

Outline of Lectures on **Dark Matter**

by
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Lecture 1 : Introduction

- Evidence for the presence of Dark Matter (DM) in the Universe
- The standard "cold" Dark Matter (CDM) paradigm
- Possible CDM candidates : Weakly Interacting Massive Particles (WIMPs); Axions; Massive Compact Halo Objects (MACHOs); Primordial Black Holes (PBHs), ...
- The relic abundance of WIMPs : the concept of "freeze out" of thermal relics -- the "WIMP miracle"
- Dark Matter in our Galaxy, the Milky Way : Rotation curve; Phase-space distribution of the DM particles; the Standard Halo Model

Lecture 2 : Direct Detection of Dark Matter

- Basic concepts of Direct and Indirect Detection of WIMP DM candidates
- Direct Detection (DD) of WIMP DM : WIMP-nucleus elastic scattering; nuclear recoil spectrum; spin-independent (SI) and spin-dependent (SD) scattering; annual modulation of event rates; astrophysical uncertainties in the expected event rates
- Various types of WIMP DD experiments : discrimination between signal (nuclear recoils) and backgrounds (electron recoils)
- Neutron-induced nuclear recoils -- the cosmogenic and radiogenic neutron backgrounds
- Exclusion plot and sensitivity of a DD experiment: upper limits on WIMP-nucleon elastic scattering cross section
- Brief descriptions of some of the currently operating major DD experiments
- Future prospects