Monday, September 10, 2018

Cosmic Ray Interactions, Propagation, and Acceleration in Space Plasmas.

Astro magazine: Update.

My first bunch is arrived from San Francisco <3

It’s not the final version. This is the eco-version.

Two versions will be available by my webspace.

I'am waiting to be registered to get the ISSN-L number so these are issues intended for the registration at the library, and verifications.

The Glossy will be more colorful, the covers, and, the resolution: higher.

But i love the eco-version, too. Very special, amazing!

Now,that I know how the magazine looks like, I'll be able to do them better..

They are so cool and I love their appearance.

I really needed to see what they were like because I had a lot of cancellations to do during the month of August so doing this in Paris is a real obstacle course.

As I explained, everything was done by me: Layout, photos, designs.

The company makes the printing and sending and provides the design platform and all the options for both versions: the Glossy version requires more work in the finishes.

In Paris, graphics and design are expensive (between 500 and 2000 euros) and we have to pay for everything!

A big thank you to Brain for providing informations to try to help me find a print-shop but unfortunately the print-shop did not answer to me..

Like all the prints contacted the last days before I decides to do everything alone,what has been the liberation!   hahaha.

Update September 11:

The US company offer me again the total support for the next composition! So They support me a second time for the 5 first Original Glossies (more expensive)

The company is from far such a cool place. i’m stunned.

Many thanks for all the times, all the kindness and professionalism.

Now i'am able to invest me to do the best with this extra material they provide.

Cosmic Ray Interactions, Propagation, and Acceleration in Space Plasmas.

Astrophysics of Cosmic Rays.

Cosmic Radiation.

Cosmic radiation is the flow of atomic nuclei and high-energy. (relativistic) particles that circulate in the interstellar middle.

The source of this radiation is according to the case in the Sun, inside or outside our galaxy.

Some astroparticles that make up cosmic radiation have an energy that exceeds 1020 eV and that is not explained by any identified physical process.

Cosmic radiation is mainly composed of charged particles: protons (88%), helium nuclei (9%), antiprotons, electrons, positrons and neutral particles (gamma rays, neutrinos and neutrons)

The discovery of cosmic radiation takes place at the beginning of the twentieth century with the observations of Victor Franz Hess made in 1912 from a balloon.

It is initially identified through its role in the ionization of the Earth's atmosphere.

Direct observation from the ground of the most energetic components of cosmic radiation is not possible because it interacts with the atmosphere when it enters and produces secondary particles.

We must wait until the end of the 1950s to make the first direct observations with instruments onboard artificial satellites or stratospheric balloons.

Cosmic radiation of high energy constitutes, just like electromagnetic radiation, a single source of information on phenomena of galactic and extragalactic origin.

But its characteristics (energy, rarity) make precise observations difficult.

Moreover, the important interactions with the galactic and extragalactic environment complicate the interpretation of the collected data in order to determine its source and its nature.

Part of the low energy cosmic rays:

(relative to the rest of the cosmic rays: of the order of the MeV), trapped by the Earth's magnetic field, participates in the formation of the Van Allen belts.

Galactic or extragalactic rays can cross, interfere with DNA, cross rock and buildings, and deeply penetrate planetary soils and subsoils.

They participate in 14% of the total natural radioactivity on the surface of the Earth.

Composition of Cosmic Radiation:

This is mainly charged with protons (88%) helium nuclei (9%)

the rest being composed of electrons, different nucleons (nuclei of atoms) as well as tiny quantities of light antimatter.

(antiprotons and positrons)

The neutral part consists of gamma rays and neutrinos.

The latter is not always counted in cosmic radiation.

Primary particles (arriving on the atmosphere) have an energy that can reach 1020 eV.

Apart from neutrinos, the particles detected on the ground are essentially secondary particles coming from atmospheric sheaves, with much lower energy.

The most abundant particle at sea level is the muon, because it interacts little with matter: there is an average of one per square centimeter per minute.

