

## Is Reality Digital or Analog? - A Very Special Trip

By Dante Barbis Ayres

I was thinking about foundational questions in physics and cosmology. Then –I told myself- I am going to do a very special trip in order “to see” the smaller particles in the Universe, and also, in order “to detect” if they build up a reality digital or analog. Finally, I am going to find up how these basic particles can explain some question about cosmology.

I begin this journey in a metal capsule. Here I can breathe and stay for several hours, also I can see outside through a window, I can even put an arm and a hand inside a plastic sleeve that has a glove on the end. This sleeve is connected to the wall of the capsule. Through the glove I can feel the reality that surrounds the capsule without the capsule’ air escapes from it. In the opposite position to the sleeve there is a metal arm coming out of the capsule. This arm ends on a paddle. I can move the paddle at different speeds in order to create a disturbance in the environment that surrounds the capsule. When I cause a disturbance in the capsule environment I can see and feel through the window, and through the glove, how that disturbance can be transmitted around the capsule.

The capsule is a special one; it can shrink with me to dimensions smaller than sub-atomic particles. The capsule has reflectors that emit light a tremendous high frequency. That frequency can be increasing as we get smaller in order to see smaller particles, thousands of times smaller than an electron.

I enter in the capsule, close it and settle down comfortably. I start to shrink until the capsule disappears from the floor where the capsule was resting. I fall into the intermolecular space and still shrugging to reach the size of atomic particles.

I’m the size of an electron, passing between two atoms of matter which I can only distinguish a cloud of electrons. I pass near an electron, I see it rotating at high speed, but I cannot see details of its shape, so in my mind I adjust my internal clocks to run at higher speed in order to see everything in slow motion. I was in that process when everything went dark. I kept shrugging almost one-thousandth of an electron. At that moment I heard thousands of strokes over the surface of the capsule, like small steel balls trying to pierce the hull and the window pan.

I focused my vision and saw that I was bombarded by thousands of little spheres. That spheres not only clashed with the capsule but they are bumping with each other. All space was filled with these small spheres that constantly bumping between them, in perfectly elastic collisions. I realized that these spheres had neither internal components nor internal spaces, they are made of dense material, and should have the maximum hardness that can be any material. As well they were moving in the absolute vacuum, there was nothing that could stop his movement. They were forever moving and bumping into each other without losing its speed from the beginning of time. These particles must be part of the dark energy! I told myself.

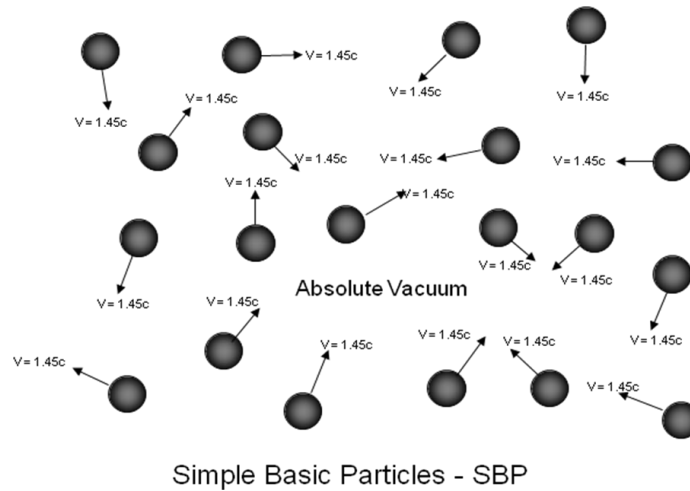
But before jumping to conclusions I shrug more to see that these particles are actually the smallest in the Universe. I kept shrugging hundreds of times, thousands of times, and only I perceive an absolute vacuum. My internal clocks was running millions of times faster, so I could see a particle pass me, no matter that particle be moving at the speed of light. Also, the reflectors are radiating light with a wavelength million times smaller than the diameter of an electron in order to see any object within the range of those dimensions. I put a hand outside, protected by the glove and plastic sleeve, to feel the environments’ nature outside. I wanted to feel if it really was the absolute vacuum or I was dipped in some sort of fluid. I drive the metal arm with the paddle to create a disturbance in the external environment. Nothing happened. There was no resistance to the movement of the paddle and I felt nothing through the glove. The absolute vacuum was around me.

