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Picture of Dynamic Development

Part 3

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After the first explosion, burning chunks, or torches of different sizes flew in all directions. These high temperature torches with huge mechanical momentum met with virgin substances, causing new explosions. Due to differences in mass, temperature, mechanical momentum, flying direction and time of impact, there were many possible ways for the torches and virgin materials to interact. After the second wave of explosions, there was the possibility of torches meeting other torches, instead of virgin bodies as they flew through space.

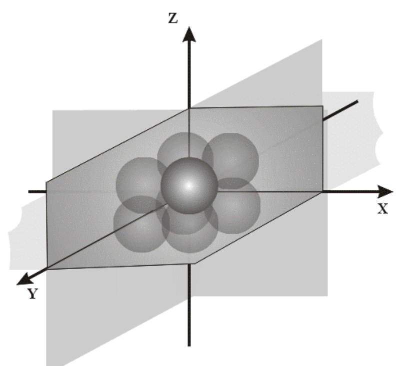
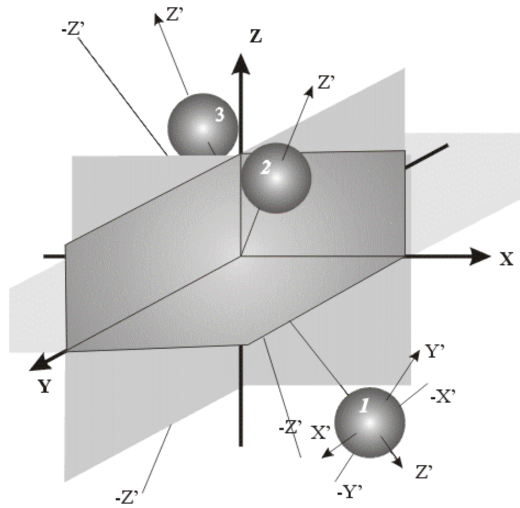


Fig. 8

Let us postulate that the center of the condensed matter where the first explosion occurred is at the origin of a three-dimension coordinate system, x-y-z. All movement ultimately can be mathematically described in this **primary reference frame** with origin O **(Fig. 8).** Let us assume that just before the first condensed ball exploded, it had evenly distributed its mass in all 8 quadrants of the coordinate system x-y-z, with substances in each quadrant further condensing into balls that spread on a mean shell to be defined later. Each secondary ball was of the same nature as the original condensed ball but only *1/8* the volume. The sizes of the secondary condensed balls will be used for calculations in this chapter, and referred to as simply "condensed balls".

All condensed balls consisting of substance from layers 2 and higher are the size of the secondary condensed balls. We will further introduce a 3-D frame, (x'-y'-z'), at the mass center of each of the secondary exploding condensed balls situated at o'. The z' axis is assumed to always be aligned (a radial line) though origin O, with the positive direction pointing away from O, or the ASP. The orientation of x' and y' is unimportant. **(Fig. 9)**



The x' and y' axes for each of condensed balls 2 and 3 are omitted in the picture. Their orientation with respect to the x-y-z system is unimportant anyway.

Fig. 9

The torches produced after the explosion of each secondary condensed ball may fly in any direction with respect to the x'-y'-z' frame. However, for mathematical purposes, when the explosion is a spontaneous one rather than induced by mechanical impact of other objects, we can resolve their movement with vectors of equal magnitude of momentum in six directions in the x'-y'-z' frame. So we further postulate that, all of the six vectors representing the momentum of the torches have equal mass *m*, and equal absolute velocity *v*. The result is then, with respect to the primary origin O, this results in one torch moving in the centrifugal direction (+z'), one in the centripetal direction (-z') along the z' axis, and four torches move in directions that are tangential to the radial line,with two along the y' axis (+y' and -y') and two along the x' axis (+x' and - x'). (Centrifugal and centripetal are words more closely related to rotational movements, but are used here to indicate the translation movement along a radial line with respect to the primary origin.)

