Power out of Deep Space

Dr Colin Keay 9th May 2000

Our star, the Sun, derives its prodigious energy from nuclear fusion: the steady conversion of hydrogen into helium.

It is an energy source that mankind has yet to tame but when that day dawns the energy available will end reliance on fossil fuels, nuclear fission and the so-called renewables.

Over the past half century increasingly complicated devices called stellarators, rotomaks and tokomaks have crept tantalisingly closer to the break-even point where, for brief instants, more energy is produced than consumed to run them.

They employ complicated magnetic fields to confine plasmas heated to a hundred-million degrees and enable nucleii to fuse and release energy

The Sun achieves this feat continuously by virtue of its size and colossal gravitational field, which confines the fusion process to its central core.

Here on Earth gravity is too weak, so hard-to-handle magnetic forces must be employed.

The challenge to find a solution to the fusion confinement problem may be assisted by an interesting astrophysical discovery.

The faint object camera on the Hubble Space Telescope has produced a highly detailed image of a jet of plasma 10,000 light-years long, which is roughly one tenth of the distance across the Milky Way galaxy. The jet is being emitted from a galaxy called 3C66B, itself more than a quarter of a billion light-years distant from our own galaxy.

The faint object camera captures detail more than 10 times finer than any ground based telescope and three times better than the best radio images.

It has revealed that the plasma jet exhibits a unique double-strand braided structure all along its incredible length. It is also astonishingly bright.

The big question is what is the nature of the energy source that keeps the jet emitting light over a period of more than 10-,000?

What was the mechanism in the first place that squirted the jet from the galaxy at the pre-historic time when early primitive human societies were evolving on our planer?

We know that the bluish light on the jet is produced by electrons spiralling along a strong magnetic field at nearly the speed of light.

What powerhouse keeps them hurtling through space at such enormous speeds?

It is a complete mystery.

Another mystery is posed by two sharp bend and kinks in the jet at a distance of about 3000 and 8000 light-years out from the core of 3C66B.

Why do they not cause the entire jet to disrupt itself?

There must be some unknown stabilising mechanism operating to preserve the integrity of the jet as a conduit for the stupendous energies involved.

Hopefully better observational evidence of this and other similar galactic jets may lead to a better understanding of the way such huge amounts of energy are produced and guided by magnetic fields over vast distances.

It is the kind of knowledge needed to help crack the problems of fusion power generation and thus ensure a bright energy future for the human race.

NASA's Astronomy Picture of the Day

above is a link to an amazing image taken by NASA of the jets of the Sun