Despite its lifetime of 2.2 µs, which corresponds to a maximum distance of 660 m at the speed of light, the muon travels much greater distances..

Thanks to the dilation effect of time predicted by the restraint relativity.

The most energetic particles come from interstellar and intergalactic space.

Part of these particles is diverted by the solar wind at the origin of polar auroras which brings for its part mainly ions and electrons.

Current knowledge would explain the acceleration of particles to the level of the "knee" by violent astrophysical processes such as shocks.

They would have originated from the explosion of supernovas, according to the hypothesis issued in 1949 by the Italian physicist Enrico Fermi, but this is not currently confirmed.

Other sources are suggested, which call upon the most energetic astronomical phenomena known in nature: active nucleus of galaxy, gamma jump, black hole, hypernovas, etc.

By pushing these models, it is possible to find an explanation for particle acceleration up to 1020 eV.

However, the lack of information on cosmic rays at such high energies does not allow to constrain these models.

For the most energetic particles, the zetta-particles, beyond the ankle (4 × 1019 eV) the observations are still very few (less than one sheaf a year in very specialized observatories like the Fly's Eye of the University of Utah or the Akeno Giant Air Shower Array.

In 2017 the first confirmations of the geographical origin of the high-energy radiation are given by the publication of the result of 12 years of measurements made since 2004 at the Pierre-Auger Observatory in Malargüe, Argentina: this radiation is clearly extragalactic, coming from galaxies located in a part of the space beyond the confines of the Milky Way.

The observatory has indeed collected and studied about 30 000 radii with energies exceeding 8 × 1018 electron volts.

The study of the angular distribution of their entries into the atmosphere has finally highlighted a motive(slightly dipolar) on the Celestial Sphere.

This motif was located opposite the direction of the Milky Way.

This flux thus emanates from an excess of galaxies located a hundred million light-years away.

It remains to understand the mechanism of its production.

Specialists learn for phenomena born from the environment of enormous black holes and-or the collapse of super-massive stars.

This radiation represents 15% of the natural radioactivity can be ionizing and likely to break DNA, to cause cancer and genetic malformations.

At ground level it is widely dispersed by the magnetosphere or blocked by the atmosphere and its suspended particles.

However aircrew aircraft and especially astronauts can be exposed more significantly.

(Annual effective dose of 2 to 5 mSv on long-haul flights), especially since the plane is flying at high altitude.

In France, at the beginning of the 2000s, an information and evaluation system by flight of cosmic radiation exposure in air transport (known as the "SIEVERT project") was set up in connection with the airlines of France.

Aviation and professional bodies aims to establish a regulatory dosimetry, operational for companies, allowing a calculation of dose for each flight based on real parameters including taking into account solar flares (GLE), with "dose estimation and information for the public.

Cosmic rays are sufficiently energetic to alter the state of an electronic component of an integrated circuit, which can cause transient errors, such as data corruption in RAM as well as poor processor performance, often referred to as: Soft error (not to be confused with software errors caused by programming errors or a bug)

It was a problem for electronics at very high altitude, such as satellites, but with transistors becoming smaller and smaller, it becomes a bigger concern.

Studies conducted by International Business Machines (IBM) in the 1990s, suggest that computers generally experience a cosmic ray induced error of 256 megabytes of RAM per month.

To reduce this problem, Intel has proposed a cosmic ray detector that could be integrated with future microprocessors with low fineness of engraving, allowing the processor to execute the last order again according to the cosmic ray.

Cosmic rays are suspected to be the cause of a flight incident in 2008 when an Airbus A330 airliner of the Qantas company, which plunged twice over a hundred meters after an unexplained malfunction in autopilot.

Several passengers and crew were injured, some seriously.

(Sophie PUJAS La chasse aux rayons cosmiques : Journal Le POINT, p. 97, N° 21197- 23 octobre 2014)

The Interstellar Middle:

In Astronomy, the Interstellar Middle is the material that, in a Galaxy, fills the Space between the Stars and merges into the surrounding Intergalactic environment

It is a mixture of gases (ionized, atomic and molecular), cosmic rays and dust.

