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Unification of Electromagnetic and Gravitational Forces (Electro-Gravity)

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Abstract: *In this work, we examined the gravitational and electromagnetic forces. We used statistical methods to obtain statistical relations which suggestively may indicate unification of the fundamental interactions. With some plausible assumptions, the observable data yield* $logF_g = -0.740logU_{mag} + 45.46$*; where* F_g *is gravitational force,* U_{mag} *is magnetic field energy density, (with correlation coefficient;* $R \simeq 0.6$*). This suggests that since the correlation is good, gravitational and electromagnetic interactions relate as* $F_g \sim U_{mag}^{-\psi}$*; where* ψ *is the slope of the plot.*

Keywords*: Extragalactic Radio sources, Blackhole Masses, Fundamental forces.*

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I. Introduction

In this chapter, we used statistical method to obtain relations that may suggestively indicate unification of the four fundamental interactions. These interaction (or forces) include: gravitational, electromagnetic, weak (nuclear), and strong (nuclear) interactions (Perkins, 2000).

II. Materials And Method

The data used in the analyses were obtained from Minfeng *et al.,* (2001), Sofia *et al.,* (1999) Jong-hak and Megan (2002) and Yi Liu *et al.,* (2005).

Statistical Data Analyses

Here, we used statistical data analyses to obtain a relation that suggestively may unify gravitational and electromagnetic interactions. The magnetic field energy density, U_{mag}, of a source emitting synchrotron radiation was given by (Robson, 1996):

$$\frac{dE}{dt} = \frac{4}{3}\sigma_T c\gamma^2 U_{mag} \quad (1)$$

where E is energy, t is time, σ_T is Thompson cross- section, c is speed of light, γ is Lorentz factor. By definition, $\frac{dE}{dt}$ is luminosity. Therefore, assuming bolometric luminosity (P_{bol}) of the source, and taking σ_T to be $6.65 \times 10^{-29}m^2$(Robson 1996), equation (1) may be written as:

$$U_{mag} = \frac{3P_{bol}}{4\sigma_T c\gamma^2} \quad (2)$$

The last equation simply indicates that we can estimate the value of the source magnetic field energy density once its bolometric luminosity and jet speed are known.

Moreover, gravitational force, F_g of interaction of a given blackhole is given by (Hawking, 1976):

$$F_g = 2 \times 10^{-6}\frac{\pi k}{\hbar}\frac{m_\odot}{m_b} \quad (3)$$

where k is Boltzmann constant, $m_\odot$ is solar mass, m_b is mass of blackhole.

Using equation (3), we also estimated gravitational force of interaction of each source. Linear regression of U_{mag} against F_g was carried out as shown in figure 1.

