A New and Sound Way of Making Physics; Explicit Calculation of the Probabilities within the Unit Cell

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Abstract: The picture we have given in our previous work is debugged and clarified [1]. The probabilities are calculated with the help of Python and Pyplot. The results are interpreted and a possible scheme to explain the dual character of the electric force is intuitively described.

1. Introduction

We came to this point through a definite way whose cornerstones cited below, while the related explicit references are to be found in [1]:

- Due to the fact that the predictions of the Holy Books, as depicted in Figure 1, seem to be being realized, there is a certain probability for us being created by an Intelligent Designer. That we need to know better via physics the natural philosophy.

Figure 1: Scientific fact that reminds us of the predictions made in Holy Books.

- Physics the math has brought us to claim all things around us are illusions which is very probably an improper claim. We need to try to revitalize classics as done previously, though only to a certain extent possible at that time, which Figure 2 tries to stimulate.

UNIVERSITY OF BERN

06 June, 1907

Dear Mr. Einstein,

Your application for the Doctorate has not been successful at this time and as such you are not eligible for the position of Associate Professor.

While you posed an interesting theory in your article publishe in "Annalen der Physik", we feel that your conclusions about the nature of light and the fundamental connection between spa and time are somewhat radical. Overall, we find your assumptio to be more artistic than actual Physics.

Sincerely yours,

Professor Wilhelm Heinrich, Ph.D.
Dean of Sciences

Figure 2: Grounded evaluation of modern theories by a fake letter. The letter is/may be fake, but the history of the Nobel Price Einstein got and many other quotes induces similar thoughts.

- Even the classics made a necessary for their time error, treating the charges and the fields as separate entities. The dual character of electric forces was a real hard nut.

We previously proposed a model the characteristics of which are summarized below [1]:

- Vacuum is a place in which an enormous number of datoms , Democritus' atoms, though not in the exact sense due to the fact that they are indistinguishable hard spheres moving in the space with the speed of light.
- Particles are stable forms consisting of a great deal of datoms interacting with the field around by constantly emitting and absorbing datoms. They are created in very high datom densities, stay stable at certain densities and do harmonically expand and shrink, exhausting their rest masses at each expansion and reconstructing themselves at each shrink.
- Fields are vector probability fields of datoms, changing structure in presence of a particles.
- Phases of oscillations of particles are quantized, +'s oscillate simultaneously and so are –'s with 180 degrees phase difference with respect to the +'s. That is all plus signed particles expand and shrink simultaneously and minus signed expand as plus signed shrink.
- Motion of particles is cellular, i.e. also quantized.

There remains of course a good deal of questions, the first one regarding the stability of the particles, followed by their structure and the structure of their near fields. This is hopefully to be answered in the future.

Regarding attractive and repulsive forces our proposal is given with a mechanical analog in Figure 3.