Now, let us define the mean shell. Assume that the substance in each *n -th* layer of our **Onion Model** contracts to a shell of radius r_n , thereby dividing the space of each layer into two sub-layers such that the sub-layer between $R_{u,(n-1)}$ and r_n is of equal volume as the sub-layer between r_n and $R_{u,n}$. In other words, these two sub-layers should contain equal masses before any contraction begins. We call the shell of radius r_n the mean shell. When *n* is reasonably large, it is easy to show that the distance between each adjacent mean shell is equal to ΔR . Because of the good approximation between r_n and $R_{u,n}$ at large *n* in the future we may use them interchangeably without any special stipulations.

If we assign ρ_u as the homogeneous mass density of the universe, the mass contained by the *n-th* mean shell would be

$$\Delta M_n = \frac{4\pi}{3}\rho \cdot \left[n^3 - (n-1)^3\right]\Delta R^3$$

$$= \frac{4\pi}{3}\rho_\mu\left(3n^2 - 3n + 1\right)\Delta R^3$$

For the first mean shell, upon explosion, we would have 8 secondary condensed balls, with one in each of the quadrant of the primary frame. Since we have stipulated that each secondary condensed ball will produce 6 torches, there would be 48 torches after the explosion of the first mean shell. Because the second mean shell has 7 times as much as the first shell, this will give 48x7 new torches after the second mean shell explodes, and 48x19 for the third, and 48x37 for the fourth, and so on. Generally, the *n-th* mean shell will produce $48(3n^2-3n+1)$ torches if all its materials explode.

The kinetic energy ΔE is converted from and determined by the internal energy of each unit mass of virgin material upon exploding. The internal energy must be the same for material of the same nature. Therefore we can always have $\Delta E = (1/2)mv_c^2$, where m is the unit mass and v_c (not speed of light) is a constant value of speed that is set by the internal energy of the unit mass.

We can also further categorize the torches into the following two groups:

1) Out-going group. We will include all torches that are leaving the primary origin. This group includes the torches moving along the x' and y' axes in the x'-y'-z' system as well as the torches moving centrifugally along the + z' direction. All torches along these paths will continue to move farther away from the primary origin *O*, or the ASP, where the first explosion is assumed to have occurred.

2) In-going group. This includes only those torches moving along the -z' direction and thus towards the primary origin *O*.

Each newly produced torch would carry a momentum of mv_c if the explosion is to spontaneous. It is apparent that 5 out of the 6 torches from each condensed ball are out-going objects. With so many torches rushing out from each mean shell, collisions are unavoidable. The collisions are mainly:

1) Between torches. This is further divided into two groups:

a) The out-going torches moving at various velocities on different but generally out-going directions, will combine into some bigger chunks and continue the out-going tendency after the collision.

b) The out-going torches from the *n*-th and lower shells with the in-going torches from the *(n+1)-th* and higher shells. Depending on the individual case, the resultant material gathered through such a collision may be an in-going chunk while others may be out-going.

2) Between the torches and the virgin materials on the mean shells of a certain order and higher. It is this combination that renders the most astonishing results. But before we reveal the picture of this kind of collision, we require further illustration.

Both types of collisions are actually momentum recombinations among materials. Before we analyze the results of the various possible combinations , let us concentrate on one typical mathematical case.

