it

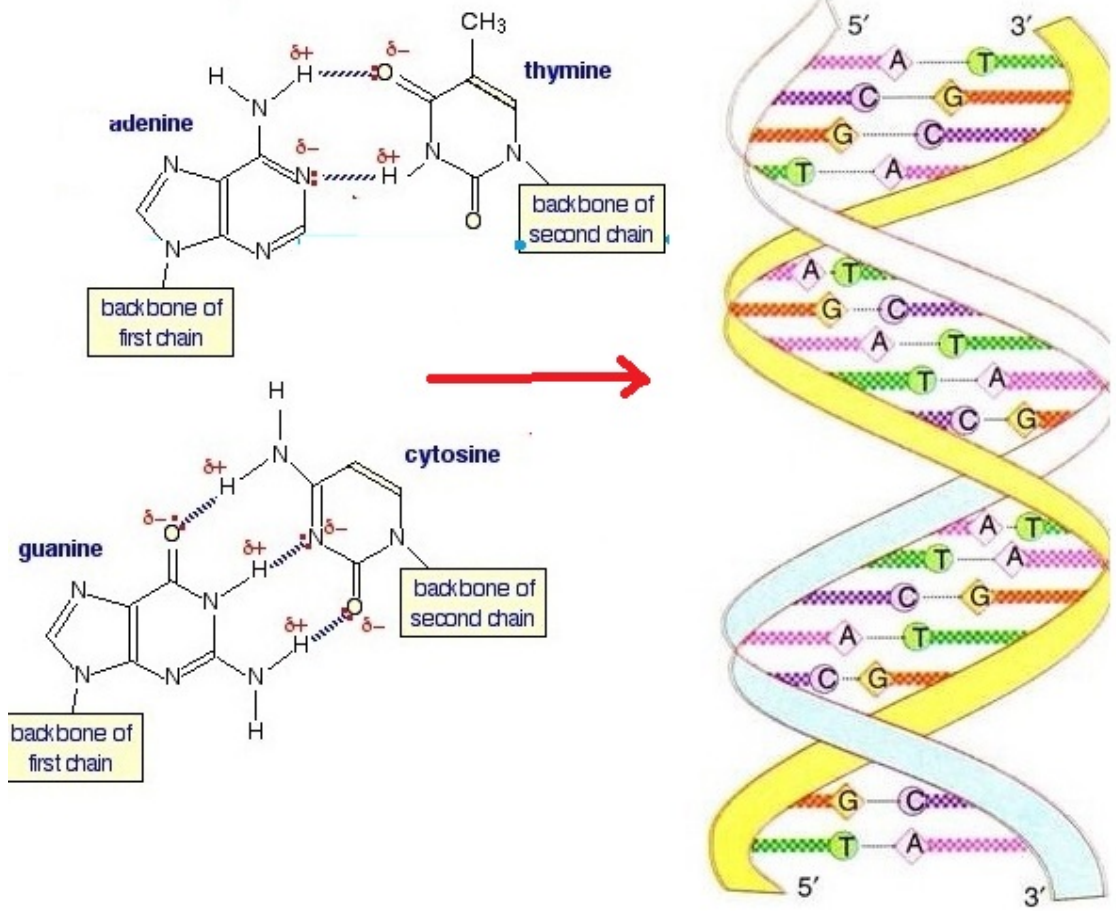
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was missing, as were 87 other genes surrounding it. Some of these missing genes, including Pdx1, are essential and without them an animal cannot survive. The first clue was that, in several of the sand rats body tissues, they found the chemical products that the instructions from the missing genes would create. This would only be possible if the genes were present somewhere in the genome, indicating that they werent really missing but just hidden [1, 2]. So where are they? We can response to this question in extra dimensions. Until now, some investigations have bben done on the effects of extra genes in extra dimensions. For example, it has been shown that DNA teleportation is possible if DNA, water and wave be $4 + n$ -dimensional objects [3]. Also, molecules of water could be able to store information if they have DNA-like structures in extra dimensions. On the other hand, these genes in extra dimension could act like the receiver or sender of waves and exchange information with genes in four dimensions [4]. And finally in one of newest works, it has been shown that compacting DNA with 7 meter long in a very small place leads to the emergence of curved space-time around it. Then, using the concept of 11-dimensional black branes, the relation between Tsallis -entropy of DNA-Branes exterior and interior of sheel for chick embryo has been calculated [5]. Motivated by these researches, we conclude that origin of dark DNAs could be explored in extra dimensions. These dark DNAs communicate with other genes in four dimensions and control evolutions of body. If some of these genes in extra dimensions become destroyed, some deseases like cancer may be emerged. To observe the effects of these genes in extra dimensions, we consider evolutions of number of microstates of DNA for normal and cancerous chick embryos. We show that for cancerous chick embryos, some microstates are transformed from extra dimensions to four dimensions.

The outline of the paper is as follows. In section II, we will propose a mathematical model for calculating number of microstates in extra dimensions. In section III, we propose an experimental method for obtaining number of microstates of cancerous and normal DNAs in extra dimensions for chick embryo.

