TOMITA CHIAO PHASE IN THE
EVANS FIELD THEORY

The geometrical phase of Tomita and Chiao is usually expressed as:
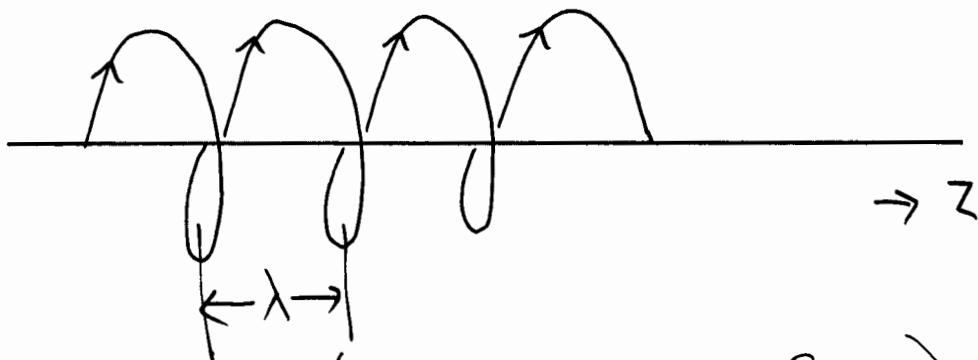
$$\phi = \exp\left(2\pi i \left(1 - \frac{p}{s}\right)\right) \quad - (1)$$

where p is the pitch of the helix and s is its length. A helix turns 2π radians in a pitch p, so $p = \lambda$ where λ is the wavelength. Also s is Z. Therefore:

$$\phi = \exp\left(2\pi i \left(1 - \frac{\lambda}{Z}\right)\right)$$

$$= \exp(2\pi i) \exp\left(-2\pi i \frac{\lambda}{Z}\right)$$

$$\boxed{\phi = \exp\left(-2\pi i \frac{\lambda}{Z}\right)} \quad - (2)$$

using:

$$e^{2\pi i} = \cos 2\pi - i \sin 2\pi = 1. \quad - (3)$$

General Relativity (Evans Field Theory)

The light traversing the helical path is a rotating and translating tetrad $q^{(1)}$ multiplied

2) by $A^{(0)}$:

$$\underline{A}^{(1)} = A^{(0)} \underline{q}^{(1)} \quad - (4)$$

where:

$$\underline{q}^{(1)} = \frac{1}{\sqrt{2}} (\underline{i} - i\underline{j}) \exp\left(i\left(\omega t - \kappa Z\right)\right) \quad -(5)$$

with:

$$\omega = \frac{v}{r}, \quad \kappa = \frac{1}{r}, \quad \omega = \kappa v. \quad -(6)$$

Here ω is an angular frequency in radians per second, r is a distance in metres, κ is a wavenumber in inverse metres and v is a velocity in metres per second. Thus eq. (5) is a <u>propagating</u> and <u>circularly</u> <u>polarised</u> <u>wave</u> of <u>spacetime</u>, and can be expressed as:

$$\boxed{\underline{q}^{(1)} = \frac{1}{\sqrt{2}} (\underline{i} - i\underline{j}) \exp\left(-i\frac{\bar{Z}}{r}\right)} \quad -(7)$$

where:

$$\bar{Z} = Z - vt. \quad -(8)$$

We <u>know from gravitational theory that waves</u> <u>of spacetime propagate at c</u>, so:

$$v = c. \quad -(9)$$

The purpose of the helix is to set up a particular

3) geometrical path for the light beam (helical optical fiber).

Comparing eqns. (2) and (7):

$$r = \frac{z \bar{z}}{2\pi \lambda} \qquad - (10)$$

In the special case:

$$z = \bar{z} = \lambda \qquad - (11)$$

then:

$$r = \frac{\lambda}{2\pi} = \frac{1}{\kappa} \qquad - (12)$$

Special Relativity (Maxwell Heaviside Field Theory)

The electromagnetic field is an entity separate from the frame of reference. Therefore there is no concept of a helical tetrad field or propagating wave of spacetime. A light beam travelling in a helix is predicted to have the same phase as a light beam travelling in a straight line, contrary to experimental observation.

Conclusion

Evans field theory (general relativity) is preferred to Maxwell Heaviside field theory (special relativity).