I decided to start to get bigger to see again those particles that hit my spherical capsule. Apparently these particles are the smallest of the Universe and they are filling out what we think the vacuum is.

I am as large as the size of a thousandth of an electron and I feel again the shock of these particles. I adjust my internal clock and the chronometer I carry with me. I watch how fast they move and I guess these spheres are moving faster than the speed of light. But that cannot be! I told myself. According to the theory of relativity, no object can move faster than light, otherwise its mass would tend to infinity when the object reaches the speed  $c$  of light.

How is this possible? The only explanation is that these particles are the most basic and simple particles of the Universe I call SBP (Simple Basic Particles). They are moving in total vacuum, they had not electrical charge, they are not affected by electromagnetic fields or by gravity, they are just spheres, without gravitrons inside. They have mass or matter but do not have gravity, and are moving in the absolute vacuum, without resistance of any kind. The first conclusion that I had is that they are invariant in their mass as its speed.

I measured its diameter. They are about one hundred thousandth of an electron. Then I did a more accurate measurement of its speed. I mark two points in the window and use my chronometer in order to measuring the travel time of these particles. According to my calculation they are moving between 1.41 and 1.45 times the speed of light, bumping into each other constantly, with an average distance of less than one ten thousandth the diameter of an electron.



I did another deduction. Any wave or disturbance occurred in this medium will be transmitted to infinity by the constant collision of these basic particles, therefore we do not need a photon with zero mass to explain why a ray of light can travel at that speed to infinity because the basic particles are responsible for transmitting that signal, without requiring any additional energy.

If these basic particles are moving at a speed that is greater in a forty-five percent of the speed of light in all directions, then it is possible that a disturbance or a signal produced at a given point in space will be transmitted by these particles, at the speed of light, in all directions, such as a sound wave is transmitted into a gas at a rate that is 45 percent lower than the average velocity of the gas molecules.

I was reminded of a table, I once had to make because a paper about the speed of sound in certain gases, relative to the mean square speed of molecules of gas.[1]

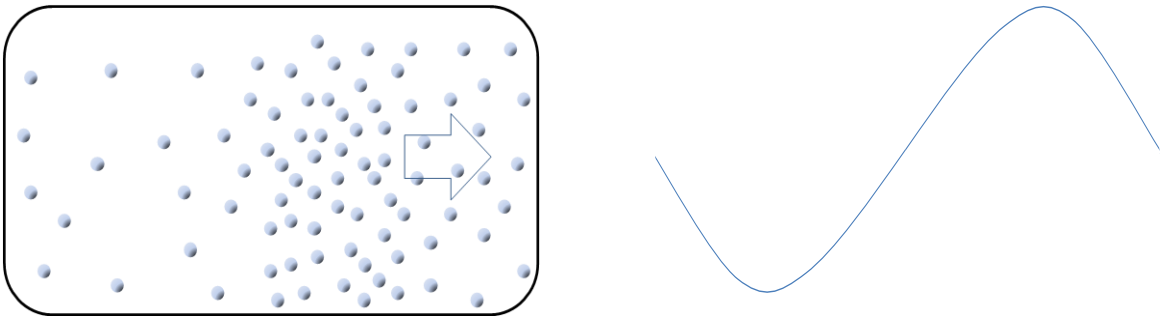
If these particles are moving at a speed equal to  $1.45c$ , in all directions, bumping into each other, any experiment, such as Michelson-Morley will fail trying to detect this medium as a stationary medium within light propagates, because this medium is not stationary, it is moving in all directions at once, is totally independent of any other type of particle, molecule or body. They cannot be affected by any type of field force, and therefore cannot be dragged.

These particles pass through the electrons, quarks and any atomic particle known. The SBP only interacts with two others basic particles I am going to describe in a while.

