An Electric Universe View of Stellar and Galactic Formation

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The formation of stars and galaxies has long been assumed by electrical theorists to result from pinch effects in cosmic electric (Birkeland) currents. The exact details of these pinches and the mechanisms involved have remained obscure even though various laboratory experiments have been done in the past. These details are now clarified by relating the mechanisms of Marklund convection and the double plasma focus experiments of W. Bostick. The observed ubiquitous 'hour-glass' shapes of planetary nebulae are shown to be fundamental to this process. The major difference between the formation of stars and of galaxies is simply a matter of scale – the processes are essentially identical.

1. Introduction

Attempts to describe the formation of stars and galaxies by processes that utilize only the gravitational force have been and continue to be elusive. No successful simulation of galaxy or stellar formation using only the purely gravitational 'accretion disk' mechanism has ever been accomplished.[1] Inclusion of plasma into simulations has yielded somewhat better results.

The purpose of this paper is to apply to the known properties of cosmic Birkeland currents, the mechanism called the Dual Plasma Focus Device, the process called Marklund convection, and the recent observations of planetary nebulae.

2. Cosmic (Birkeland) Currents

In the Electric Universe (EU) model, twisting streams of electrons and ions form filaments that span vast regions of space. Where pairs of these spaghetti-like structures interact, the particles gain energy and, at narrow pinch regions (called z-pinches), produce the entire range of galaxy types as well as the full spectrum of cosmic electromagnetic radiation.[2]

3. Plasma Focus Device

On December 12, 1956, the front page of the New York Times announced[3]: "Physicist 'Creates' Universe in a Test Tube; Atom Gun Produces Galaxies and Gives Clues to Creation". Dr. Winston Bostick had used a pair of plasma focus devices to create tiny galaxy shaped plasmoids. The device is shown in Fig. 1.

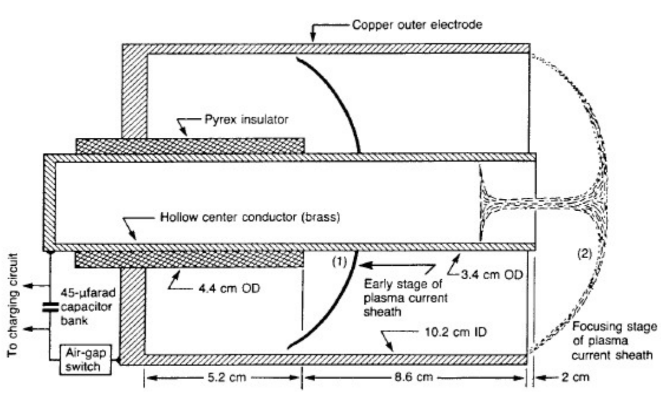

Fig. 1. Plasma focus device.

A capacitor bank is discharged through two coaxial cylindrical electrodes forming a plasma current sheath between the inner and outer electrodes. The annular shaped discharge moves toward the open end of the device where the inner radius of the discharge rounds the end of the inner electrode and forms a columnar pinch or 'focus' on-axis. The outer surface of the discharge moves beyond the end of the device and takes on a parabolic shape (not unlike an opened umbrella). Not shown in the figure is a jet of plasma containing protons, electrons, and neutrons that extends out along the axis. This jet forms when the central electrode is positive with respect to the outer cylinder.

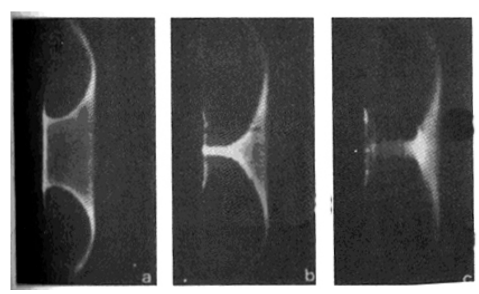

Fig. 2. Evolution of the pinch.

Bostick conducted an experiment (1956-1957) wherein two plasma focus devices were fired at each other across a magnetic field.

The shapes of the resulting plasmoids are suggestive of embryonic galaxies. A. Peratt later reproduced the shapes seen here via particle in cell (PIC) simulations on super-computers.

Fig. 3. W. Bostick and his plasmoids generated via dual plasma focus guns.

4. Marklund Convection

When a pinch in a Birkeland current occurs in cosmic space the magnetic flux tubes are not directly observable themselves, but the associated plasma filaments can often be observed by the radiation they emit."[4]

When several different chemical elements are contained within such a region of compression, they do not mix homogeneously. Rather, they tend to distribute themselves radially according to their ionization potentials. This effect was studied by G.T. Marklund[5] and is now called Marklund convection.