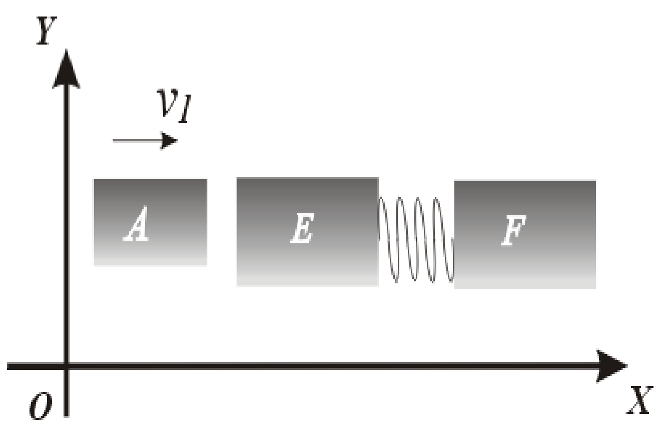


Fig. 10

Suppose in an isolated space, there are 3 blocks A, E and F. **(Fig. 10).** In relation to the reference frame x-o-y, block A of mass m_1 is moving to the right with speed v_1, while blocks E and F, both of mass m_2, are motionless. Blocks E and F are tied together by a weightless but highly compressed spring between them. The tension of the spring is set up according to m_2, such that when the tie breaks, (and if only E and F are involved), blocks E and F will fly away from each other with a constant speed of $2v_c$. In other words, the tension of the spring is calibrated to a constant per unit mass. The tie is always broken when block A lands on E; time delay is allowed and is not critical.

Our dynamic system of A, E and F should always have an invisible point called the center of mass, abbreviated as CNM, which is moving with velocity v_{cmn}. Relative to frame x-o-y, v_{cmn} can be calculated as $v_{CNM} = \frac{m_1 v_1}{m_1 + 2m_2}$.

If there is no external force, v_{cmn} for the system of block A, E and F will not vary before or after the spring is released due to conservation of momentum. It should be noted, however, that within this system, block A offers a momentum to E and F. So, after the spring is released, because of the impact from A, each of E and F will not be able to fly with v_c in relation to the frame x-o-y. Instead, A and E may adhere to each other and fly together with one velocity, v_3, while F will fly alone with another velocity, v_4. Both velocities, v_3 and v_4, at this stage of calculation are defined relative to CNM. Now we have the following equations:

$$(m_1 + m_2) \cdot v_3 = -m_2 v_4$$

$$\frac{1}{2}(m_1 + m_2) \cdot v_3^2 + \frac{1}{2} m_2 v_4^2 = 2 \cdot \left(\frac{1}{2} m_2 v_c^2\right)$$

These two equations lead to

$$v_3 = \frac{-\sqrt{2}\, m_2}{\sqrt{(m_1 + m_2)(m_1 + 2m_2)}} v_c \qquad \text{, and}$$

$$v_4 = \sqrt{\frac{2m_1 + 2m_2}{m_1 + 2m_2}}\, v_c \qquad .$$

Ultimately, relative to x-o-y, we have

$$v_i = v_{CNM} + v_3 = \frac{m_1}{m_1 + 2m_2} v_1 - \frac{\sqrt{2}\, m_2}{\sqrt{(m_1 + m_2)(m_1 + 2m_2)}} v_c \qquad \text{, and}$$

$$v_o = v_{CNM} + v_4 = \frac{m_1}{m_1 + 2m_2} v_1 + \sqrt{\frac{2m_1 + 2m_2}{m_1 + 2m_2}}\, v_c$$

where v_i is the velocity for A and E moving together, with subscript *i* indicating in-going for future analysis purposes, v_o is the velocity of F moving alone, with subscript *o* indicating out-going tendencies for future analysis purposes as well.

The "-" sign in v_i tells us that v_i can either be in the direction opposite to the original direction of block A or, when the first term in the equation is large enough, in the same original direction as block A.