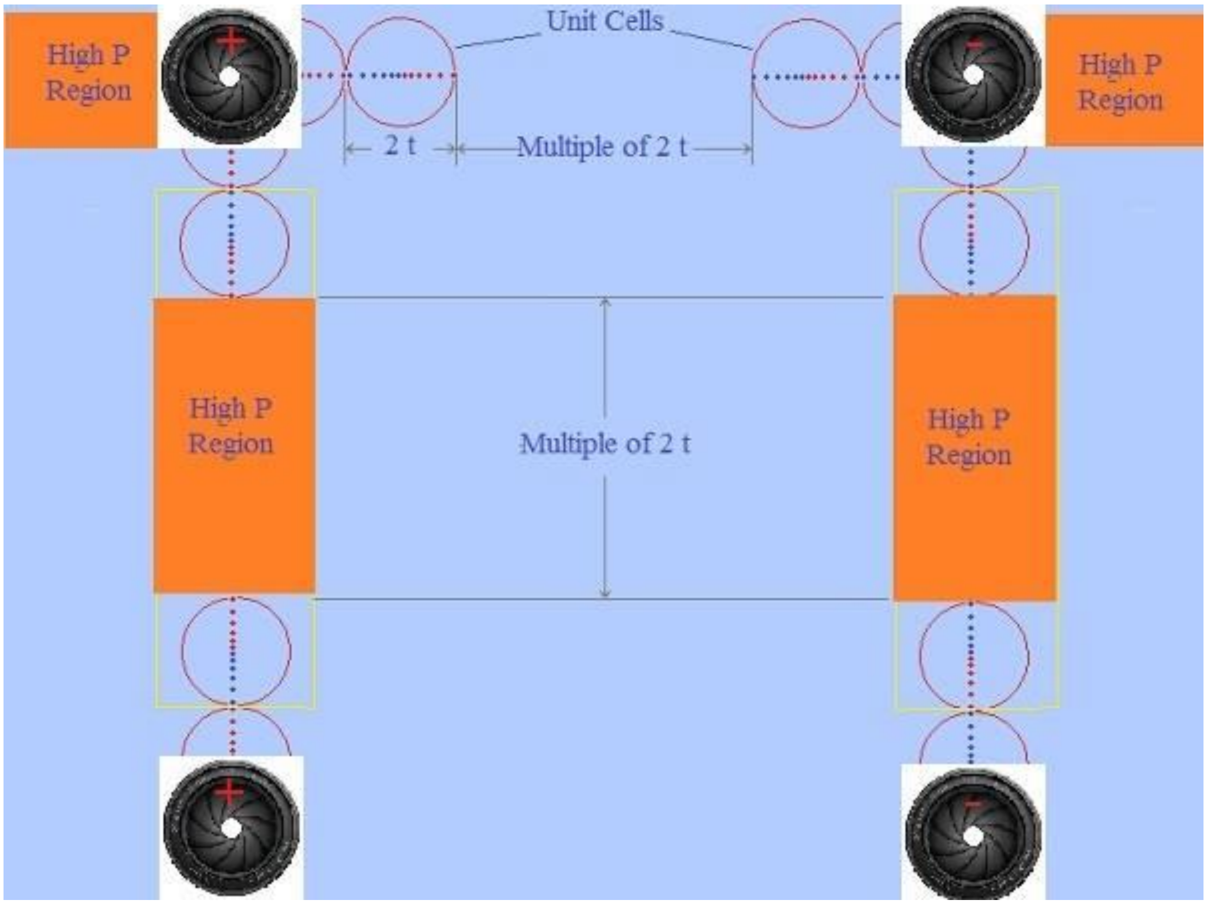


Figure 3: The simple/layman's summary of the dual character of force of electric charges not understood for centuries. Still not well understood by the way, but we seem to be on the right track.

In the original figure given previously there were spheres representing particles [1]. Here are the spheres replaced (particles, at the 4 corners) by the shutters. Shutters with "+" signs are synchronous and they repetitively get on and off simultaneously.

So are the shutters with "-" signs, but both kinds do have a phase diff. of 180 degrees. If + is open/on, - is closed/off.
A closed + sends a bubble to the environment. Another + is closed, due to cellular structure as it meets this buble. Since the diaphragm is elastic, it takes a concave form with respect to the space in between. If the receiver is - , it is open as the bubble is in near vicinity, lets the bubble through, The buble is then reflected back, hits the closed diaphragm from behind and the diaphragm gets a convex shape with respect to the space in between.

Actually no reflection, each buble has this duality in it which is tried to be symbolized via the red and blue dots within them. The whole space around make also its contribution, and related questions can't be exactly answered without explicit knowledge of the structure and the structure of the near fields of particles. The process of reconstruction may be very effective within this regard.

Here we begin with the calculations regarding the unit cells. They repeatedly go away till they diminish, i.e. till they get completely randomized as vacuum. Said in other way till they lose their structure and become “energy”.

2. The Unit Cell

The unit cell is the circle in random vacuum where the datom will have made a 0-momentum collision for certain. We previously investigated the structure inside a unit cell by naïve methods and here we use Python and Pyplot to see the probabilities inside.