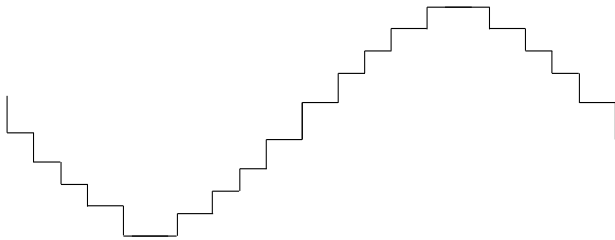
Returning to the subject of this paper. Let's see if the reality in my capsule environment is digital or analog. I am going to produce a disturbance in the surrounding environment and then I am going to see what happens.

I move, with my left hand, the metal arm and the paddle, both ways, trying to create a wave around the capsule. I watch out the window and put out my right arm with my hand to feel the disturbance I've produced.

The basic particle-SBP, which were moving randomly were hit by the paddle to the right and then to the left. The random motion of the SBP changed on its movement. First there was a concentration of them followed by a vacuum. This concentration followed by vacuum was passed from the particles on to each other, in the form of a wave, at the speed of light. Remember that my internal clocks are very fast and I can see these particles as moving in slow motion. I see the basic particles concentration as a cloud of particles moving from left to right in front of my window, this is the positive part of the wave and then I see only a few particles. The lack of them produces a vacuum. That is the negative part of the wave.



Because the wave I've created I feel a pressure in the palm of my hand, to the right, followed by a force to the left, produced by the negative pressure or vacuum. In my fingers I feel the individual strokes of the SBP, I realized that is the digital nature of the medium, where everything is generated and transmitted by the every SBP actions. The wave passed through my window and hit my hand, was not continuous but discrete nature. At an aggregate level, in my hand's palm surface I feel as an analog wave, but my fingers felt it was digital. My fingers felt the strokes of each particle individually. On the following drawing is expressed what I felt.



I can conclude that the reality around me is digital. SBP particles transmit any disturbance through their infinitesimal shocks, one by one. The disturbance produced a wave supported by these basic particles. These particles are not part of any continuous nature fluid, they are discrete particles.

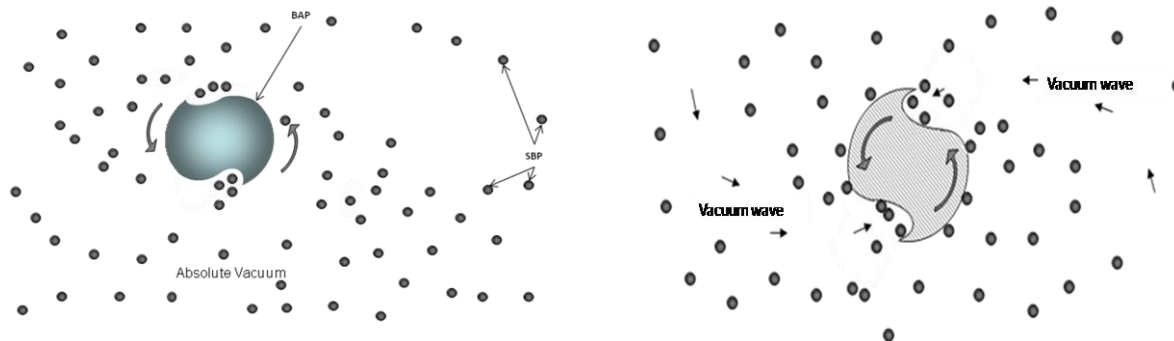
As already mentioned, these particles SPB are so small that they cannot be detected. They can pass through the electrons, quarks and any known atomic particle, interacting only with the following two particles discovered on this trip.

In effect, I focus my vision again and saw two types of particles passing in front of me. There are two types of new particles. These particles should be intermediate between SBP and the smallest known atomic particles like electrons and quarks.