II. NUMBER OF MICROSTATES OF DARK DNAS IN EXTRA DIMENSIONS

In this section, we will obtain the relation between non-linear fields, area of DNA and entropy in four and extra dimensions. To this aim, we should consider evolutions of parameters of DNA. Each DNA is constructed from hexagonal and pentagonal manifolds (See figure1).



1.jpg

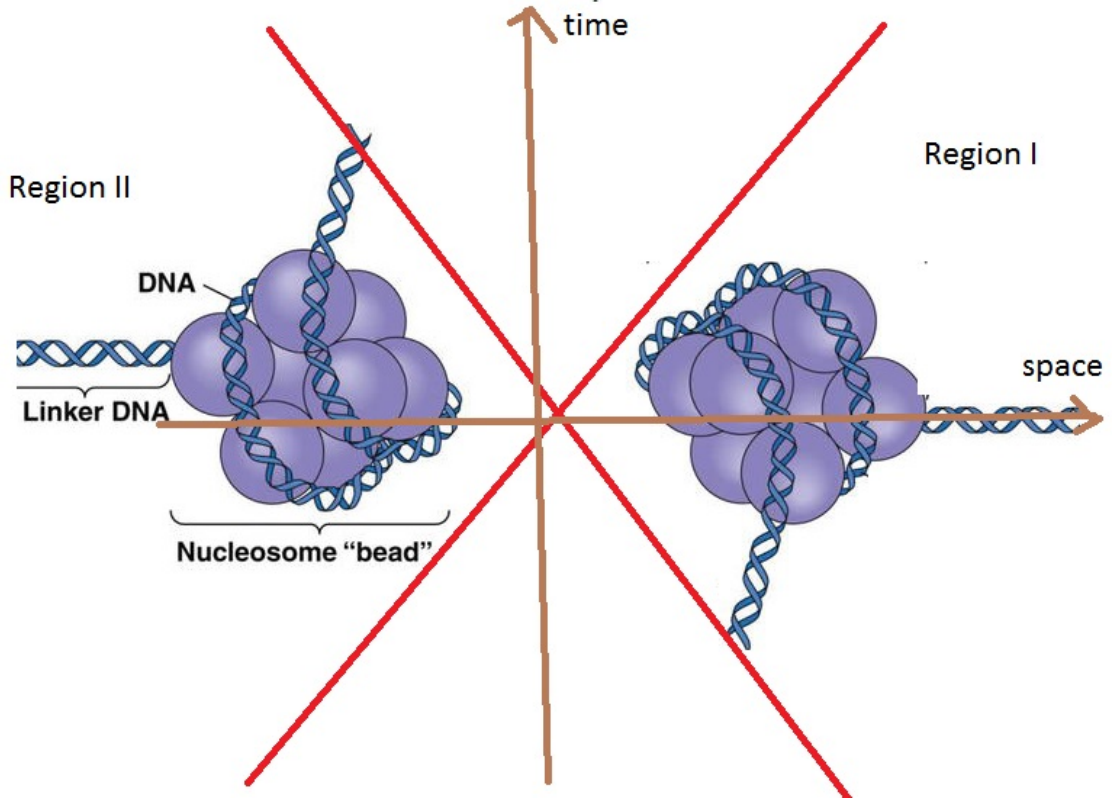
FIG. 1: A DNA is formed from joining hexagonal and pentagonal molecules.

We show that non-linear fields lead to the acceleration of DNA and emergence of two regions of a Rindler space-time. Consequently, two DNAs are emerged that parameters of DNA in each region acts reverse to parameters of DNA in another region (See figure 2). Previously, it has been shown that the metric of a thermal DNA in 10-dimensional space-time is given by [3–7]

$$ds^2 = D^{-\frac{1}{2}} H^{-\frac{1}{2}} (dx_2^2 + dx_3^2) + D^{\frac{1}{2}} H^{-\frac{1}{2}} (-f dt^2 + dx_1^2) + D^{-\frac{1}{2}} H^{\frac{1}{2}} (f^{-1} dr^2 + r^2 d\Omega_5^2) \quad (1)$$

where

$$f = 1 - \frac{r_0^4}{r^4} \quad H = 1 + \frac{r_0^4 \sinh^2 \alpha}{r^4} \quad D = \cos^2 \epsilon + \sin^2 \epsilon H^{-1} \quad (2)$$



2.jpg

FIG. 2: Compacted DNA in a Rindler space-time.

and

$$\cosh^2 \alpha = \frac{3 \cos \frac{\delta}{3} + \sqrt{3} \cos \frac{\delta}{3}}{2 \cos \delta} \quad \cos \epsilon = \frac{1}{\sqrt{1 + \frac{K^2}{r^4}}} \quad (3)$$

The angle δ is defined as:

$$\cos \delta = \bar{T}^4 \sqrt{1 + \frac{K^2}{r^4}} \quad \bar{T} = \left(\frac{9\pi^2 N}{4\sqrt{3}T_{D3}} \right)^{\frac{1}{2}} T \quad (4)$$

