

WG4

March 2024

2nd Training School COST Action COSMIC WISPers (CA21106)

<https://indico.ijs.si/event/1825/>



10–14 Jun 2024

Faculty of Mathematics and Physics, Ljubljana (Slovenia)

CA21106 WHITE PAPER EDITORS

WG1: - Arturo de Giorgi (UAM/IFT, Madrid, Spain),

arturo.degiorgi@uam.es

Mario Reig Lopez (Oxford) mario.reiglopez@physics.ox.ac.uk

Nicole Righi (King's College London) nicole.righi@kcl.ac.uk

WG2: - Mathieu Kaltschmidt (CAPA, U. Zaragoza, Spain),

mkaltschmidt@unizar.es

Amelia Drew (DAMTP, University of Cambridge), ad652@cam.ac.uk

Marco Gorghetto (DESY), marco.gorghetto@desy.de

Silvia Gasparotto (IFAE), sgasparotto@ifae.es

WG3: - Giuseppe Lucente (ITP, University of Heidelberg),

giuseppe.lucente@ba.infn.it

María Benito (Tartu Observatory, University of Tartu),

mariabenitocst@gmail.com

David Marsh (Stockholm University) david.marsh@fysik.su.se

Pierluca Carenza (Stockholm University) pierluca.carenza@fysik.su.se

WG4: - Michael Staelens (IFIC, CSIC – Universitat de Valencia),

michael.staelens@ific.uv.es

- Ophir Ruimi (HUJI & HIM/JGU), ophir.ruimi@mail.huji.ac.il

- Alessio Rettaroli (INFN - LNF), alessio.rettaroli@Inf.infn.it

Dear all,

according to the doodle I realize that the first date in which apparently all are available is **12nd April**.

So I fixed our meeting on that date at 3 pm (CET). Please save the date.

Meanwhile, the **WG leaders can discuss with the editors about the topics to be covered in each Section**.

When the topics are fixed you can pass the table of Content to

GIUSEPPE LUCENTE (Giuseppe.lucente@ba.infn.it)
who will prepare a common table of contents.

Before our common meeting **I recommend WG leaders to call WG meeting to present the table of content and ask if people are wishing to contribute to some part. We expect for each contribution 3-5 pages**.

You have to ask the **contribution in 4 months** [in order to have them in 6 months :-)]
If there is no volunteer editors and WG leaders should ask specifically to WG members.

I hope by our next meeting we will have a list of topics and of authors so that then we can decide about instructions.

Best regards,
Alessandro

WG4 Report

Contents

1 Introduction	3
2 Theory	3
3 EU Experiments	3
3.1 Pure lab (LSW, collider etc.)	3
3.2 Helioscope	4
3.3 Haloscope	4
3.4 beam dump ($M < 1$ GeV)	5
3.5 Non-WISP focused experiments with ability to detect WISPs	5
3.6 TEMPLATE Experiment	6
3.7 The ALPS II experiment	7
3.8 The MADMAX experiment	8
3.9 The ATLAS and CMS experiments at the LHC	10
3.10 The MoEDAL-MAPP experiment	10
3.11 The IAXO experiment	12
3.11.1 BabyIAXO	13
3.12 The QUAX experiment	16
3.13 The FLASH experiment	18
3.14 The CADEX experiment	19
3.15 The CAST-CAPP experiment	20
3.16 The WISPF1 experiment	22
3.17 The WISPLC experiment	24
3.18 The WISPDMX experiment	26
3.19 The GNOME Experiment	28
3.20 The CASPER Experiment	30
3.20.1 CASPER-gradient	30
3.20.2 CASPER-electric	32
3.21 The PADME experiment	32

4 Summary Plots	34
5 Ongoing EU R&D	34
5.1 Ongoing R&D	34
5.2 Resonators	34
5.3 Magnets	34
5.4 Sensors	34
6 EU WISP Infrastructures and Labs	34
7 TEMPLATE Facility	34
8 The Frascati National Laboratory of INFN	34
9 The cryoplatfrom at DESY in Hamburg	35
10 New experimental schemes for WISPS searches	37
10.1 Template Experimental Scheme	37
10.2 The Piezoaxionic Effect arXiv:2112.11466	37
10.3 Production and detection of an axion dark matter echo arXiv:1902.00114	37
10.4 Directly Deflecting Particle Dark Matter PHYSICAL REVIEW LET- TERS 124, 011801 (2020)	37
10.5 Sound of Dark Matter: Searching for Light Scalars with Resonant- Mass Detectors PRL 116, 031102 (2016)	39
10.6 Axion production in unstable magnetized plasmas. Phys. Rev. D 101, 051701(R)	39
10.7 Searching for axion forces with spin precession in atoms and molecules arXiv:2309.10023	39
10.8 Proposal for gravitational direct detection of dark matter PHYSICAL REVIEW D 102, 072003 (2020)	41
10.9 Intensity interferometry for ultralight bosonic dark matter detection PHYSICAL REVIEW D 108, 015003 (2023)	41
10.10A Diffraction Grating for the Cosmic Neutrino Background and Dark Matter arXiv:2303.04814	41
11 Discussion	41
12 Conclusion	41