The first one is spherical; it looks as having a dense constitution with two or three cavities on its surface. The size of these particles was about 30 times larger than the simple basic particles. The cavities on the surface appeared to have been made by some particles that had an impact on them, such as large meteors falling obliquely on the surface of the earth. The effect was equal to a cavity made by a small teaspoon had taken a little material but more than one side than the other leaving a hole in the form of tears.

This particle was rotating due to SBP beaten into the particle's cavities, which were oriented in the same direction; therefore the received energy is transformed into rotation. At the end there was a balance between energy received from SBP and the energy produced around him in form of waves.

These waves produced in the cavities of this particle are like waves of vacuum. As to rotate this particle their cavities are moving forward in a given direction and the simple basic particles that reached into every cavity are going to move in that direction, leaving an empty space behind them to be replaced by other basic particles, generating a wave of "vacuum" that spread radials at the speed of light. These particles form an attractive field around them that spreads to infinity. These particles I have called the Basic Attraction Particle or BAP, and should form what is known as dark mass. They could also be the "Gravitons" responsible for creating the gravitational fields of atomic particles.

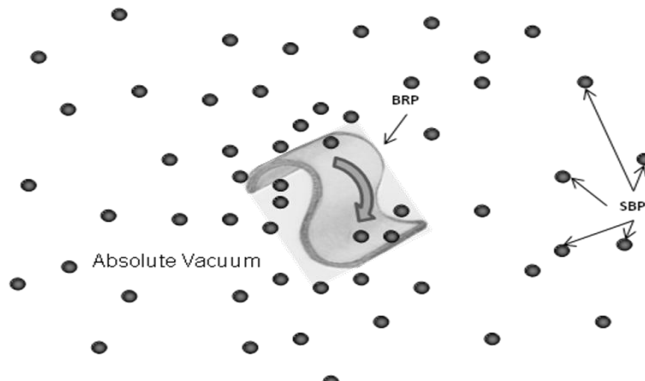


Basic Attraction Particles - BAP

The other type of particle that I saw pass out the window of my capsule is also circular in shape, it is of equal size of the BAP. These last particles are not exactly like a sphere, but like a thick sheet, with warped ends in the form of a letter S. These particles also spinning rapidly, like an anemometer, because the simple basic particles colliding in the particle concave part delivered more energy than the basic particles crashing of the convex part of these particle.

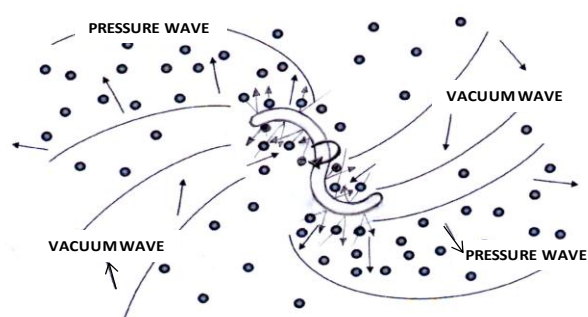
This new particle, because its spins, gets a balance between the energy received from the SBP and the energy they delivers to that medium in the form of a pressure wave which is generated in the two convex parts of the particle. This pressure wave is propagated at the speed of light in a radial direction and causes rejection on all the particles around them; so, it creates a repulsive field that spreads to infinity.

For its size they cannot be detected and because its function should be responsible for the expansion of the Universe, therefore should be part of Dark Energy. This type of particle would be a basic repulsion particle or BRP.



Basic Repulsion Particles - BRP

In fact, the BRP creates a combined wave; where the most important part is of repulsive nature or "pressure wave" generated by the convex part of the BRP, but followed by a weak vacuum wave produced on the concave side.



I found in total three types of basic particles. The simplest and small of them -SBP- are filled all the space of the Universe that we believe is empty, and its energy is much greater than the energy of all the visible matter. However, the small are these particles -less than one thousandth of an electron, its mass multiplied by the square of its velocity, which is equal to  $1.45c$ , also multiplied by their number (billions of times greater than all the particles of visible matter), should be an impressive figure. These particles do not interact directly with the atomic particles that we know but they do it through the BRP and the BAP.