Now, we can obtain metrics of thermal DNAs in non-flat space-time. In fact, we want to consider effects of non-linear fields on this metric. These non-linear fields lead to the acceleration of DNA and emergence of a Rindler space-time. To this aim, we begin with the action of three dimensional manifold:

$$S_3 = -T_{tri} \int d^3\sigma \sqrt{\eta^{ab} g_{MN} \partial_a \phi^M \partial_b \phi^N + 2\pi l_s^2 G(F)}$$

$$\begin{aligned}
G &= \left(\sum_{n=1}^3 \frac{1}{n!} \left(-\frac{F_1 \dots F_n}{\beta^2} \right) \right) \\
F &= F_{\mu\nu} F^{\mu\nu} \quad F_{\mu\nu} = \partial_\mu A_\nu - \partial_\nu A_\mu
\end{aligned} \tag{5}$$

where g_{MN} is the background metric, $\phi^M(\sigma^a)$'s are scalar fields, σ^a 's are the DNA coordinates, $a, b = 0, 1, \dots, 3$ are world-volume indices of time dependent DNA and $M, N = 0, 1, \dots, 10$ are eleven dimensional spacetime indices. Also, G is the nonlinear field [3] and A is the photon which exchanges between charged particles. First, we describe a non-thermal DNA in a flat space-time and use of below metric for bulk:

$$ds^2 = -dt^2 + dr^2 + r^2 \left(d\theta^2 + \sin^2\theta d\phi^2 \right) + \sum_{i=1}^6 dx_i^2 \tag{6}$$

Using this metric, we can write below relations between coordinates of bulk and DNA [6]:

$$t(\sigma) = \tau \quad r(\sigma) = \sigma, \quad x_1(\sigma) = z \tag{7}$$

Using above relations, for this DNA in flat space time, the action is given by [3, 4]:

$$S = - \int d\sigma \sigma^2 \sqrt{1 + z'^2 - 2\pi l_s^2 G(F)} \tag{8}$$

For this action, it has been asserted that momentum density is given by [3, 4]:

$$\Pi = \frac{2\pi l_s^2 G'(F) F_{01}}{\sqrt{1 + z'^2 - 2\pi l_s^2 G(F)}} \tag{9}$$

where ' denotes the derivative respect to the field (F). On the other hand, it has been asserted that there is a relation between momentum density and σ [3, 4]:

$$\Pi = \frac{K}{\sigma^2} \tag{10}$$

Using equations (9 and 10) and assuming ($z' \ll G(F)$), we can obtain :

$$\sigma = \left[\frac{\sqrt{1 - 2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \quad (11)$$

Above equation shows that coordinates of DNA depend on non-linear fields and increase by increasing the strength of fields. We also obtain the acceleration, with taking derivative of above coordinate respect to time:

$$a = \frac{d^2\sigma}{dt^2} = \left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1 - 2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \quad (12)$$

Above equation shows that acceleration of DNA has a direct relation with non-linear fields which live on it. This acceleration leads to the emergence of a rindler space-time. In these conditions, the relation between the world volume coordinates of the DNA (τ, σ) and the coordinates of Minkowski space-time (t, r) are [3–5];

$$\begin{aligned} at &= e^{a\sigma} \sinh(a\tau) & ar &= e^{a\sigma} \cosh(a\tau) & \text{In Region I} \\ at &= -e^{-a\sigma} \sinh(a\tau) & ar &= e^{-a\sigma} \cosh(a\tau) & \text{In Region II} \end{aligned} \quad (13)$$

Now, we can obtain metric of a thermal DNA in non-flat space-time. Replacing acceleration by non-linear fields in equation (12), we can rewrite equation (13) as:

$$\begin{aligned} \left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1 - 2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] t &= e^{\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1 - 2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma} \sinh(a\tau) \\ \left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1 - 2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] r &= e^{\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1 - 2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma} \cosh(a\tau) & \text{In Region I} \\ \left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1 - 2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] t &= -e^{-\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1 - 2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma} \sinh(a\tau) \\ \left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1 - 2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] r &= e^{-\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1 - 2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma} \cosh(a\tau) & \text{In Region II} \end{aligned} \quad (14)$$

Above equation shows that non-linear fields change coordinates of space-time, leads to the acceleration and produce two different regions in a new Rindler space-time. Thus, metric changes and a new metrics in regions I and II are emerged.

Substituting equation (14) in equation (1), we obtain:

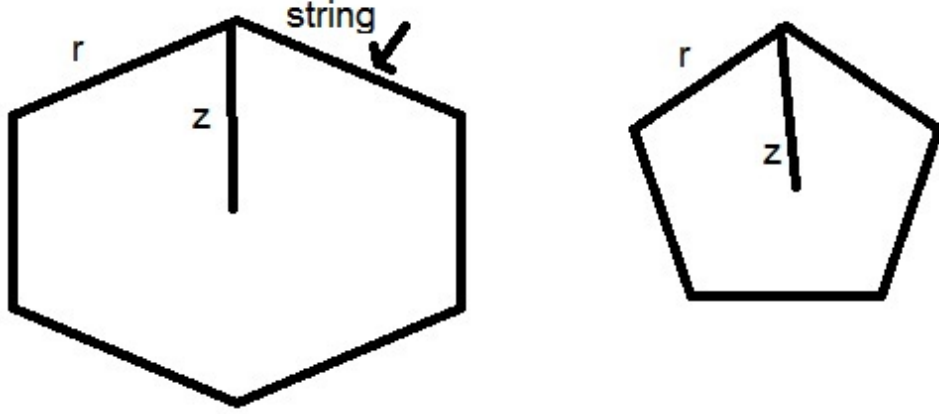


FIG. 3: The hexagonal molecule of a DNA.

