

Next Frontiers in Magnetic Monopole Searches

Workshop Overview and Goals

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Why we are here

- Magnetic monopoles (MMs) are a **robust prediction of Grand Unified Theories** and other BSM theories with **symmetry breaking**.
- They explain electric-charge quantisation and symmetrize Maxwell's equations.
- A **recent proliferation of models** predicts MMs with **much lower masses** than previously assumed.

Why we are here (II): the road to cosmic rays

- The next collider (FCC-hh/SPPC) can directly probe *some* of these low-mass models – but it is **decades away**.
- So, on a realistic timescale, we must look for MMs in **cosmic rays**.
- Two hard requirements:
 - **High elevation** – low-mass MMs will quickly range out in the crust;
 - **Huge area** – the expected flux is tiny.

Why we are here (III): the scalability question

The problem

Previous dedicated approaches – MACRO, Ohya, SLIM – established the technique but would require **new solutions** for the areas now required.

- The next-generation search must solve this **scalability question**.
- The innovative approaches, and the hard decisions that make the scale possible, will be discussed in the dedicated session.

This is where MANDATE comes in.

- ➊ **Theory & phenomenology** – the current state, motivation for low masses, GUT predictions, cosmological and astrophysical implications.
- ➋ **Experimental landscape** – advantages and limitations of the different detection techniques; where the limits stand today.
- ➌ **Cosmic-ray synergies** – what a major observatory adds, and what a dedicated search returns.
- ➍ **Exotic-particle searches** – nuclearites, Q-balls and other highly-ionising exotics with the same technologies.
- ➎ **The MANDATE proposal** – physics case, detector concept, deployment scenarios, projected sensitivity.
- ➏ **Collaboration & roadmap** – the path to a Conceptual Design Report.

- **Invited talks** – overview of each theme.
- **Contributed talks** – specific results and ideas.
- **Two dedicated discussion sessions:**

Discussion 1: Open questions

- **Wish list to the theorists**
- **MANDATE design choices**

Discussion 2: CDR roadmap

What we leave with

The outcome

A **plan-to-CDR**: the physics motivation, experimental design, deployment options, and timeline for MANDATE. With **named section owners** and a **deadline for the first complete draft**.

This document will be the foundation for **seeking institutional support** and **launching a new dedicated experiment**.

And one more thing...

Take it easy and have fun!

Workshop dinner
traditional Chinese show



Great Wall or Forbidden City
excursion



Nearby parks
stroll