Suppose a datom just begins to move in +x direction. It will have a certain probability to make a 0-momentum collision on the way. A 0-momentum collision requires a datom moving in +x direction at point x, and another one moving in –x direction at x. That then datom began at x=0 at the beginning is assumed, but its probability of being moving along x-axis decreases as collisions are made.

Let $P_{dat}(x+)$ be the probability of a datom at x, moving in x+ and $P_{dat}(x-)$ the probability of finding a datom at x, moving in –x. Then, considering these probabilities as independent, we will have $P_{coll}(x) = P_{dat}(x+) * P_{dat}(x-)$ with $P_{coll}(x)$ being the probability of a 0-momentum collision at x.

The exponentially increasing 0-momentum collision probability we have assumed in our previous work is then pretty unsound, several plausible cases may be considered though:

- At each point there is a certain constant probability of 0-momentum collision, i.e. $P_{coll}(x)=kP_{dat}(x+)$. In this case the probability of finding the datom, $P_{dat}(x+)$, on the way at any point of x-axis moving in x+ direction will decrease exponentially. This is of course a situation in which the possibility of a unit cell is nill. It can be studied only as an approximation.
- At each point there is a certain probability of 0-momentum collision that is proportional with the distance traveled, i.e. $P_{coll}(x)=kxP_{dat}(x+)$. In this case the probability of finding the datom , $P_{dat}(x)$, on the way at any point of x-axis will be a positive region half of a Gaussian form, since at the beginning there was a datom at x=0. The collision probability will then be almost Gaussian.

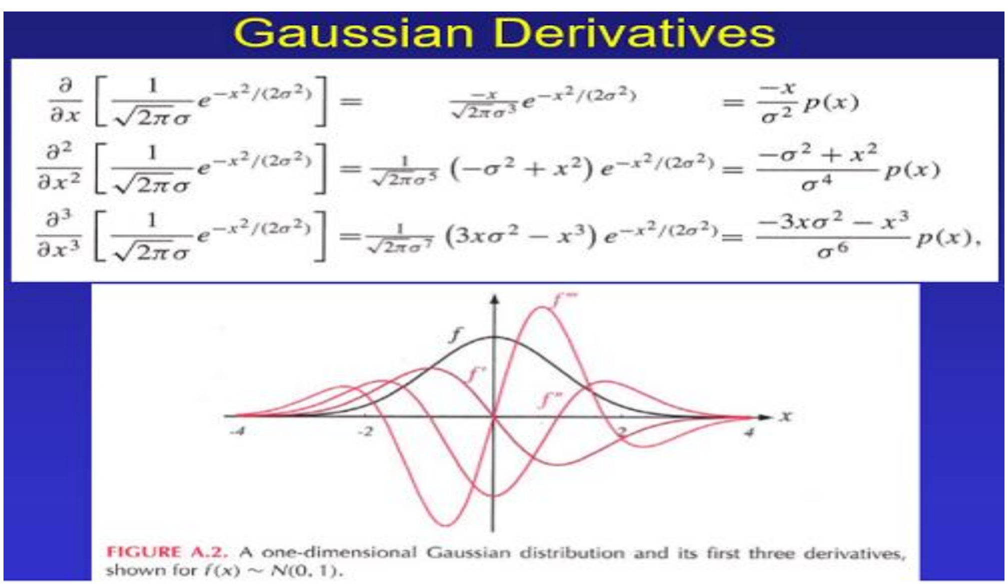


Figure 4: Justification of the claim made above [2].

- A normalized triangular function for P_{coll} (x), as in Figure 5, to simplify the Gaussian.

