Seminar Notice

On 7th July, 2022 (Thrusday)
Time: ***3:00 PM***

Venue: ***PAMU Seminar Room***
Physics and Applied Mathematics Unit
Indian Statistical Institute, Kolkata- 700108

Speaker: ***Dr. Abhishek Majhi***
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Title: Resolving the Singularity by Looking at the Dot and Demonstrating the Undecidability of the Continuum Hypothesis

Abstract:

Einstein's theory of general relativity, which Newton's theory of gravity is a part of, is fraught with the problem of singularity that has been established as a theorem by Hawking and Penrose, the latter being awarded the Nobel Prize in recent years. The crucial hypothesis that forms the basis of both Einstein's and Newton's theories of gravity is that bodies with unequal magnitudes of mass fall with the same acceleration under the gravity of a source object. Since, the validity of Einstein's equations is one of the assumptions based on which Hawking and Penrose have proved the theorem, therefore, the above hypothesis is implicitly one of the founding pillars of the singularity theorem.

In this work, I demonstrate how one can possibly write a non-singular theory of gravity which manifests that the above mentioned hypothesis is only valid in an approximate sense in the "large distance" scenario. To mention a specific instance, under the gravity of the earth, a 5 kg and a 500 kg fall with accelerations which differ by approximately $113.148*10^{-32}$ meter/sec^2 and the more massive object falls with less acceleration. Further, I demonstrate why the concept of gravitational field is not definable in the "small distance" regime which automatically justifies why the Einstein's and Newton's theories fail to provide any "small distance" analysis. In the course of writing down this theory, I demonstrate why the continuum hypothesis, as spelled out by Goedel, is undecidable. The theory has several aspects which provide the following realizations: (i) Descartes' self-skepticism concerning exact representation of numbers by drawing lines (ii) Born's wish of taking into account "natural uncertainty in all observations" while describing "a physical situation" by means of "real numbers" (iii) Klein's vision of having "a fusion of arithmetic and geometry" where "a point is replaced by a small spot" (iv) Goedel's assertion about "non-standard analysis, in some version" being "the analysis of the future". To further justify Goedel's assertion, I provide a glimpse of what I may call 'non-standard physics'.

All are Cordially Invited to Attend

(Head, PAMU)