United Nations Educational, Scientific and Cultural Organization

ICTP - East African Institute for Fundamental Research under the auspices of UNESCO

SHORT COURSE ON COSMOLOGY

April 1 – 5, 2019

Cosmology is the scientific study of the Universe as a whole: its origin, constituents, evolution and final fate. Since the work of Newton, Einstein and Hawking, its aim has been to explain a constantly increasing amount of observational data in a unified mathematical framework. Using the tools of general relativity and modern particle physics, it describes how the Universe we see, full of stars and galaxies, emerged from an extremely hot and dense initial state known as the Big Bang, and tries to understand if its present expansion will continue forever or eventually halt to re-collapse into a final Big Crunch.
The goal of this course is to provide an overview of the basic principles of the discipline.

Marko Simonović
(CERN, Switzerland)

Topics covered:
- Basics of General Relativity
- The expanding Universe: distances and horizons
- The Hot Big Bang model and the thermal history of the Universe
- Primordial nucleosynthesis and the origin of elements
- Dark Matter and Dark Energy: the fate of the Universe
- Shortcomings of the model and cosmic inflation
- Cosmological perturbations and Large Scale Structures

This workshop is open to researchers in physics and mathematics. Classes will take place every afternoon from 2 PM to 5 PM at ICTP-EAIFR in the KIST2 building, CST, Nyarugenge Campus.

There is no attendance fee, but **participants are requested to reserve by email in advance due to the limited number of seats.**

For further information and reservations: workshop20190401@eaifr.org

United Nations Educational, Scientific and Cultural Organization

ICTP - East African Institute for Fundamental Research under the auspices of UNESCO

Short Concept Note

In colloquial terms, we would like to know how everything started, what is happening now, and how/if everything will end. Specifically, at EAIFR, we are interested in developing a critical mass of physicists and mathematicians who can push the frontiers of our understanding of the Universe, its origin, and predictions about the future of the Universe. These scientists need to be versed in Einstein's theory of general relativity, tensor calculus, differential geometry. The goal of these short courses in cosmology is to develop and instill these skills, knowledge, and understanding in the participants and, thus, build people in Africa than can contribute to such advancement of knowledge about our Universe and explain the many mysteries that we still encounter.

We have invited Dr. Marko Simonovic, who is based at the world's foremost center for high energy physics, CERN, to train participants in Rwanda and contribute towards building the "next [set of] Einstein[s]" in Africa. He will deliver a set of courses every day from **1st to 5th of April, 2019** from 14:00 to 17:00 HRS each day. Students will be able to ask questions and delve deeply into understanding the Universe.

Topics covered:

- Basics of General Relativity
- The expanding Universe: distances and horizons
- The Hot Big Bang model and the thermal history of the Universe
- Primordial nucleosynthesis and the origin of elements
- Dark Matter and Dark Energy: the fate of the Universe
- Shortcomings of the model and cosmic inflation
- Cosmological perturbations and Large Scale Structures