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Editorial

It is indeed a great pleasure and privilege for me to introduce the current issue of *Mapana*-Journal of Sciences which is committed to publishing original and novel research and review articles from Physical Sciences. This issue comprises of articles pertaining to different areas like Astrophysics, Nuclear Physics and Nanomaterials aiming to provide a broader arena to publish nuanced perspectives of Physics. We are delighted to publish 5 articles related to research in this area.

Mandyam N Anandaram in the article, "*On the Adaptive Quadrature of Fermi-Dirac Functions and their Derivatives*", demonstrates the use of automatically adaptive integrator quad combined with optimized breakpoints for fast and accurate computation of all Fermi-Dirac integrals. It is a useful alternative for the use of fixed-order quadrature schemes in many stellar EOS calculations and in other applications.

The second article by U V S Seshavatharam and S Lakshminarayana, titled, "*On the Role of Four Gravitational Constants in Nuclear Structure*" gives an insight into the role of four gravitational constants in nuclear structure. The authors present a discussion of the role of nuclear structure on different gravitational constants associated with gravitational, weak, electromagnetic and strong interactions. Nuclear gravitational constant plays a crucial role in understanding the nuclear elementary charge, the strong coupling constant, nuclear charge radii, nucleon magnetic moments, nuclear stability, nuclear binding energy and neutron lifetime. Weak gravitational constant plays a crucial role in understanding the Fermi's weak coupling constant. The three assumed atomic gravitational constants play an interesting role in understanding neutron-proton stability. The authors also highlighted that electromagnetic and nuclear gravitational constants play an interesting role in understanding proton-electron mass ratio, Bohr radius and characteristic atomic radius.

In the article "*Utilization of FOTIA for studying PIXE and its applications*", Daisy Joseph describes the working of folded tandem Ion Accelerator to study Particle-induced X-ray Emission using

protons of energy 3-5 MeV. The article discusses the sample preparation methods, the types of detectors, the analysis methods and the findings therein for a variety of applications in biological samples, rare earths, materials, geological samples and forensic samples.

The fourth article, "*Tailoring of Energy Band Gap in Graphene-like System by Fluorination*" by Aparna V Nair and B Manoj outlines the "Tailoring of Energy band gap in graphene-like system by Fluorination" by deoxyfluorination reaction. The introduction of band gap suggests that these types of materials can act as an effective semiconductor and whose electrochemical applications are worth investigating.

In the penultimate review article titled "*On Self-gravitating Polytropic Cylinders and Slabs*", Mandyam N Anandaram outlines the 2-D Lane-Emden equation (LEEq) model of a self-gravitating gas distribution in the form of an infinitely long cylinder shaped polytrope of finite radius. The author also reviews the 1-D LEEq model of an infinitely wide planar polytrope of finite thickness and its basic radial properties. These models are found to have finite radii for all polytropic indices unlike the restricted spherical analogs and are shown to have astrophysical applications.

We appreciate and acknowledge all the authors for their valuable contribution. We encourage the authors to submit note-worthy research articles in the field of Physics, Electronics and related interdisciplinary areas.

B Manoj
Issue Editor