$$\begin{aligned}
ds_{I,A,thermal}^2 &= D_{I-A}^{\frac{1}{2}} H_{I-A}^{-\frac{1}{2}} f_{I-A} \times \\
&\left(e^{2\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\sigma} + \frac{1}{\sinh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau\right)} \left(\frac{dz}{d\tau}\right)^2 \right) d\tau^2 - \\
&D_{I-A}^{-\frac{1}{2}} H_{I-A}^{\frac{1}{2}} f_{I-A}^{-1} \times \\
&\left(e^{2\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\sigma} + \frac{1}{\cosh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau\right)} \left(\frac{dz}{d\sigma}\right)^2 \right) d\sigma^2 + \\
&\frac{1}{\sinh\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau\right) \cosh\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau\right)} \left(\frac{dz}{d\tau} \frac{dz}{d\sigma}\right) d\tau d\sigma + \\
&D_{I-A}^{-\frac{1}{2}} H_{I-A}^{\frac{1}{2}} \left(\frac{1}{\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]} e^{\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\sigma} \cosh\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau\right) \right)^2 \times \\
&\left(d\theta^2 + \sin^2\theta d\phi^2 \right) + \\
&D_{I-A}^{-\frac{1}{2}} H_{I-A}^{-\frac{1}{2}} \sum_{i=1}^5 dx_i^2 \tag{15}
\end{aligned}$$

$$\begin{aligned}
ds_{II,A,thermal}^2 &= D_{II-A}^{\frac{1}{2}} H_{II-A}^{-\frac{1}{2}} f_{II-A} \times \\
&\left(e^{-2\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\sigma} + \frac{1}{\sinh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau\right)} \left(\frac{dz}{d\tau}\right)^2 \right) d\tau^2 -
\end{aligned}$$

$$\begin{aligned}
& D_{II-A}^{-\frac{1}{2}} H_{II-A}^{\frac{1}{2}} f_{II-A}^{-1} \times \\
& \left(e^{-2\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma} + \frac{1}{\cosh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau\right)} \left(\frac{dz}{d\sigma}\right)^2 \right) d\sigma^2 - \\
& \frac{1}{\sinh\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau\right) \cosh(a\tau)} \left(\frac{dz}{d\tau} \frac{dz}{d\sigma}\right) d\tau d\sigma + \\
& D_{II-A}^{-\frac{1}{2}} H_{II-A}^{\frac{1}{2}} \left(\frac{1}{\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right]} e^{-\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma} \cosh\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau\right)} \right)^2 \times \\
& \left(d\theta^2 + \sin^2 \theta d\phi^2 \right) + D_{II-A}^{-\frac{1}{2}} H_{II-A}^{-\frac{1}{2}} \sum_{i=1}^5 dx_i^2 \tag{16}
\end{aligned}$$

where

$$\begin{aligned}
f_{I-A} &= 1 - \frac{\left(e^{\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma_0} \cosh\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau_0\right) \right)^4}{\left(e^{\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma} \cosh\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau\right) \right)^4} \\
H_{I-A} &= 1 + \frac{\left(e^{\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma_0} \cosh\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau_0\right) \right)^4 \sinh^2 \alpha_{I-A}}{\left(e^{\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma} \cosh\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau\right) \right)^4} \\
D_{I-A} &= \cos^2 \epsilon_{I-A} + \sin^2 \epsilon_{I-A} H_{I-A}^{-1} \tag{17}
\end{aligned}$$

$$\begin{aligned}
f_{II-A} &= 1 - \frac{\left(e^{-a\sigma_0} \cosh(a\tau_0) \right)^4}{\left(e^{-a\sigma} \cosh(a\tau) \right)^4} \\
H_{II-A} &= 1 + \frac{\left(e^{a\sigma_0} \cosh(a\tau_0) \right)^4 \sinh^2 \alpha_{II-A}}{\left(e^{a\sigma} \cosh(a\tau) \right)^4} \\
D_{II-A} &= \cos^2 \epsilon_{II-A} + \sin^2 \epsilon_{II-A} H_{II-A}^{-1} \tag{18}
\end{aligned}$$

and

$$\cosh^2 \alpha_{I-A} = \frac{3 \cos \frac{\delta_{I-A}}{3} + \sqrt{3} \cos \frac{\delta_{I-A}}{3}}{2 \cos \delta_{I-A}}$$

$$\cos \epsilon_{I-A} = \frac{1}{\sqrt{1 + \frac{K^2}{\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right]^{-1} e^{-\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma} \cosh(a\tau) \right)^4}} \quad (19)$$

$$\begin{aligned} \cosh^2 \alpha_{II-A} &= \frac{3 \cos \frac{\delta_{II-A}}{3} + \sqrt{3} \cos \frac{\delta_{II-A}}{3}}{2 \cos \delta_{II-A}} \\ \cos \epsilon_{II-A} &= \frac{1}{\sqrt{1 + \frac{K^2}{\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right]^{-1} e^{a\sigma} \cosh(a\tau) \right)^4}} \end{aligned} \quad (20)$$