While discussing Marklund convection, Peratt [6] also says, "The most abundant elements of cosmical plasma can be divided into groups of roughly equal ionization potentials as follows: He (24eV); H, O, N (13eV); C, S (11eV); and Fe, Si, Mg (8eV)…. These elements can be expected to form hollow cylinders whose radii increase with ionization potential. Helium will make up the most widely distributed outer layer; hydrogen, oxygen, and nitrogen should form the middle layers, while iron, silicon, and magnesium will make up the inner layers. Interlap between the layers can be expected and, for the case of galaxies, the metal-to-hydrogen ratio should be maximum near the center and decrease outwardly…. Mirabel and Morras[7] (1984) have detected the inflow of neutral hydrogen toward our own galaxy."

Any time charges are accelerated (as they are in the case of a Birkeland current) "synchrotron" electro-magnetic radiation at various frequencies occurs – typically from microwaves through hard x-rays.

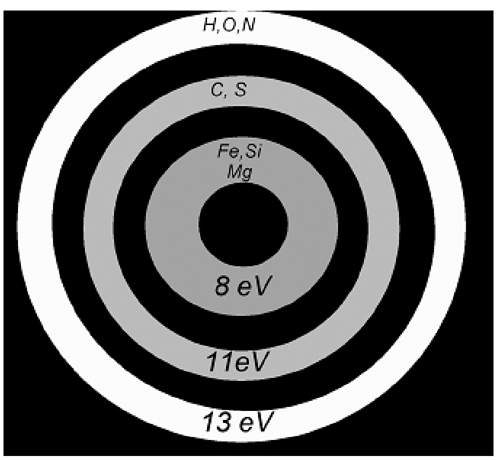

Fig. 4. Elements form into concentric cylinders in a Birkeland current. Radii are proportional to their ionization voltage.

Thus, a Birkeland current performs a scavenging effect, gathering and concentrating whatever (neutral or ionized) elements it passes near. The result is analogous to a cosmic coaxial cable transmission line.

5. Magnetic Pinch

When electric current passes axially along a cylindrical conductor, a magnetic field is created that surrounds the conductor and tends to crush the cylinder. This effect is called the magnetic pinch and is commonly seen in the laboratory.

If the conductor is a multi-layered collection of concentric cylinders, this crushing effect can produce a discharge between two or more layers of the structure.

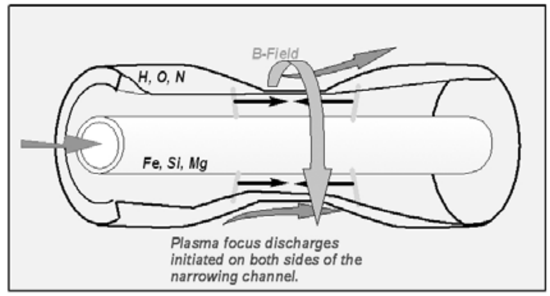

Fig. 5. Magnetic pinch causes reduced spacing between inner and outer conductors thus initiating an annular plasma discharge.

The effect is similar to two oppositely directed plasma focus devices. Two oppositely directed axial jets of ions, electrons and neutrons can be generated. The result is as shown in Fig. 6.

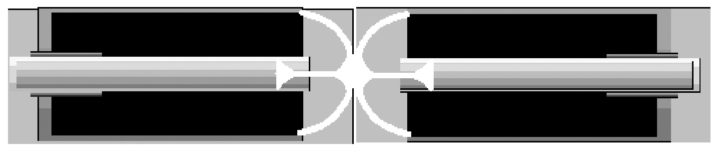

Fig. 6. Dual opposed plasma focus devices.

A typical planetary nebula is shown in Fig. 7. Notice the dual concentric cylinders that form the Birkeland current. Dual jets extend axially in both directions from the pinch. These flows each produce a least two visible double layers. The parabolic shapes of the plasma discharges are apparent.

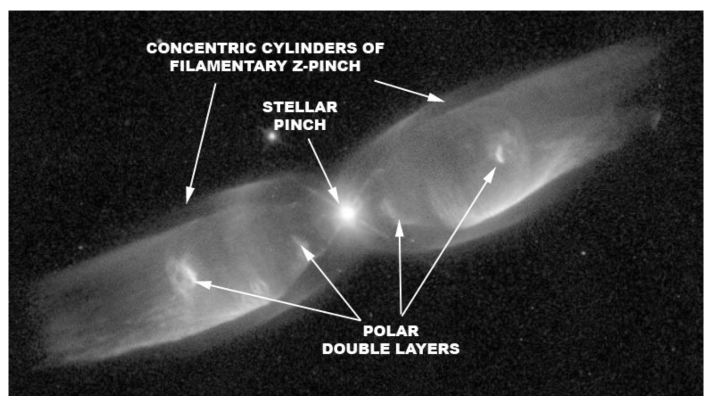

Fig. 7. A typically observed planetary nebula.

6. Other Examples

There are literally dozens of objects that exhibit this morphology such as planetary nebula MyCn 18, which contains a ring around its central object.

