

Symposium Dark Matter (SYDM)

jointly organised by
the Gravitation and Relativity Division (GR),
the Particle Physics Division (T), and
the Theoretical and Mathematical Physics Division (MP)

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Dark Matter is one of the Big Open Problems in our understanding of the Universe as a whole. The observations give very clear indications that there must be “something”. Three outstanding researchers offer insights into several of the many diverse research directions that are designed to bring light into the nature of this “something”: by theoretical modelling, through earthbound experimental search, and by attempts at earthbound production.

Overview of Invited Talks and Sessions

Invited Talks

SYDM 1.1	Mon	10:00–10:45	PVa	New (and old) ideas on dark matter — ●BJOERN MALTE SCHAEFER
SYDM 1.2	Mon	10:50–11:35	PVa	Producing on Earth the missing matter of the Universe — ●ALEXANDER GROHSJEAN
SYDM 1.3	Mon	11:40–12:25	PVa	Detecting on Earth the missing matter of the Universe — ●FEDERICA PETRICCA

Sessions

SYDM 1.1–1.3	Mon	10:00–12:25	PVa	Dark Matter 1
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SYDM 1: Dark Matter 1

Time: Monday 10:00–12:25

Location: PVa

Invited Talk SYDM 1.1 Mon 10:00 PVa
New (and old) ideas on dark matter — ●BJOERN MALTE SCHAEFER — Heidelberg University

Dark matter is an essential concept in modern cosmology and is indispensable if Newtonian gravity is extrapolated to scales of galaxies and larger. In my talk I will review the necessity of dark matter and its role in cosmic structure formation and galaxy evolution, and discuss possible particle candidates, in particular axionic dark matter as a possible solution to outstanding dark matter problems in cosmology.

5 min. break

Invited Talk SYDM 1.2 Mon 10:50 PVa
Producing on Earth the missing matter of the Universe — ●ALEXANDER GROHSJEAN — DESY, Notkestraße 85, 22607 Hamburg

Understanding dark matter is one of the most tantalizing challenges in today's science. While its gravitational effect on large scale structures is well established, its nature remains obscure. An attractive solution to the dark matter problem is provided by new species of particles that are not contained in the Standard Model.

Producing and detecting these particles is one of the major quests of particle physics. The masses of these particles span a wide range from very light particles that could be produced through light in strong magnetic fields up to extremely heavy particles, which could be produced by high-energy accelerators such as the Large Hadron Collider

at CERN.

I will discuss some of the most promising theory models to explain dark matter, give an overview of different experiments to search for dark matter particles, and will close with an outlook on the next major milestones.

5 min. break

Invited Talk SYDM 1.3 Mon 11:40 PVa
Detecting on Earth the missing matter of the Universe — ●FEDERICA PETRICCA — Max-Planck-Institut für Physik, Föhringer Ring 6, D-80805 München

Nowadays, we have an extremely accurate model of our Universe, but still, most of its content eludes our observation. Detecting with Earth-bound experiments the missing matter is one of the most intriguing challenges in modern physics and is of compelling necessity for our understanding. The experimental efforts to decipher the nature of dark matter underwent amazing development in recent years, and a new generation of large exposure high sensitivity detectors is ready to accept the challenge. In this contest, a multi-target multi-technology approach is needed to look into the different mass regions of possible dark matter candidates to maximise the detection probability. The most sensitive approaches that are opening new frontiers of this search will be reviewed together with a glance on future perspectives. Although not certain, a discovery might be at hand.