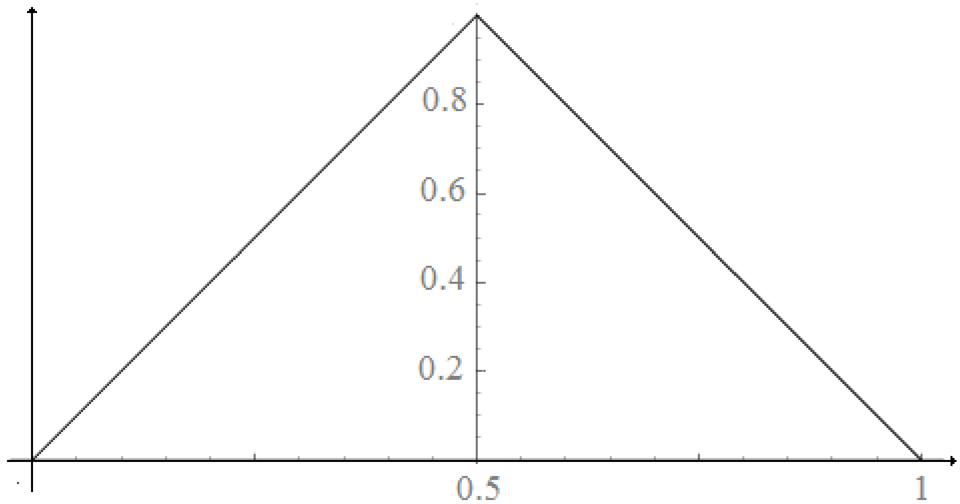


Figure 5: The triangle function, normalized.

To calculate the probabilities within the unit cell we made us of Python and Pyplot. The code we used is given below:

```
import math

import numpy as np

import matplotlib.pyplot as plt

e = np.e

x , y = np.meshgrid(np.linspace(0, 1, 100), np.linspace(0, 1, 100))

f = (x-.5)**2

g = (y-.5)**2

fig = plt.figure()

ax = fig.add_subplot(1, 1, 1)

for r in range (50,101,1):

  for theta in range (-270,90,1):

    a=r/100+(1-r/100)*(np.sin(np.deg2rad(theta)))

    b=.5+(1-r/100)*(np.cos(np.deg2rad(theta)))
```

```
 #exponential decrease
 #1 fct1=math.exp(-((r-50)/50))
 fct1=math.exp(-((r-50)/25))
 #end of exponential
 #Gaussian
 #fct1=(1/math.sqrt(2*math.pi))*(math.exp(-(((r/100-0.75)**2)/0.014)))
 #end of Gaussian
#triangular approximation of Gaussian
 #if r<75:
 #   fct1=4*(r/100-0.5)
 #else:
 #   fct1=-4*(r/100-1.0)
 #end of triangular/linear
fct2=math.fabs((np.sin(np.deg2rad((theta-90)/2))))+math.fabs((np.cos(np.deg2rad((theta-90)/2))))
#exponential decrease
 t=(fct1*fct2)/1.42
 #end of exp.
 #Gaussian
 #t=(fct1*fct2)*1.76
 #end of Gaussian
#triangular
 #t=(fct1*fct2)/1.42
 #end of triangular
 if theta == -90:
```

```
        print(t)
    col = (1-t/1.0, 1-t/1.0, 1-t/1.0)
    circ=plt.Circle((a, b), radius=0.0003, color=col)
    ax.add_patch(circ)
plt.show()
```

The figures we got are given below:

