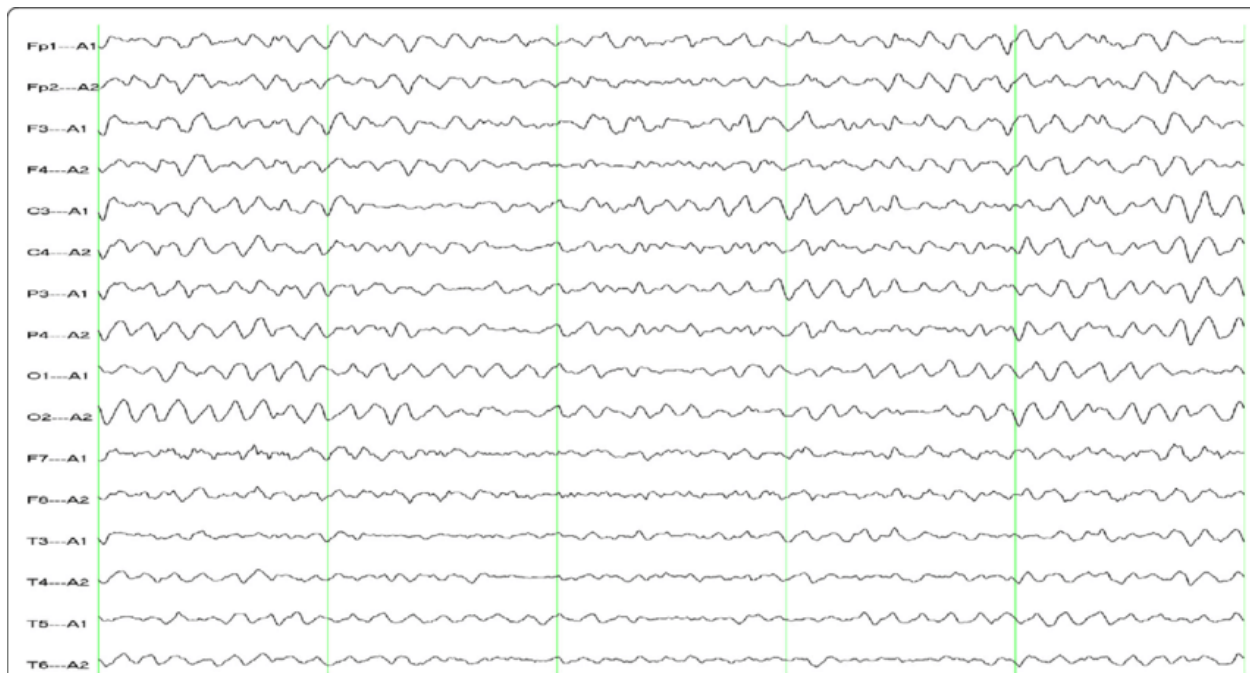


## A Mathematical Model of Electrical and Magnetic Activities of the Human Brain

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Working of the brain presents one of the most challenging problems of neurosciences. It is an extremely complex structure containing something of the order of  $10^{10}$ - $10^{12}$  nerve cells with perhaps  $10^{15}$  interconnections. Magnetic field of brain is of the order  $10^{-13}$  Tesla. The neuron-synaptic system was modeled <https://www.ngds-ku.org/Papers/J08.pdf> as a system of driven-harmonic oscillators. The variation of electric and magnetic potentials in the dendritic trees was studied. First-order corrections to EEG (Fig. 1) in the presence of weak electric, magnetic <https://www.ngds-ku.org/Papers/J13.pdf> and gravitational fields\* were estimated<sup>§</sup>.



**Fig. 1. Normal EEG (Electroencephalogram)**

**Keywords:** Driven-harmonic oscillator • EEG • Neuron • Neuroscience • Synapse

**Web address of this document:** <https://www.ngds-ku.org/Presentations/IEEP.pdf>

\*Update 1997: 4 years later results for gravitational-field study have been published as:

Ahmed, S. N., S. A. Kamal, K. A. Siddiqui, S. A. Husain and M. Naem (1997). EEG in weightlessness: a theoretical estimate. *Karachi University Journal of Science*, **25** (1): 29-39, full text:

<https://www.ngds-ku.org/Papers/J20.pdf>

§Update 2021: An enhancement of the published version (4-year later) of the covariant-generalized-coupling model:

Kamal, S. A. and K. A. Siddiqui (1997). The covariant-generalized-coupling model of global electrocortical activity. *Karachi University Journal of Science*, **25** (1): 29-39, full text: <https://www.ngds-ku.org/Papers/J19.pdf>

has been worked out in 2021 as the paper:

Kamal, S. A. (2021). The covariant-enhanced-coupling model of global-electrocortical activity. *International Journal of Biology and Biotechnology*, **18** (3): 547-560, full text: <https://www.ngds-ku.org/Papers/J61.pdf>