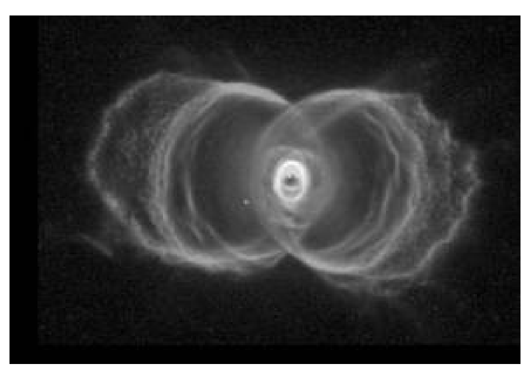

Fig. 8. MyCn 18

Many instances have recently been reported of stars exhibiting surrounding rings. The bright star Fomalhaut has now been discovered to have one. Another classic double hour-glass structure is visible in images of the object called the Southern Crab Nebula. It is a well known property of plasma that it can operate in two visible modes (arc and glow) and one invisible mode (dark mode). So in some objects all of the structure described above presents itself. In others parts of the plasma composition are in dark mode and so are not visible. For example in the object shown in Fig. 9, the outer, larger extent of the plasma is very diffuse – the electric current density being insufficient to illuminate it as well as the inner regions shown in the lower right of that figure.

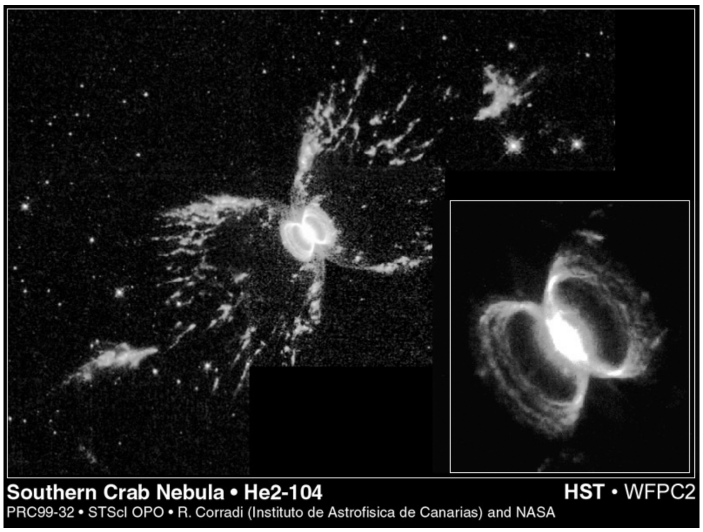

Fig. 9. Planetary nebula He2-104.

7. Conclusion

The dual hour-glass shape that appears to be almost ubiquitous in the case of planetary nebulae was predicted by Hannes Alfvén in both his stellar and galaxy models. The fact that there is now a combination of well-understood electrical mechanisms that can densely concentrate matter in the cosmos in order to create a star or a galaxy, reveals the extent of the failure of standard explanations. For example, the official Hubble site, which produced the image seen above in Fig. 8 offers the following as an explanation:

> The results are of great interest because they shed new light on the poorly understood ejection of stellar matter which accompanies the slow death of Sun-like stars. In previous ground-based images, MyCn18 appears to be a pair of large outer rings with a smaller central one, but the fine details cannot be seen.
>
> According to one theory for the formation of planetary nebulae, the hourglass shape is produced by the expansion of a fast stellar wind within a slowly expanding cloud which is more dense near its equator than near its poles. What appears as a bright elliptical ring in the center, and at first sight might be mistaken for an equatorially dense region, is seen on closer inspection to be a potato shaped structure with a symmetry axis dramatically different from that of the larger hourglass. The hot star which has been thought to eject and illuminate the nebula, and therefore expected to lie at its center of symmetry, is clearly off center. Hence MyCn18, as revealed by Hubble, does not fulfill some crucial theoretical expectations.

It is suggested that the reader compare this explanation with the one presented in this paper.

References

[1] S. A. Balbus & J. F. Hawley, "A Powerful Local Shear Instability in Weakly Magnetized Disks", *Astrophysical Journal* **376**:214-222 (1991)

[2] A. L. Peratt, "Plasma Cosmology", *Sky & Telescope* **83** (2): 136-140 (Feb 1992).

[3] www.thunderbolts.info/tpod/2008/arch08/080124bostick.htm.

[4] A. L. Peratt, **Physics of the Plasma Universe**, pp. 165-166 (Springer Verlag, 1992).

[5] A. G. T. Marklund, "Plasma Convection in Force-Free Magnetic Fields as a Mechanism for chemical Separation in Cosmical Plasmas", *Nature* **277**: 370 (1979).

[6] A. L. Peratt, op. cit. pp 167-168.

[7] Mirabel and Morris, "Evidence for High Velocity Inflow of Neutral Hydrogen toward the Galaxy", *Astrophysics J* **279**: 86 (1984).