The angles δ_{I-A} and δ_{II-A} are defined by:

$$\begin{aligned} \cos \delta_{I-A} &= \bar{T}_{0,I-A}^4 \sqrt{1 + \frac{K^2}{\left(a^{-1} e^{-\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma} \cosh\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau\right) \right)^4}} \\ \bar{T}_{0,I-A} &= \left(\frac{9\pi^2 N}{4\sqrt{3}T_{D3}} \right)^{\frac{1}{2}} T_{0,I-A} \end{aligned} \quad (21)$$

$$\begin{aligned} \cos \delta_{II-A} &= \bar{T}_{0,II-A}^4 \sqrt{1 + \frac{K^2}{\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right]^{-1} e^{a\sigma} \cosh\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau\right) \right)^4}} \\ \bar{T}_{0,II-A} &= \left(\frac{9\pi^2 N}{4\sqrt{3}T_{D3}} \right)^{\frac{1}{2}} T_{0,II-A} \end{aligned} \quad (22)$$

where T_0 is the temperature of the DNA in non-Rindler space-time. Above equations show that metric of thermal DNA depends on the evolutions of non-linear fields. In fact, evolutions of non-linear fields have a direct effect on thermodynamics of DNA. Following the method in [3–5], we can obtain the separation distances between center and molecules in a pentagonal or hexagonal molecule (See figure 3):

$$\begin{aligned} dz_{I-A} = dz_{II-B} &\simeq \left(e^{-4\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma} \sinh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau\right) \cosh^2(a\tau) \right) \times \\ &F_{DBI,I,A}(\tau, \sigma) \left(\frac{F_{DBI,I,A}(\tau, \sigma)}{F_{DBI,I,A}(\tau, \sigma_0)} - e^{-4a(\sigma - \sigma_0)} \frac{\cosh^2(a\tau_0)}{\cosh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau_0\right)} \right)^{-\frac{1}{2}} \\ &\left(\frac{F_{DBI,I,A}(\tau_0, \sigma)}{F_{DBI,I,A}(\tau_0, \sigma_0)} - e^{-4\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] (\sigma - \sigma_0)} \frac{\cosh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau_0\right)}{\cosh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau\right)} \right)^{-\frac{1}{2}} \\ &\frac{\sinh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \tau_0\right)}{\sinh^2(a\tau)} \end{aligned} \quad (23)$$

or

$$\begin{aligned}
dz_{I-B} &= dz_{II-A} \simeq \\
&\left(e^{4\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\sigma} \sinh^2\left(\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\tau\right) \cosh^2\left(\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\tau\right) \right) \times \\
&\left(\frac{F_{DBI,II,A}(\tau, \sigma) \left(\frac{F_{DBI,II,A}(\tau, \sigma)}{F_{DBI,II,A}(\tau, \sigma_0)} - e^{4\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right](\sigma-\sigma_0)} \frac{\cosh^2\left(\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\tau_0\right)}{\cosh^2(a\tau)} \right)^{-\frac{1}{2}}}{F_{DBI,II,A}(\tau_0, \sigma) \left(\frac{F_{DBI,II,A}(\tau_0, \sigma)}{F_{DBI,II,A}(\tau_0, \sigma_0)} - e^{4\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right](\sigma-\sigma_0)} \frac{\cosh^2\left(\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\tau_0\right)}{\cosh^2\left(\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\tau\right)} \right)^{-\frac{1}{2}}} \right. \\
&\left. \frac{\sinh^2\left(\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\tau_0\right)}{\sinh^2(a\tau)} \right)^{-\frac{1}{2}} \tag{24}
\end{aligned}$$

with the definition of $F_{DBI,I,A}$ given below:

$$\begin{aligned}
F_{DBI,I,A} &= F_{DBI,II,B} = \left(\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]^{-1} e^{\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\sigma} \times \right. \\
&\left. \cosh\left(\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\tau\right) \right)^2 \frac{4 \cosh^2 \alpha_{I-A} - 3}{\cosh^4 \alpha_{I-A}} \\
F_{DBI,II,A} &= F_{DBI,I,B} = \left(a^{-1} e^{-\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\sigma} \times \right. \\
&\left. \cosh\left(\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\tau\right) \right)^2 \frac{4 \cosh^2 \alpha_{II-A} - 3}{\cosh^4 \alpha_{II-A}} \tag{25}
\end{aligned}$$