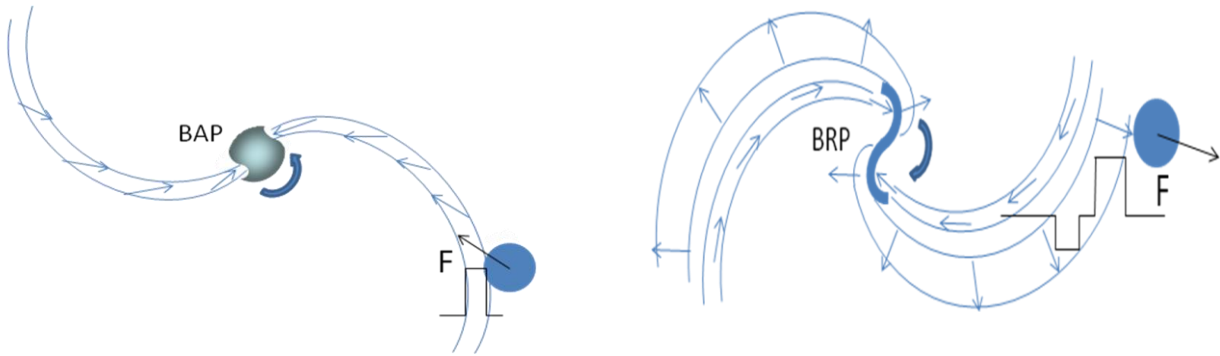
Maybe, at the Big Bang time these SBP probably moved more quickly, perhaps 2 or 3 times the light velocity, and therefore they had more energy, but gave up part of that energy to the basic attraction particles -BAP- or dark matter, and also to the basic repulsion particle -BRP- or Dark Energy. When all the BAP and the BRP had reached the rotation speed they have now a balance was established between the energies of these three basic types of particles; being the most simple of them, the SBP with the speed they now have equal to  $1.45c$ , and therefore thus defining the speed of light we know.

BAP particles and BRP particles should be interacting with other bigger particles as the electron and quarks. These two particles, transmit to the SBP all the signals they receive from the electron and quarks, whether electrical and / or magnetic signals, so, these signals are transmitted by SBP at the speed of light to other BAP and BRP which are in the other electrons and quarks proximity,

and because that the transmission of electromagnetic signals could be possible at the speed of light throughout the Universe.

I also think that in the electrons and quarks should have BAP inside them, like the gravitons that we cannot detect, but which allow a particle to attract another in proportion to its size. That is, in proportion to the number of BAP particles can fit inside it. BAP particles remain self-contained within the electrons and quarks. BRP particles may also enter an electron or a quark but could not stay inside because they are rejecting all together and ends up expelling each other. Therefore, the BAP would be the only of these basic particles that could be self contained within the known particles such as electrons or quarks and therefore give them the gravity characteristic of these particles.

The attraction or repulsion waves created by BAP and BRP particles around them are not of continuing nature, but digital nature because those forces are transmitted by pulses. Each BAP or BRP particle build up around them an attractive force field or an repulsive force field. Those force fields are not of continuous nature but digital nature. Any particle inside those fields is going to be under a pulsing force either attractive or repulsive, as you can see on the following figures.



Now let's to talk in a cosmological level to explain how these particles have influenced the expansion of the Universe.

While measuring the red shift of the light from stars and galaxies, Edwin Powell Hubble, find out that the Universe is expanding. The most recent observations allow us to ensure that the expansion of the Universe has been desaccelerated since the Big Bang occurred until a few billion years when the expansion begun to accelerate. We suppose that there exists a dark energy, ie energy that cannot detect with the instruments we have, but that dark energy is causing the accelerated expansion of the Universe.

Also exists the evidence about a kind of dark matter that explains the motions of galaxies, since the masses of matter they contain are not sufficient to explain their attraction forces.

Dark energy and dark mass can be explained by the existence of these three basic particles that I saw in my special journey.

The basic attraction particles -BAP- could be the dark mass because its attractive nature and the other particles BRP- could be the dark energy because its repulsive nature.

