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Physics

Thesis

Abstract

We developed a methodology for analysing electroencephalogram (EEG) data as probabilistic in nature, allowing for novel parameters such as the average positional and momentum values, frequencies of being in a region or with a certain momentum, and an underlying uncertainty principle analogous to Heisenberg's of quantum mechanics to be ascertained. The analytical techniques of this model uncovered a tendency for EEG signal to be localised in the anterior regions in rest, whereas it is more uniformly distributed while engaged in a task. Moreover, the constant values (the analog to the Heisenberg uncertainty principle) extracted from this methodology appear to be consistent in both resting and stimulated EEG data, suggesting an underlying common property of the human brain activity which goes beyond cognitive performance.

How enjoyable was using an integrated approach?

It really showcased how all of science needs to act in concert to achieve amazing results! I loved it and it prepared me well for the interdisciplinary nature of condensed matter physics!

Were there any difficulties integrating sciences?

Not particularly. I was using quantum mechanics to study the brain! Very intersectional!

Any advice for future students?

Do something you like! If you have a cool idea, suggest it to a professor doing similar research. I bet they will enjoy your initiative! It is way easier to dedicate time to something that interests you.

[Reference](#)