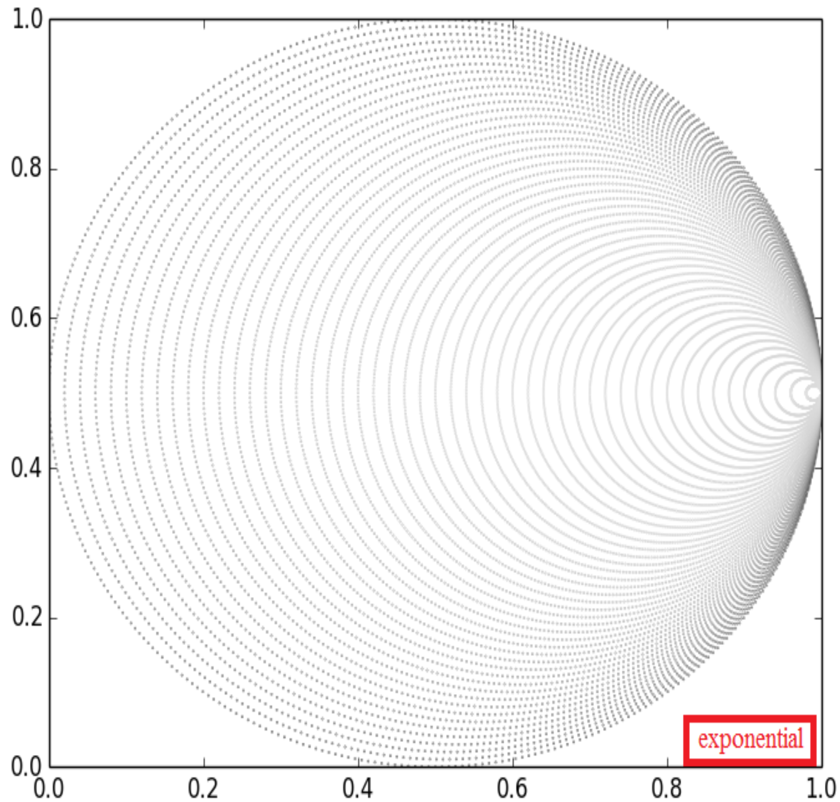
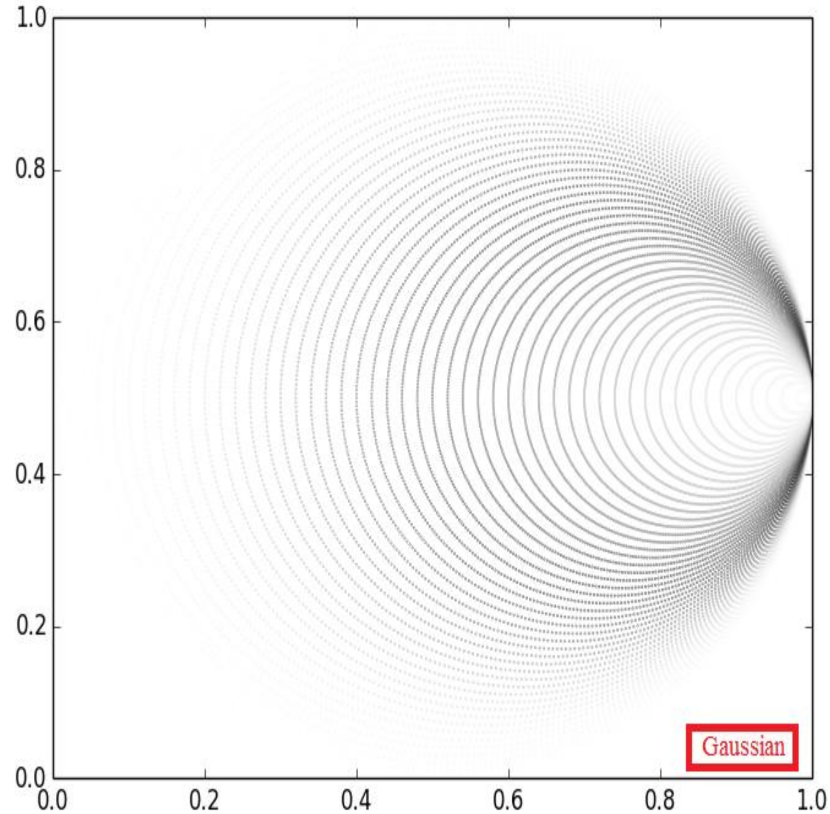