These separation distances depend on the nonlinear magnetic fields and temperature. When, the separation distance in one region grows, the separation distance in another region decreases. Now, we calculate the area of a thermal DNA by using equations (23,24 and 14):

$$\begin{aligned}
A_{I-A,5} &= A_{II-B,5} = \int \frac{5}{2} r_{I-A} dz_{I-A} = \int \frac{5}{2} r_{II-B} dz_{II-B} = \\
&\int d\sigma \left[\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]^{-1} e^{\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\sigma} \cosh(a\tau) \right] \times \\
&\left(e^{-4\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\sigma} \sinh^2\left(\left[\frac{d^2}{dt^2}\left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F)F_{01}}\right]^{\frac{1}{2}}\right]\tau\right) \cosh^2(a\tau) \right) \times
\end{aligned}$$

$$\begin{aligned}
& F_{DBI,I,A}(\tau, \sigma) \left(\frac{F_{DBI,I,A}(\tau, \sigma)}{F_{DBI,I,A}(\tau, \sigma_0)} - e^{-4a(\sigma - \sigma_0)} \frac{\cosh^2(a\tau_0)}{\cosh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau\right)} \right)^{-\frac{1}{2}} \\
& \left(\frac{F_{DBI,I,A}(\tau_0, \sigma) \left(\frac{F_{DBI,I,A}(\tau_0, \sigma)}{F_{DBI,I,A}(\tau_0, \sigma_0)} - e^{-4\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right](\sigma - \sigma_0)} \frac{\cosh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau_0\right)}{\cosh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau\right)} \right)^{-\frac{1}{2}}}{\sinh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau_0\right)} \right)^{-\frac{1}{2}} \\
& \frac{\sinh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau_0\right)}{\sinh^2(a\tau)} \right)^{-\frac{1}{2}} \tag{26}
\end{aligned}$$

or

$$\begin{aligned}
A_{II-A,6} &= A_{I-B,6} = \int 3r_{II-A} dz_{II-A} = \int 3r_{I-B} dz_{I-B} = \\
& \int d\sigma \left[\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right]^{-1} e^{-\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma} \cosh(a\tau) \right] \times \\
& \left(e^{4\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \sigma} \sinh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau\right) \cosh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau\right) \right) \times \\
& \left(\frac{F_{DBI,II,A}(\tau, \sigma) \left(\frac{F_{DBI,II,A}(\tau, \sigma)}{F_{DBI,II,A}(\tau, \sigma_0)} - e^{4\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] (\sigma - \sigma_0)} \frac{\cosh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau_0\right)}{\cosh^2(a\tau)} \right)^{-\frac{1}{2}}}{F_{DBI,II,A}(\tau_0, \sigma) \left(\frac{F_{DBI,II,A}(\tau_0, \sigma)}{F_{DBI,II,A}(\tau_0, \sigma_0)} - e^{4\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] (\sigma - \sigma_0)} \frac{\cosh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau_0\right)}{\cosh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau\right)} \right)^{-\frac{1}{2}}} \right)^{-\frac{1}{2}} \\
& \frac{\sinh^2\left(\left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1-2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}}\right]^{\frac{1}{2}}\right]\tau_0\right)}{\sinh^2(a\tau)} \right)^{-\frac{1}{2}} \tag{27}
\end{aligned}$$

Above equation shows that area of thermal accelerating DNAs depend on the nonlinear fields which live on them. These electromagnetic fields lead to the acceleration of DNA. This acceleration produces a Rindler space-time with two regions. The area of a DNA in region I expands, while, the area of a DNA in region II decreases.

To calculate total area of a DNA, we should sum over areas of hexagonal and pentagonal manifolds in four and extra dimensions in region I and region II.

$$A_{DNA} = A_{I-A,DNA} + A_{II-A,DNA} \tag{28}$$

where

$$A_{I-A,DNA} = \sum_{i=1}^M \left([A_{I-A,6, \text{fourdimension}} + A_{I-A,5, \text{fourdimension}}] + \right.$$

$$[A_{I-A,6,extradimension} + A_{I-A,5,extradimension}]) \quad (29)$$

$$A_{II-A,DNA} = \sum_{i=1}^M \left([A_{II-A,6,fourdimension} + A_{II-A,5,fourdimension}] + [A_{II-A,6,extradimension} + A_{II-A,5,extradimension}] \right) \quad (30)$$

where M is the number of molecules. This area depends on temperature and nonlinear fields. In a biological system like a cell, DNA is compacted four times around various axes and temperature is very large. This causes that total area of DNA grows and achieve to large values.

Each rotating DNA radiates a wave which it's frequency is equal to rotating velocity of DNA. If this wave achieves to a metal, leads to the motion of it's electrons and production of a current. We can write:

$$P_{radiation,DNA} = \rho I_{Current,DNA}^2 = \frac{d^2\sigma}{dt^2} = \left[\frac{d^2}{dt^2} \left[\frac{\sqrt{1 - 2\pi l_s^2 G(F)}}{2\pi l_s^2 G'(F) F_{01}} \right]^{\frac{1}{2}} \right] \quad (31)$$

By replacing above relation in equation (28),we can obtain area of a DNA in terms of current. Above equation shows that area of a DNA has a relation wit current which is produced by it's wave in a metal. This help us to measure area f a DNA by evolutions of currents in a lab. Also, Tsallis and Cirto have argued that the entropy of a gravitational system such as a black brane could be extended to the non-additive entropy, which is given by $S = \gamma A^\beta$, where A is the horizon area [8]. We can write:

$$\bar{S}_I = \gamma A_{DNA}^\beta \quad (32)$$

Above equation shows that entropy of a DNA has a relation wit current which is produced by it's wave in a metal. This help us to measure entropy of a DNA by evolutions of currents in a lab. On the other hand, entropy has a relation with number of microstates of a DNA:

