# International Journal of Physics Research and Applications

**Volume - 7, Issue - 1**

**Research Article** **Published Date:-2024-04-05 15:48:15**

## Statistical Mathematical Analysis of COVID-19 at World Level

Worldwide, statistical data of people infected by COVID-19 has been taken until March 29, 2023, which, when correlated, showed a predictive logistic model. The purpose was to determine the predictive model, which was acceptable, in such a way that the proportionality constant and the correlation and determination coefficients are of great importance to estimating epidemiological and pandemic data; coinciding with what was reported by other authors. Bearing in mind that a mathematical model is a mathematical description through a function or equation of a phenomenon in the real world; whose purpose is to understand infections and make predictions for the future. The stages were: to model the number of people infected as a function of time, formulate, and choose the logistic model, determine the model and obtain mathematical conclusions, and make predictions (estimates) about the number of people infected by COVID-19 worldwide. The logistic model was derived to predict the speed of people infected by COVID-19 and the critical time (tc = 733 days) for which the speed was maximum (1694,7209 infected/day). The Pearson correlation coefficient for the time elapsed (t) and the number of people infected (N) worldwide, based on 32 cases, was r = -0.88; the relationship between time and those infected is real, there is a “very strong correlation” between the time elapsed (t) and the number of people infected (N) and 77.03% of the variance in N is explained by t.

---

**Research Article** **Published Date:-2024-04-05 15:43:58**

## Time Electron Theory

What is time? Is it a physical quantity, illusion, or dimension? Defining time is challenging and fascinating. We often consider time as a dimension to help us understand the concept of space-time. Time undeniably exists, but we can only sense its presence through its effects. For instance, if we take two apples, one bought months ago and the other just a day ago, we can tell that one apple was bought a long time ago because it had rotted. We express time as the effect caused by it. If there were no effects of time on this universe, then the concept of time would not exist [1,2].

---

**Mini Review** **Published Date:-2024-03-19 17:45:03**

## Approximation of Kantorovich-type Generalization of (p,q) - Bernstein type Rational Functions Via Statistical Convergence

In this paper, we use the modulus of continuity to study the rate of A-statistical convergence of the Kantorovich-type (p,q) - analogue of the Balázs–Szabados operators by using the statistical notion of convergence.
Mathematics subject classification: Primary 4H6D1; Secondary 4H6R1; 4H6R5.

---

**Mini Review** **Published Date:-2024-02-20 15:40:52**

## Thermoelectric Materials Based on Lead Telluride and Prospects for their Practical Application

---

Lead telluride (PbTe) is considered one of the most promising materials in thermoelectrics due to its unique thermoelectric properties. This semiconductor exhibits a high thermoelectric figure of merit (ZT) in certain temperature ranges, making it highly effective for converting heat energy into electricity. Additionally, PbTe is characterized by stability and low thermal conductivity, which further enhances the efficiency of thermoelectric devices. Another advantage of using PbTe is its relative affordability and high availability of raw materials. This makes it attractive for manufacturing mass thermoelectric devices such as thermoelectric modules for automobiles, industrial thermoelectric generators, heat recirculation, and others. The paper provides a review of works and an analysis of general approaches to semiconductor thermoelectric materials, including lead telluride.

---

**Research Article** **Published Date:-2024-02-09 11:38:08**

Optimizing Milk Safety: Applying Nuclear Techniques in X-ray Fluorescence Spectroscopy for Heavy Metal Quantification in Powdered Milk Consumed in Senegal

This study conducted an elemental analysis and assessed heavy metal concentrations in five powdered milk samples (V1, L1, H1, G1, and D1) from Senegal, utilizing X-ray Fluorescence (XRF). The analysis focused on aluminum (Al), calcium (Ca), potassium (K), phosphorus (P), and chlorine (Cl). Aluminum was either undetected or found at negligible levels in all samples. Calcium levels consistently surpassed the Acceptable Maximum Level (AML) in all samples, with H1 exceeding the AML by approximately 11.1 times (27,745.06 ± 310.16 ppm). Potassium concentrations varied, with G1 exhibiting the highest levels, significantly exceeding the AML (51,058.15 ± 456.13 ppm), while V1 remained within acceptable limits. Chlorine concentrations generally complied with the AML, except for G1, which slightly exceeded the limit (3631.04 ± 31.23 ppm). Phosphorus concentrations in H1 were notably higher than the AML (13,750.94 ± 275.35 ppm). The non-uniformity in heavy metal concentrations among samples emphasizes the need for ongoing research and regulatory scrutiny to address potential risks and ensure the safety of powdered milk.