What proportion of each one exists in the Universe?

The proportions between the quantities of these particles are given by the findings of the Wilkinson Microwave Anisotropy Probe WMAP. [2]

According to this information would be 4.56% of visible matter, as matter of galaxies that contain everything: stars, planets, living beings, in short, everything we see and is made of electrons,

protons, neutrons and other particles detectable in the laboratory. The other 95.44% would be composed of dark matter and dark energy plus a small percentage of neutrinos. Dark matter is approximately 22.8% of all matter in the Universe and the 72.6% must be dark energy.

We can assign 22.8% of the total mass of the Universe to basic attractive particles BAP, and 72.6% would be composed of simple basic particles SBP and basic repulsive particles BRP.

How to distribute these 72.6%?

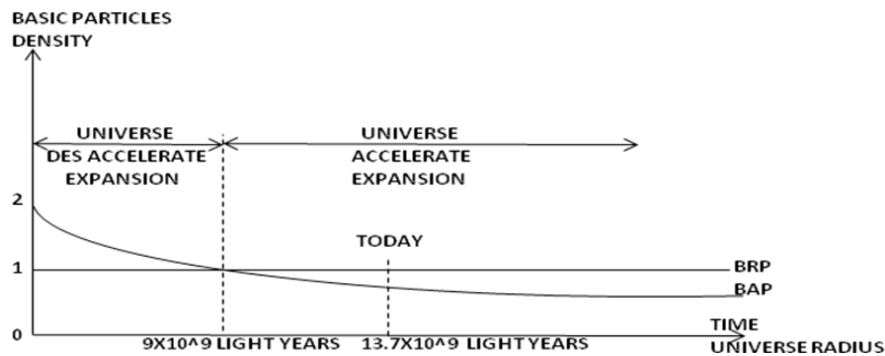
Usually the simplest explanations are better in order to explain a new theory in physics. I think that because a simple proportional ratio, the basic repulsive particles BRP must have the same amount that the basic attractive particles BAP, ie 22.8%, and due a subtraction operation, simple basic particles SBP should participate in the mass of the Universe with a 49.8%.

With these data we can explain the mechanics of the expanding Universe.

Many years ago it was thought that the Universe's expansion rate decreased, but now we know that the Universe's expansion is accelerating. The explanation I can offer is this: The matter formed at Big Bang time, and then the stars, also the planets and galaxies, when they were closer to the center of the Universe, ie closer to the point where the Big Bang occurred, were subject to greater attraction because the greater density of the basic attraction particles BAP that fill all the vacuum of the Universe. Also the vacuum of the Universe is filled whit the simple basic particles SBP and the basic particles of repulsion BRP. But there is a fundamental difference between the densities of these particles.

The BRP fill the vacuum of the Universe with uniform density. Because of its repulsive nature they are constantly taking apart between them and therefore they have a uniform density distribution, so its density can be represented as a horizontal line, see next figure. Instead, the BAP or dark matter has more density in the center of the Universe due to its attractiveness nature; therefore its density can be represented as a curve. The BAP not only are more concentrated in the center of the Universe but must also have a higher concentration within the galaxies and around them because they are attracted by the others BAP that exists within the electron and quark that make up the stars and planets in every galaxy. The topology of the BAP distribution and density is quite complicate to explain along this paper; I can only conclude that they are more concentrated in the center of the Universe and in the galaxies. The topology of the BRP is very simple: they are distributed uniformly throughout the volume of the Universe.

It is assumed that all matter was created in the Big Bang. That matter was expulse away at the speed of light, and as the time passes this matter was forming stars, planets and galaxies. The rate of expansion of these stellar bodies, which form the visible Universe, was decreasing due to the attractive force of the BAP or dark matter, which is more concentrated in the center of the Universe, and also because the gravity force of visible matter.



There should be a moment that we could locate roughly where the radius of the visible Universe was nearly 9,000 million light years, where the density of BRP or dark energy begins to be greater than the density of BAP or dark matter, since that time, about 4,700 million years, the expansion of the Universe started to accelerate.

