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The East African Institute for Fundamental Research (EAI FR)
invites you to a seminar

Title: Orientations in the plane as quantum states

by

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Astroparticules et Cosmologie
(APC, UMR 7164)

Université Paris Diderot (Paris 7), France



Date: Wednesday, 20 March, 2019

Time: 16:00 – 17:00 HRS

Venue: EAI FR, top floor
(Former “KIST2” Building of the Univ. of Rwanda in Nyarugenge)

This is a seminar that can be of interest to physicists and mathematicians. The general public is invited.

Abstract:

I will introduce and discuss some of the most basic fundamental concepts of quantum physics by using orientations or angles in the plane. Associating these quantum orientations with linear polarizations of light in the plane normal to its propagation constitutes the most appealing physical example of the presented formalism. The pure states form the unit circle (actually a half of it) and the mixed states form the unit disk (actually a half of it). Rotations in the plane rule time evolution through Majorana-like equations involving only real quantities for closed and open systems. Since the tensor product of two planes, their direct sum, and their cartesian product, are isomorphic (2 is the unique solution to $x^{\wedge}x = x \times x = x+x$), and they are also isomorphic to C^2 , and to the quaternion field H (as a vector space), I will describe an interesting relation between entanglement of real states, one-half spin cat states, and unit-norm quaternions which form the group $SU(2)$. Finally, I will present an example of quantum measurement with pointer states lying also in the Euclidean plane.

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