The energy that occupies the same volume, in the form of electromagnetic radiation, corresponds to the interstellar radiation field.

Stars form within the densest regions of the environment (molecular clouds) and supply the environment with matter and energy by means of planetary clouds, solar winds, supernovae and their final extinction.

This interaction between the Stars and the Interstellar Middle itself helps to define the rate at which a Galaxy exhausts its gaseous reserve, and thus its duration of Star formation.

The Interstellar Middle occupies an important position in Astrophysics between the Stellar and Galactic scales.

These regions, and the processes that occur there, must be studied using infrared telescopes (eg IRAS) since they do not emit visible light.

The interstellar cloud:

In Astronomy, interstellar cloud is the generic name given to the accumulations of gas and dust in our galaxy.

This is the medium from which solar systems are born.

Counting tens of billions of atoms per cubic meter (as opposed to our atmosphere, which has 25 million trillions of billions), and spanning hundreds of light-years, it contains the equivalent of several thousand times the mass of the Sun in gaseous matter.

Mainly composed of hydrogen, helium being the second most abundant element, it also contains traces of heavier elements, such as carbon, nitrogen, and iron.

The hydrogen contained in an interstellar cloud can, depending on the density, the size and temperature of the cloud, be neutral (HI region), ionized (HII region) or molecular (molecular cloud)

Stars have long remained points in the sky, and this same views through the most powerful magnifying instruments, such as the telescope.

It is only from the end of the twentieth century and the beginning of the twenty-first century that the angular resolution of the best instruments has become less than the second of arc and thus proved sufficient to see structures around certain stars as well as to distinguish these stars as a disc and not as a point.

However still today the overwhelming majority of stars remain inaccessible to such direct observation.

Most of the stellar observations therefore focus on data relating to their electromagnetic spectrum, brightness or polarization.

The study of the stars also includes that of the Sun, which can be observed in detail, but with appropriate equipment.

To identify the stars and facilitate the work of astronomers, many catalogs have been created.

Compared to our planet (12 756 km in diameter), the stars are gigantic: the Sun has a diameter of about a million and a half kilometers and some stars (like Antares or Betelgeuse) have a diameter hundreds of times greater than this.

The diameter of a star is not constant in time: it varies according to its stage of evolution.

It can also vary regularly for periodic variable stars.

Most stars appear white to the naked eye, because the sensitivity of the eye is maximum around the yellow.

But if we look closely, we can notice that many colors are represented: blue, yellow, red (green stars do not exist)

The origin of these colors long remained a mystery until two centuries ago, when physicists had enough understanding about the nature of light and the properties of matter at very high temperatures.

The color makes it possible to classify the stars according to their spectral type (which is related to the temperature of the star)

The spectral types range from the most purple to the most red, that is, from the hottest to the coldest.

They are classified by the letters O B A F G K M

The Sun, for example, is of spectral type G

But it is not enough to characterize a star by its color (its spectral type), it is also necessary to measure its luminosity.

In fact, for a given spectral type, the size of the star is correlated with its brightness, the brightness being a function of the surface and therefore of the size of the star.

Stars O and B are blue to the eye as β Orionis (Rigel)

A stars are white like α Canis Majoris (Sirius) or α Lyrae (Vega)

The stars F and G are yellow, like the Sun.

The K stars are orange as α Bootis (Arcturus)

Finally, the M stars are red like α Orionis (Betelgeuse)

We can define a color index, corresponding to the difference of photometric flux in two spectral bands called photometric bands (the filters)

For example, the blue (B) and the visible (V) together form the color. index.

B-V whose variation is related to the surface temperature of the star and therefore to its spectral type.

The most used temperature indices are B-V, R-I and V-I because they are the most sensitive to temperature variation.

Posted by Veronica IN DREAM at 12:47 PM