The final conclusion I can do is that in the future, the visible matter will be much more under the effect of dark energy than under the effect of dark matter, and therefore the Universe will continue expanding in accelerate form.

We can make a computer model about this mechanism, but the extension of this paper does not permit to include that model. Using information about the fares bodies in the Universe as quasars and also using data about the galaxies near us we can build a model and let the model to do millions of interactions, giving us finally how much time the Universe was des accelerating and since when begun to accelerate. The model can also give info about the BAP density at the Big Bang moment as well as these days.



## **TECHNICAL ENDNOTES:**

[1] Sound Velocity in Some Gasses. Table made by Dante Barbis

### **SOUND VELOCITY IN SOME GASSES**

(at 20°C)

<b>GAS</b>	<b>Average Quadratic Velocity V (m/sec)</b>	<b>Sound Velocity S (m/sec)</b>	<b>Velocity Factor (**) V/S</b>
Hydrogen	1,840.00	1,269.50	1.45
Helium	1,308.36	902.30	1.45
Water vapor (*)	615.38	410.00	1.50
Nitrogen	493.72	339.30	1.46
Air	486.00	331.45	1.47
Oxygen	461.60	317.20	1.46
CO2	392.28	260.00	1.50

(\*) The water vapor temperature is considered at 100 °C.

(\*\*) The differences in the velocity factor between one gas and another are due to the fact that some molecules are mono-atomic and other polyatomic and therefore the elasticity of their impacts is different.

[2] [http://en.wikipedia.org/wiki/Wilkinson\\_Microwave\\_Anisotropy\\_Probe](http://en.wikipedia.org/wiki/Wilkinson_Microwave_Anisotropy_Probe)

The Wilkinson Microwave Anisotropy Probe (WMAP) — also known as the Microwave Anisotropy Probe (MAP), and Explorer 80 — is a spacecraft which measures differences in the temperature of the Big Bang's remnant radiant heat — the Cosmic Microwave Background Radiation — across the full sky. Headed by Professor Charles L. Bennett, Johns Hopkins University, the mission was developed in a joint partnership between the NASA Goddard Space Flight Center and Princeton University. The WMAP spacecraft was launched on 30 June 2001, at 19:46:46 GDT, from the State of Florida. The WMAP mission succeeds the COBE space mission and was the second medium-class (MIDEX) spacecraft of the Explorer program. In 2003, MAP was renamed WMAP in honor of Cosmologist David Todd Wilkinson (1935–2002), who had been a member of the mission's science team.

WMAP's measurements played the key role in establishing the current Standard Model of Cosmology. WMAP data are very well-fit by a Universe that is dominated by dark energy in the form of a cosmological constant. Other cosmological data are also consistent, and together tightly constrain the Model. In this Lambda-CDM model of the Universe, the age of the Universe is  $13.75 \pm 0.11$  billion years. The WMAP mission's determination of the age of the Universe to better than 1% precision was recognized by the Guinness Book of World Records. The current expansion rate of the Universe is (see Hubble constant) of  $70.5 \pm 1.3 \text{ km}\cdot\text{s}^{-1}\cdot\text{Mpc}^{-1}$ . The content of the Universe presently consists of  $4.56\% \pm 0.15\%$  ordinary baryonic matter;  $22.8\% \pm 1.3\%$  Cold dark matter (CDM) that neither emits nor absorbs light; and  $72.6\% \pm 1.5\%$  of dark energy in the form of a cosmological constant that accelerates the expansion of the Universe. Less than 1% of the current contents of the Universe is in neutrinos, but WMAP's measurements have found, for the first time in 2008, that the data prefers the existence of a cosmic neutrino background with an effective number of neutrino flavors of  $4.4 \pm 1.5$ , consistent with the expectation of 3.06. The contents point to a "flat" Euclidean flat geometry, with the ratio of the energy density in curvature to the critical density  $0.0179 < \Omega_k < 0.0081$  (95%CL). The WMAP measurements also support the cosmic inflation paradigm in several ways, including the flatness measurement.