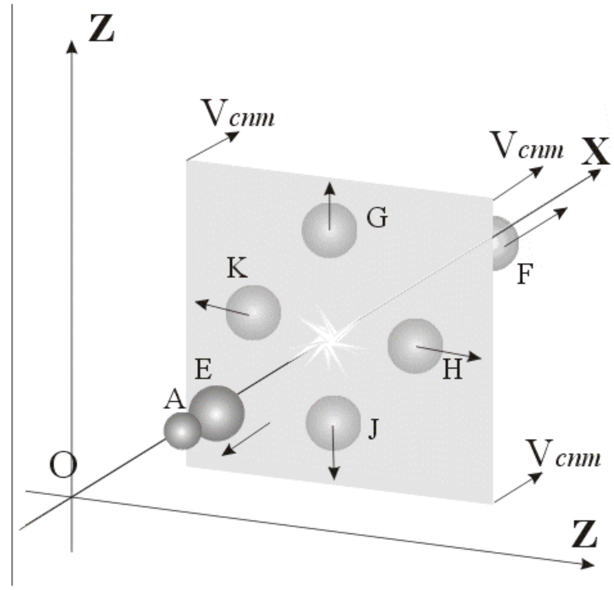


Fig. 11

Instead of 2 blocks, let us have 4 more blocks, labeled G, H, J, and K, tied to Blocks E and F. Assume that all these blocks possess the same qualities in every aspect as Blocks E and F except that a spontaneous explosion (i.e. explosion not triggered by the landing of block A) will cause block G, H, J and K to fly in directions perpendicular to A's direction. We also assume that, for purpose of mathematics, the moving directions of G, H, J and K are also perpendicular to each other. Similar to our mathematical analysis for Fig. 10, but with a moving system that includes all 7 of these blocks, we have $v_{CNM} = \frac{m_1 v_1}{m_1 + 6m_2}$.

Now, let us imagine each of the original condensed ball are mathematically consisting of 6 blocks that are similar to the above blocks E, F, G, H, J and K. Between the blocks we have some exploding devise calibrated similar to the spring in the 3 block system in **Fig. 10**. This is equivalent to saying that the condensed ball has its explosion energy capacity calibrated to $6 \times \frac{1}{2} m_2 v_C^2$. After the explosion, block F will fly with speed v'_4in the same direction as the A's original direction with respect to the *CNM*, (center of mass) of the moving system that includes all 7 of these blocks. Block E will fly with a velocity of v'_3, together with block A, with respect to the CNM. v'_3 and v'_4 here we have the same significance as v_3 and v_4 in the three block system shown in Fig. 10, but a different value. So in the later calculation for the 7 block system, we will use v_3 andv_4 in place of v'_3 and v'_4 for simpler mathematical notation.

We assume that after A's landing, all 7 blocks are moving together for a while before the explosion occurs. The newly acquired velocity for the collection of all 7 blocks can be easily proven to be the same as v_{cnm}. Imagining a plane perpendicular to the original direction of A's movement which is attached to the center of mass of the entire 7 blocks. If E and F recoil at the same time instant after the explosion, G, H, J, and K can always be regarded as moving within this plane, which has a speed of v_{cnm}. Within this plane, the 4 blocks are further assumed to be moving in directions perpendicular to each other. **(Fig. 11)&** With respect to the *CNM*of the entire 7 blocks, the vector sum of momentum of blocks G, H, J and K will always be zero. This gives

$$(m_1 + m_2)\upsilon_3 = -m_2\upsilon_4$$

$$\frac{1}{2}(m_1 + m_2)v_3^2 + \frac{1}{2}m_2 v_4^2 + 4(\frac{1}{2}m_2 v_c) = 6(\frac{1}{2}m_2 v_c^2)$$

Solving, by taking only positive values of v_4, we have

$$\upsilon_3 = -\frac{\sqrt{2}m_2}{\sqrt{(m_1 + m_2)(m_1 + 2m_2)}}\upsilon_C \qquad (Eq.III - A)$$

$$\upsilon_4 = \sqrt{\frac{2m_1 + 2m_2}{m_1 + 2m_2}}\upsilon_C \qquad (Eq.III - B)$$

With respect to the reference frame where the condensed ball containing blocks E, F, G, H, J and K is motionless before the explosion, we have

$$\upsilon_i = \upsilon_{CNM} + \upsilon_3$$
$$= \frac{m_1}{m_1 + 6m_2}\upsilon_1 - \frac{\sqrt{2}m_2}{\sqrt{(m_1 + m_2)(m_1 + 2m_2)}}\upsilon_C \qquad (Eq.III - C)$$

$$\upsilon_o = \upsilon_{CNM} + \upsilon_4$$
$$= \frac{m_1}{m_1 + 6m_2}\upsilon_1 + \sqrt{\frac{2m_1 + 2m_2}{m_1 + 2m_2}}\upsilon_C \qquad (Eq.III - D)$$

where v_i is for block E and v_o is for Block F.