III. Results

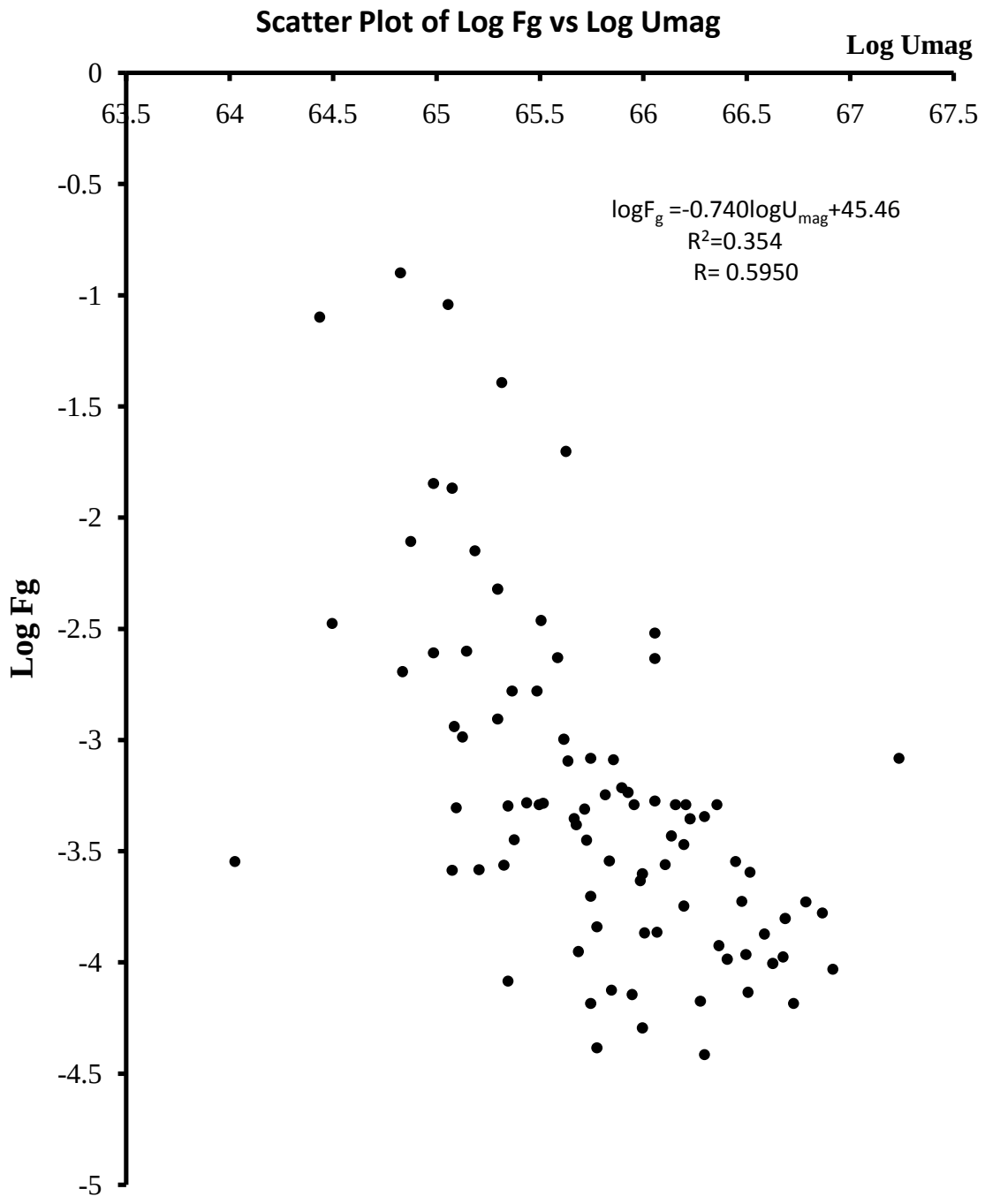

Figure 1: The plot of unification of gravitational and electromagnetic interaction

With a good correlation coefficient ($R \cong 0.6$) from the plot for U_{mag} against F_g, we obtained an equation given by:

$$logF_g = -0.740log\ U_{mag} + 45.46 \quad (4)$$

Simplifying, we obtain:

$$F_g = (2.884 \times 10^{45})U_{mag}^{-0.74} \quad (5)$$

$$F_g \sim U_{mag}^{-\psi} \quad (6)$$

IV. Discussion

The unification was conducted using Statistical method. The data obtained from the extragalactic source was used to carry out a linear regression analyses. The result of the regression is given by the equation (4), with a good correlation whose coefficient is given by R= 0.6.

where F_g is gravitational interaction, U_{mag} is the electromagnetic interactions on the expression.

This suggestively indicates that gravitational and electromagnetic interactions relate according to the expression:

$F_g \sim U_{mag}^{-\psi}$

where $\psi = 0.74$ is the slope of the plot.

V. Conclusion

The unification process was carried out through the use of the statistical method. Extragalactic source accounted for gravitational and electromagnetic interaction. A linear regression analysis was done from estimated data obtained. This accounted for a good correlation coefficient.

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