---

**Mini Review** **Published Date:-2024-01-19 09:46:09**

Generation of Curved Spacetime in Quantum Field

To reach such a consistent theory which contains the quantum field theory of particle physics and Einstein’s theory of gravitation as limiting cases, one may proceed in the following way: Standard quantum field theory just ignores the effects of gravity. This is justified in many cases due to the weakness of gravitational interactions at the presently accessible scales. In a first step beyond this approximation, one may consider an external gravitational field that is not influenced by the quantum fields. Here one may think of sources of gravitational fields that are not influenced by the quantum fields under consideration, as high-energy experiments in the gravitational field of the earth or quantum fields in the gravitational field of dark matter and dark energy. This approach amounts to the treatment of quantum field theory on curved spacetimes. The problem of quantization in curved spacetimes is now clearly visible. In Minkowski spacetime, there is a large group of symmetries that enforces a particular choice of vacuum by demanding the vacuum to be invariant. Such a criterion is absent for a general spacetime (M,g). We therefore do not know which state to choose as the vacuum. One might hope that the different prescriptions might be unitarily equivalent such that it doesn’t matter which state one takes to define the theory. Sadly this is not the case: The Stone-Von Neumann theorem is no longer valid for systems with an infinite amount of degrees of freedom. This means that unitarily inequivalent representations of the canonical commutation relations will arise, and it is not clear which equivalence concept representation is the physical one. In the second section of this chapter, we review the notions of Cauchy surfaces and global hyperbolicity.

---

**Research Article** **Published Date:-2024-01-18 12:16:50**

Markov Chains of Molecular Processes of Biochemical Materials

---

Biochemical systems are analytically investigated after encoding the properties of the dynamics, which rule the time evolution of the transition properties, using some Markov models, such as the Hierarchical Markov-State Models. The present paper is aimed at analytically writing the (finite) Markov chain originating from the considered Markov models. Within this framework, the interaction with the environment is considered, and the ergodicity of the systems obtained from numerical simulation is controlled and compared with the qualities of the Markov chain. The (von Neumann) conditions to be imposed on the Bloch equations for the biomaterial structures to be described analytically in a consistent way are governed. The formalisms of the 'heat bath' and that of the control of the numerical errors ensure the good measure-theoretical framework and the ergodicity of the finite chain, respectively. The finite Markov chains are investigated and the analytical expressions are presented, after which the Hierarchical Markov-State-Model provides the time evolution of the transition probabilities in biochemical systems.
The notion of heat bath is used to describe the interactions of the biomaterial with the environment and thus to control the uses of the projection operators in the Markovian processes where the appropriate measure is defined; the stochastic equations allow one to obtain the wanted measure from the probability spaces.
The cases in which a violation of the Markov property of the process occurs, i.e. in open systems, or dissipative processes are also considered. Furthermore, in complex molecules in biological systems, these features are investigated to be possibly even more dramatic. As far as molecular processes are concerned, this occurrence is associated with the appearance of chaotic effects with certain characteristics of potential surfaces: rather than the technique of isocommittors, the method of projectors in measure spaces is used for the Nakajima-Zwanzig paradigm for the density operator; this latter method complementary compares the time-convolution-less technique.
The finite Markov chains are finally proven to be ergodic after the control of the numerical errors which provide the Sinai-Markov partitions to be applied for the analysis of the measure space of the Markov chain, that is, one endowed with a Hilbert measure. The von Neumann conditions are therefore newly demonstrated to be apt to be applied to the Bloch equations for biomaterial structures after the use of the notion of heat bath, from which the measure space arises.
The qualities of the Hierarchical Markov-Sate Models which bring the analytical expression of the time evolution of probabilities of biomaterials are therefore newly analytically studied.