In the case $m_1 = m_2$, we have

$$v_3 = -\sqrt{\frac{1}{3}}v_C \qquad (Eq.III - E,1)$$

$$v_4 = \sqrt{\frac{4}{3}}v_C \qquad (Eq.III - E,2)$$

$$v_i = \frac{1}{7}v_1 - \sqrt{\frac{1}{3}}v_C \qquad (Eq.III - E,3)$$

$$v_o = \frac{1}{7}v_1 + \sqrt{\frac{4}{3}}v_C \qquad (Eq.III - E,4)$$

The speeds of G, H, J and K, relative to the same reference frame, should the vector sum of v_{cnm} and v_c,

therefore $$v_t = \sqrt{v_{CNM}^2 + v_c^2} \qquad (Eq.III - F)$$

and their directions are determined by $$\sin\theta = \frac{v_c}{\sqrt{v_c^2 + v_{CNM}^2}} \qquad (Eq.\ III\ \text{-}\ G)$$

where θ is the angle between A's original direction and the line on which each of the G, H, J and K is moving with respect to the x-o-y frame.

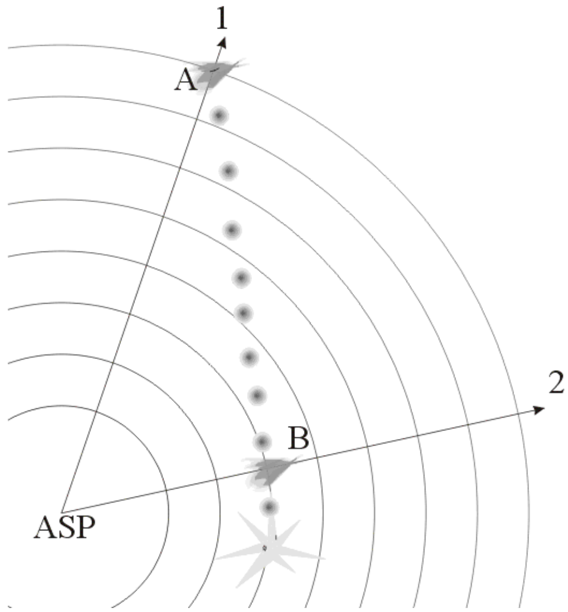


Fig. 12

If we refer to **Fig. 12**, we can say that a tangential component will act like a centrifugal component with respect to the ASP in the future when it collides with a virgin body. In Fig. 12, if the balls ejected by an explosion collide with a virgin body at location B, they almost have no effect in moving it along a radial line 2. If they hit a virgin body at location A, they certainly have a greater effect in moving it away from the ASP if the resultant sped is resolved on radial line 1.

We will insert a numerical subscript in front of "*i* " and "*o*", such as v_{5i}, v_{12o}, $v_{(n-1)i}$, v_{no}, etc., to signify from which mean shell a particular velocity component has emerged. For example, v_{14o} means an out-going component produced from the *14th* mean shell, and v_{no} is an out-going component produced from the *n-th* mean shell. For $n = 1$, it is easy to show that $m_1=0$, $v_{cnm}=0$, $v_{1i}=-v_c$ and $v_{1o}=v_c$. For $n = 2$ and above, and for any mean shell, say $n = k$, the velocity equivalent to v_1 and carried by block A before it lands on anything in our dynamic system is the velocity carried by any out-going torch from a mean shell of $n \le k-1$. This velocity is then mathematically resolved on the radial direction that is in line with the primary origin and thus actually a centrifugal velocity.

Whenever we include a certain spherical volume in space with its center at the initial big explosion, or ASP, and when its surface is overwhelmed with new explosions, we can have its total momentum summed up as:

$$P_{total} = P_o + P_i = P_r + P_t + P_i$$

where P_o is the out-going momentum that represents the sum of P_r , which is the centrifugal momentum, and P_t, which is the tangential momentum; P_i is the in-going momentum.