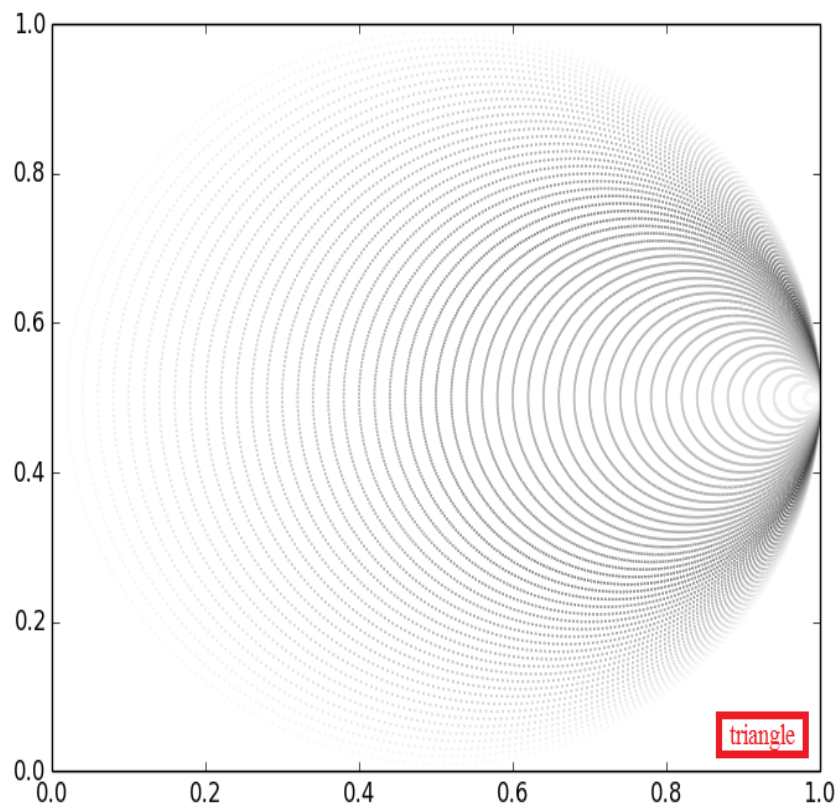