$$\bar{S}_I = K_B \log(\Omega_{DNA}) \quad (33)$$

Using equations (2, 32 and 33),we obtain number of microstates of a DNA in terms of current:

$$\begin{aligned}
\Omega_{DNA} &= \frac{1}{K_B} e^{\gamma_{DNA}^{A\beta}} = \\
&= \frac{1}{K_B} e^{\gamma_{I-A,DNA,4-dimensions}^{A\beta}} e^{\gamma_{II-A,DNA,4-dimensions}^{A\beta}} \times \\
&= e^{\gamma_{I-A,DNA,extra-dimensions}^{A\beta}} e^{\gamma_{II-A,DNA,extra-dimensions}^{A\beta}} = \\
&= \Omega_{I-A,DNA,4-dimensions} \Omega_{II-A,DNA,4-dimensions} \times \\
&= \Omega_{I-A,DNA,extra-dimensions} \Omega_{II-A,DNA,extra-dimensions}
\end{aligned} \tag{34}$$

Above equation shows that total number of microstates depends on the number of microstates in four and extra dimensions and in region of I and II of DNA. This number helps us to obtain the exact number of microstates of a DNA in term of currents in a lab. When a DNA rotate, it radiates a wave. This wave leads to motion of electrons in a wire and a current is emerged. This current gives exact information about evolution of a DNA.

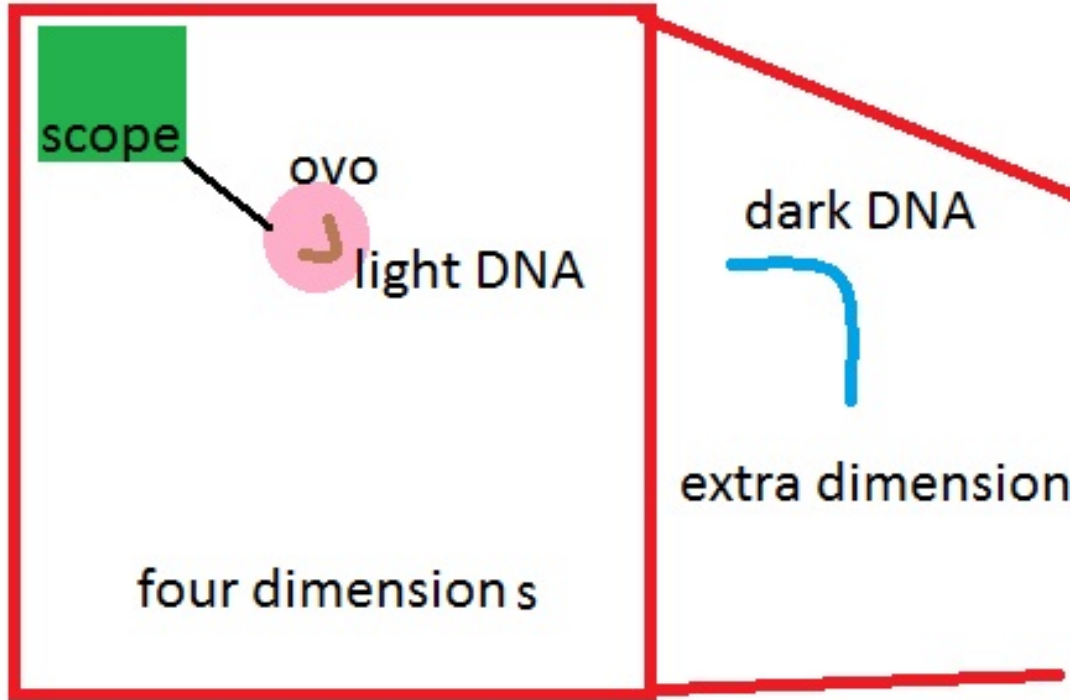


FIG. 4: Connecting DNAs of chick embryos to scopes.