A detailed mathematical demonstration of all *P*'s is shown in Appendix VII-2(a). Through such calculations we will come up with

$$P_{total} \cong 0.32 M_n v_c \qquad (Eq.III-H)$$

where M_n is the total mass contained in the spherical volume under study, i.e., the mass contained by the entire volume that explosions by virgin bodies have created.

The positive value in equation *III-H* tells us that, as a consequence of the addition of all the explosions, substances contained in the spherical volume have sufficeint extra momentum to escape from the center of the sphere. In other words, **a spherical volume containing materials that are exploding is bound to expand**. As long as there is fuel stocked outside of that volume, the fire region will occupy more and more space.

In a spherical volume, the newly produced torches moving along the radial directions (equivalent to block E in Fig. 11) on any mean shell will always have the tendency to combine with the on-coming torches from mean shells of lower order and travel together with these torches towards the ASP. This action makes the centrifugal torches out of the mean shells of lower orders become centripetal torches to a certain extent. On the other hand, torches of tangential components from any shell of *(n-1)* and below, clearly outnumber those coming in. So, over-all we can say that each mean shell can offer only 2/3 of its torches as out-going, although a spontaneous explosion of each condensed ball sends out 5 out-going torches.

Because out-going torches always outnumber the in-going torches, each shell will receive more torches per unit area than the same unit area of the preceding shell. The effect of this increasing crowding of torches on each shell is that with the increasing value of *n*, virgin condensed balls of uniform size on certain mean shell will be hit by torches that have combinations of more and more mass. So, as *n* increases, it is increasingly possible to have $m_1 m_2$, before any collision has occurred on each shell, where m_1 is the mass of block A and m_2 is the mass of block E in Fig. 11. By continuing to increase the quantity of m_1, blocks F, G, H , J and K will end up with higher and higher out-going speeds while the E's in-going speed will be reduced when compared to those of E's in preceding shells. This phenomenon will repeat itself again and again, and the speed of m_2 in later sequences may achieve unlimited speeds. Although the rate at which m_2 will increase its speed is extremely small, it is there! For a mathematical demonstration of this development, please see Appendix VII-2(b).

Generally, there are more substances moving away from the ASP than moving towards it. The mathematical demonstration in Appendix VII-2(b) should then be able to tell us that substances moving out have increasingly higher speeds in relation to their increasing distances from the ASP. Even the in-going flow of substances, which is originally mathematically moving towards the ASP, will gradually reverse its direction of motion. The speed difference with respect to the ASP between this group and the out-going group gradually diminishes as the distance from the ASP increases, although it never vanishes.

One striking characteristic exhibited by the mathematics (equations shown in Appendix VII-2(b)) is that, with the help of computer charting, the material flow of those out-going torches have speeds that increase at a fairly linear rate with respect to the distance from the ASP. **This outcome matches what Hubble's Law hypothetically predicts**.

The same calculation also gives us another interesting outcome. If there is always only one out-going torch to ignite the explosion of one condense ball in a series of explosions, the ultimate speed increase of the later out-going torch will soon reach a limit. This limit is typically represented by a speed value of $1.347v_c$ and is reached at $n=8$ in our calculation. However, a few paragraphs above we mentioned that as *n* increases, the crowd of torches also increases. Then, the torches are more likely to combine and thus increase their sizes. The increase in sizes of the oncoming torches in turn enables the immediate, newly born torches to break the speed limit that we just mentioned. On the other hand, if the crowd of oncoming torches has been established, the out-going torches produced by the next few waves reach the same limit again after the same increment of *n.*. This allows us to speculate that each newly established crowd of torches always maintains a certain distance from an immediately previous crowd. Therefore in space, the separation of layers of celestial objects should all be characterized by a certain unique distance.

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Please continue to **Distribution of the Radiating Energy**.