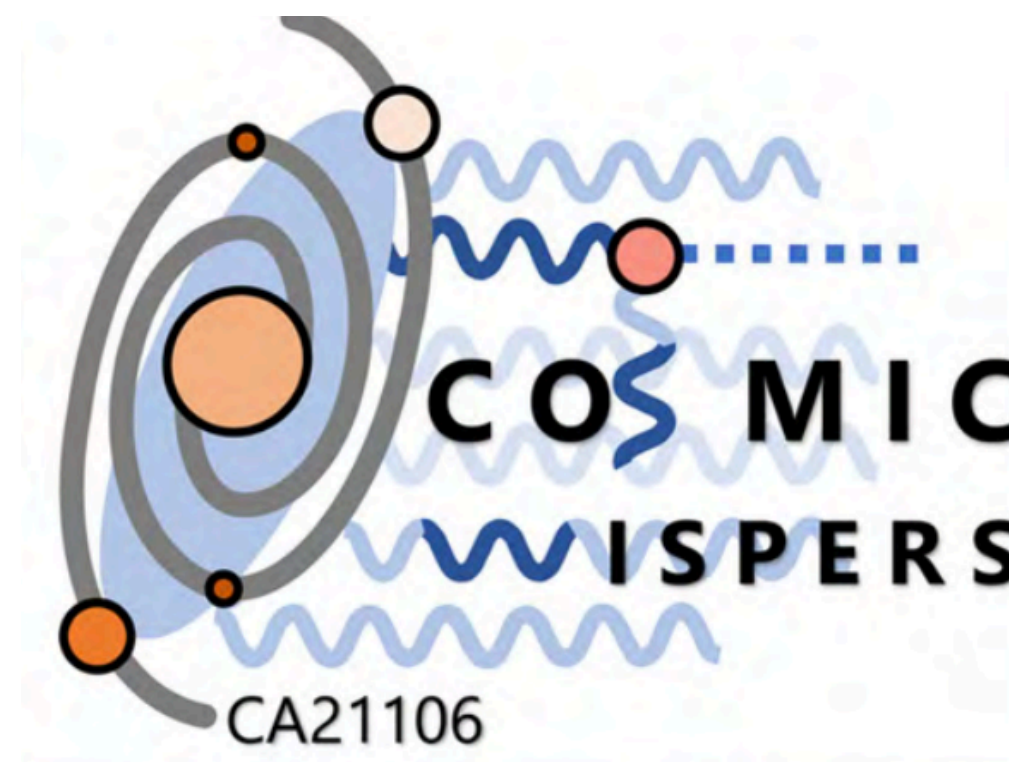


WG1: WISPs model building

Sophie Renner, University of Glasgow

Group Meeting of COST Action COSMIC WISPers, DESY, 1-2 February 2024



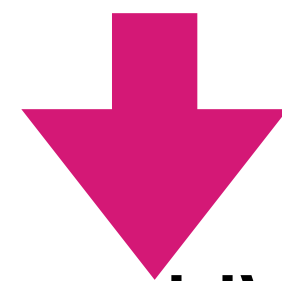
**Funded by the
European Union**

WG1 Main Goals

- Coordinate theory advances & promote knowledge exchange
- Provide theoretical guidance to experiment
- Determine nature, number, masses and couplings of WISPs with applications to particle physics via two complementary approaches:

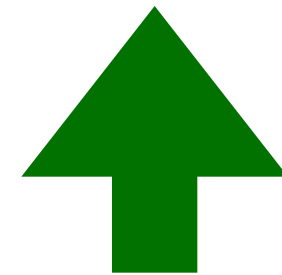
“TOP DOWN”

UV complete model building



UV constraints on WISP properties

Scenarios compatible with observations



“BOTTOM UP”

phenomenology in low-energy effective field theory

} New experimental targets?

Memorandum of understanding

WG 1: WISPs Model Building

Objectives. The objective of WG1 is to determine the nature, number, masses and couplings of WISPs that arise in well-motivated theories of fundamental physics, and in particular within string compactifications that join moduli stabilisation with (semi)-realistic matter sectors.

T1.1: Determine axion and WISP properties in Beyond the Standard Model frameworks.

- Subtask 1.1.1: Determine the preferred QCD axion window in the ma-gavy plane for the preferred theoretical models. Extend the analysis to the coupling with electrons and nucleons.
- Subtask 1.1.2: Determine number and couplings of ALPs that arise in string compactifications and the feasible range for massive ALPs.
- Subtask 1.1.3: Determine the number of hidden photons and the typical strength of their mixing in string theory.
- Subtask 1.1.4: Investigate if there are particular compactifications which can be worked out in full depth.

} Maria Ramos's talk

} Ruben Küspert's talk

Oliver Janssen's talk

T1.2: Embed phenomenological WISP scenarios in concrete UV completions.

- Subtask 1.2.1: Predict a stabilised string construction with realistic matter sector that can be tested with astrophysical or cosmological observations.
- Subtask 1.2.2: Develop observational tests for scenarios on the origin of the weak scale.

Gioacchino Piazza's talk

+ develop theoretical tools within EFTs

WG1 Organisation

Leader: Michele Cicoli (Bologna) “top down”

Co-leader: Sophie Renner (Glasgow) “bottom up” - took over from Ilaria Brivio autumn 2023

Google group <https://groups.google.com/g/cosmicwispers-wg1>

Mailing list cosmicwispers-wg1@googlegroups.com

80 members

WG1 Activities & deliverables

~Monthly meeting online (Mondays 2pm)

Previously: volunteers from the WG present their work (3 per meeting)
Now: invited external speakers (1 per meeting)

Next meeting: 26th February 14:00 CET Jakob Moritz will present his work “Glimmers from the Axiverse” 2309.13145

Training school in Ljubljana 10-13 June

Giovanni Villadoro (ICTP) will give 3 hours of lectures on Axion Theory

4.1.2. DESCRIPTION OF DELIVERABLES AND TIMEFRAME

Deliverable number	Deliverable title	WG number	Deliverable date (months)
D1.1	Draft Report on theory and pheno	1	12
D1.2	Interim Report on theory and pheno	1	24
D1.3	Final Report on theory and pheno	1	48