Figure 6: The distribution of the probabilities within the unit cell in case the 0-momentum collision probability decays exponentially.

Not to forget is that the 0-momentum collision probability is a product of probabilities of 2 particles moving at opposite directions at point x. If the second particle has the same probability to be present at any point, the first particle gets scattered and the probability of it being present at any further point decays exponentially.

Figures in the following page are the probabilities in case of Gaussian 0-momentum collision probability and triangle function formed 0-momentum collision probability. They are not given figure numbers to keep them as big as possible as the optimal use of pages is made. They are to be accepted as Figure 7.


1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Gaussian


1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
triangle

The probabilities are relative and not normalized in order to make best use of Python's visual facilities.

3. Discussion of the Results

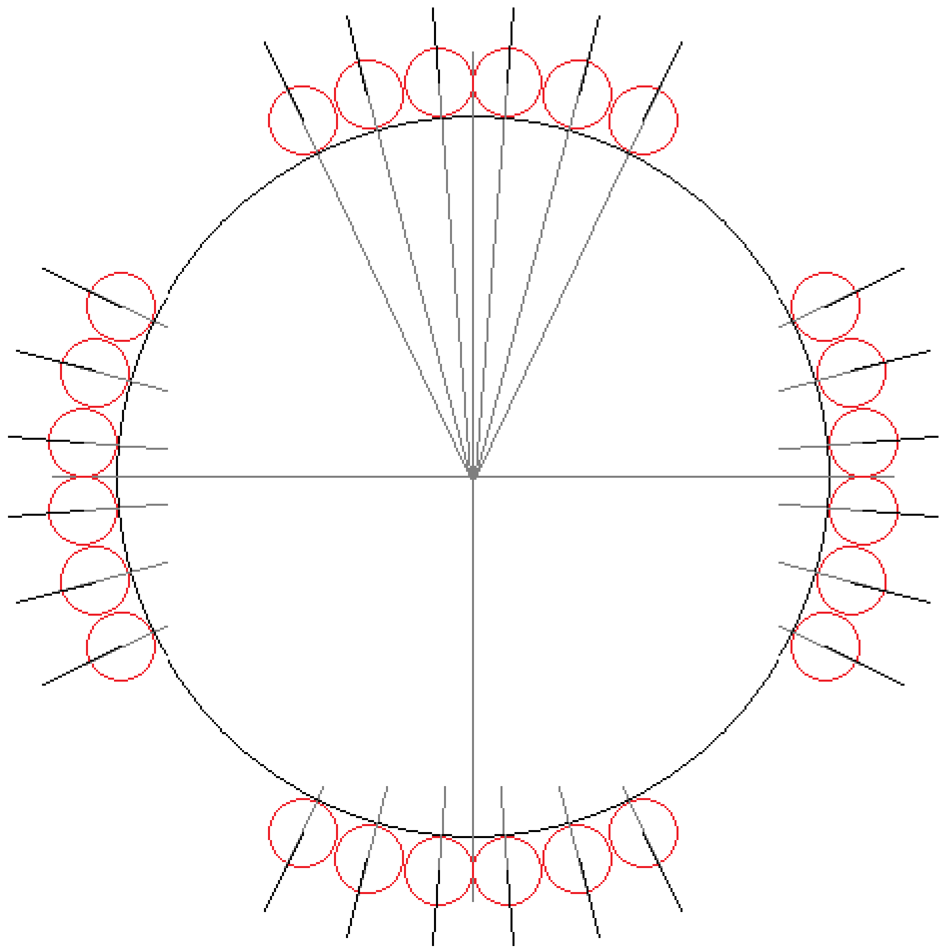


Figure 8: Simplified figure of datoms being radiated outwards from a central point. It is easy to see that only a small amount of directions can be covered.

The following facts are easily recognizable:

- Radiation to the outer space will be in bursts. The structure of the bursts will be very complicated in the near field, the nonlinear region where 0-momentum collision probability will be different from the vacuum* [3], [4], [5].
- Within the vacuum unit cells will be dominant.

* Quote from de Broglie : "When in 1923-1924 I had my first ideas about Wave Mechanics [6], [7] I was looking for a truly concrete physical image, valid for all particles, of the wave and particle coexistence discovered by Albert Einstein in his "Theory of light quanta". I had no doubt whatsoever about the physical reality of waves and particles."

- About 1% of the datoms will stay in their original direction of being emission. This will in general be depending upon the first derivatives of zero momentum collision probability and angular scattering, on their relative degrees of smoothness.
- Since angular scattering amplitudes are pretty smooth, the unit cell will practically be doing a random walk with almost equal probabilities, the form of dispersion will be almost Gaussian.
- The particles staying on line of emission will decay drastically. The probability to find them on line will decrease with 10^(-2*number of unit cells on line in between). They will be the first ones that arrive at any point there is another charge. Between two charges 1 m. apart, there will approximately be 10^15 unit cells. The speed of this interaction will be equal to the speed of light, c.
- The in general 1/r^2 dependence will be preserved though, since the initial momentum is outward and there is spherical symmetry. The random walk will take care of it.
- The average velocity of arrival to a definite point will be determined by the random walk. In case of 10^30 collisions, they will be 10^15 F away from their starting point.
- How the cellular structure will be preserved and the dual character of the electric force will be obtained is obscure for the time being.

4. Conclusion

The scheme given above seems to be plausible, further investigations are needed. Our PC runs the code given above in about half a second. It lacks the necessary power to make detailed simulations of the case. Help from/cooperation with the outer world will be appreciated.

[1] https://www.academia.edu/25264374/A_New_and_Sound_Way_of_Making_Physics_a_Challenge_for_Excellent_Computational_Physicists_and_Programmers

[2] http://www.cedar.buffalo.edu/~srihari/CSE555/Normal2.pdf

[3] http://aflb.ensmp.fr/AFLB-classiques/aflb124p001.pdf

[4] https://en.wikipedia.org/wiki/Pilot_wave

[5] https://www.quora.com/What-is-the-difference-between-Bohmian-quantum-mechanics-and-de-Broglies-double-solution-theory

[6] C.R. Acad. Sciences Paris, 177, 506, 548, 630 (1923).

[7] Doctorate Thesis (Paris 1924), 2nd. ed. Masson Paris (1963).

[8] Search via Google “louis de broglie the theory of double solution”