

77(1): Plasma Model for a Spiral Galaxy

This is based on the Hamiltonian - Jacobi equation:

$$(p^\mu - eA^\mu)(p_\mu - eA_\mu) = m^2 c^2 \quad - (1)$$

The eA^μ term is postulated to originate in the plasma of charged electrons of the plasma universe model. Eq (1) is the special relativistic

limit of $(\square + kT) \psi_\mu = 0 \quad - (2)$

with added eA^μ .

From the Enigmatic Photon, volume 1, it is known that the orbital velocity components of eq (1) are:

$$v_x = \frac{ec}{m\omega} B^{(0)} \cos \theta \quad - (3)$$

$$v_y = -\frac{ec}{m\omega} B^{(0)} \sin \theta \quad - (4)$$

so:

$$v = (v_x^2 + v_y^2)^{1/2} = \frac{ecB^{(0)}}{m\omega} \quad - (5)$$

As observed in a spiral galaxy, v and ω are constant, so $B^{(0)}$ is a constant

2) defined by: $\underline{B}^{(3)} = B^{(0)} \underline{k} \quad - (6)$

Therefore $\underline{B}^{(3)}$ is the primordial spin field of the galaxy, originating in the spinning of spacetime that causes the galaxy to form.

In eqns (3) and (4):

$$\theta = \omega t \quad - (7)$$

So the relativistic Hamilton Jacobi equation (1) describes a spinning plasma. This is the precise analogy of the inverse Faraday effect, which is also caused by spinning spacetime.

If: $\omega t \ll 1 \quad - (8)$

then from eq (4):

$$\omega = \frac{v}{r} = - \frac{ecB^{(0)}}{mv_y} \sin \theta \rightarrow - \left(\frac{ecB^{(0)}}{mv_y} \right) \theta \quad - (9)$$

i.e. we obtain the hyperbolic spiral:

$$\frac{1}{r} = - \left(\frac{ecB^{(0)}}{mv_y} \right) \theta \quad - (10)$$

3)

More accurately:

$$\frac{1}{r} = - \left(\frac{ecB^{(0)}}{2v v_y} \right) \sin \theta \quad \text{--- (11)}$$

$$= - \left(\frac{ecB^{(0)}}{2v v_y} \right) \left(\theta - \frac{\theta^3}{3!} + \frac{\theta^5}{5!} - \frac{\theta^7}{7!} + \dots \right)$$

which is a combination of spiral-like functions.

Similarly, from eq. (3):

$$\frac{1}{r} = \left(\frac{ecB^{(0)}}{v v_x} \right) \left(1 - \frac{\theta^2}{2!} + \frac{\theta^4}{4!} - \frac{\theta^6}{6!} + \dots \right)$$

giving another combination of spiral-like functions. --- (12)

So the spiral galaxy is made up of
the spiral-like combination (11) and (12).

Pulsar Theory

This is closely related to synchrotron and pulsar theory (Jackson p. 672) because the radiation emitted by an extremely relativistic particle subject to arbitrary acceleration is equivalent to that emitted by a particle moving instantaneously at constant speed.
The orbital velocity of the spiral galaxy is constant.