III. EXPERIMENTAL RESULTS

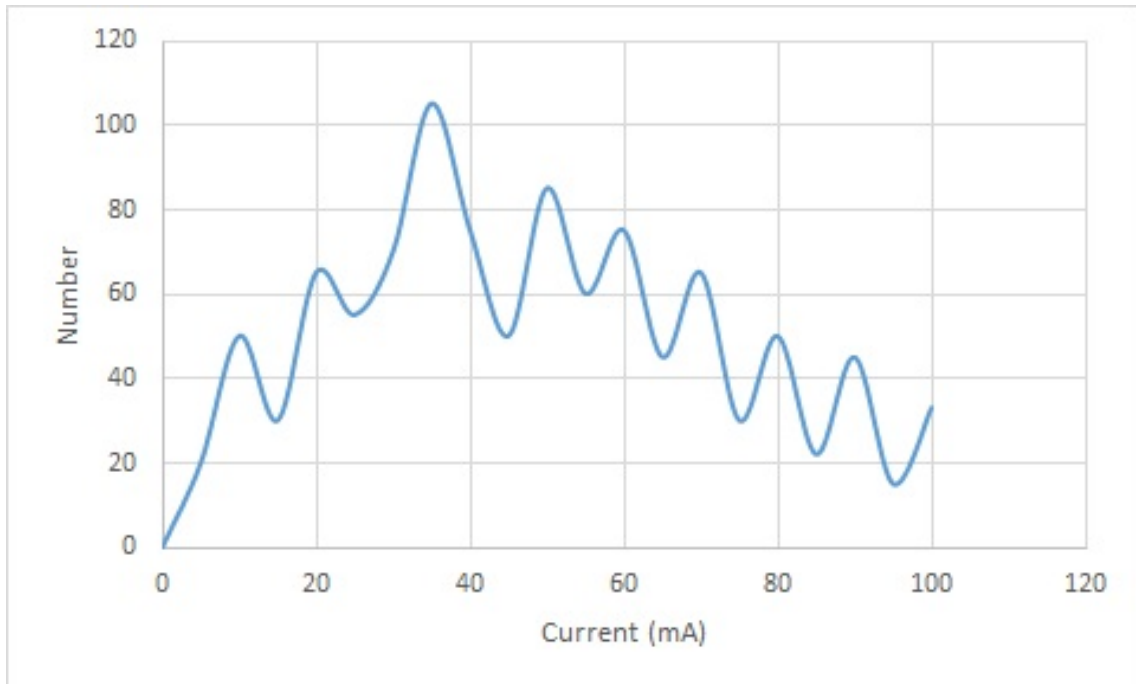


FIG. 5: Number of microstates for DNAs of normal chick embryos.

To examine the model, we count number of microstates in terms of currents for two types of chick embryos, one related to normal cells and another related to cancerous cells. We connect chick embryos to an scope and analyze datas (See figure 4). In figure 5, we show number of microstates in terms of currents for a normal chick embryo. It is clear that number of microstates is low for lower and higher values of currents and has a pick around middle currents. In figure 6, we show number of microstates in terms of currents for a cancerous chick embryo. This number is more than number of microstates for normal chick embryos. This is because that some numbers are transformed from extra dimensions into four dimensions.

IV. SUMMARY AND DISCUSSION

Recently, Hargreaves [1] discovered a new part of DNA which includes missing genes. He called this part as a dark DNA and showed that this part is the main responsible for producing chemical products which are essential and without them an animal cannot survive.

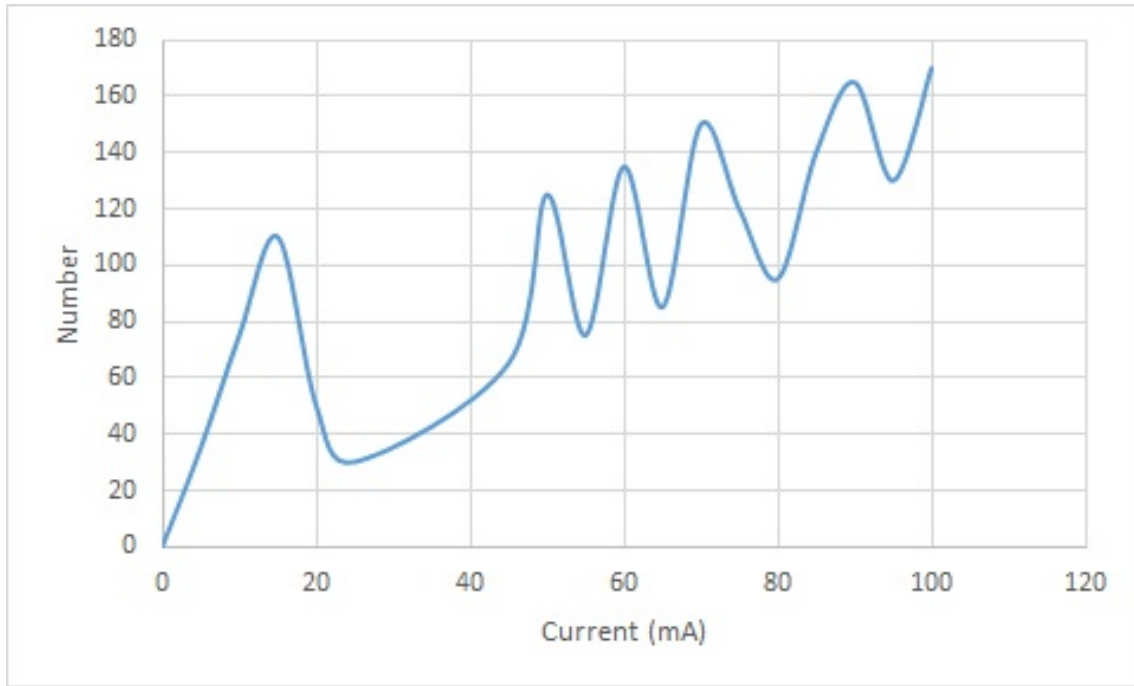


FIG. 6: Number of microstates for DNAs of cancerous chick embryos.

In this paper, using the concepts of $4+n$ -dimensional DNA in [3], we have explored the origin of dark DNA in extra dimension and proposed a model for it. We have shown that missing genes that are needed for the continuity of the animal's life may be discovered in extra dimensions. In our model, total number of microstates of DNA on a 11-dimensional manifold is constant, however by the emergence of cancer, some of microstates are transformed from extra dimensions to four dimensional manifold. We test the model for normal and cancerous chick embryo and found that it works.

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