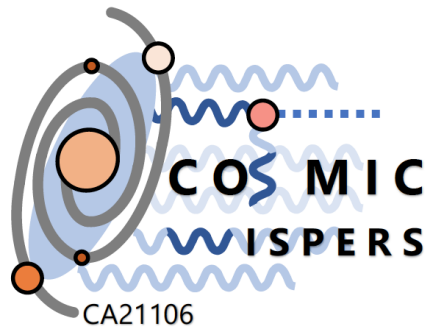


COST ACTION CA21106

COSMIC WISPERS in the Dark Universe:

Theory, astrophysics and experiments

Marin Karuza
Rijeka University

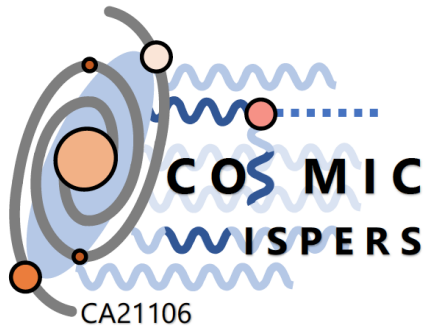


Funded by the
European Union

1° MANAGEMENT COMMITTEE MEETING

3-rd October 2022





Funded by the
European Union



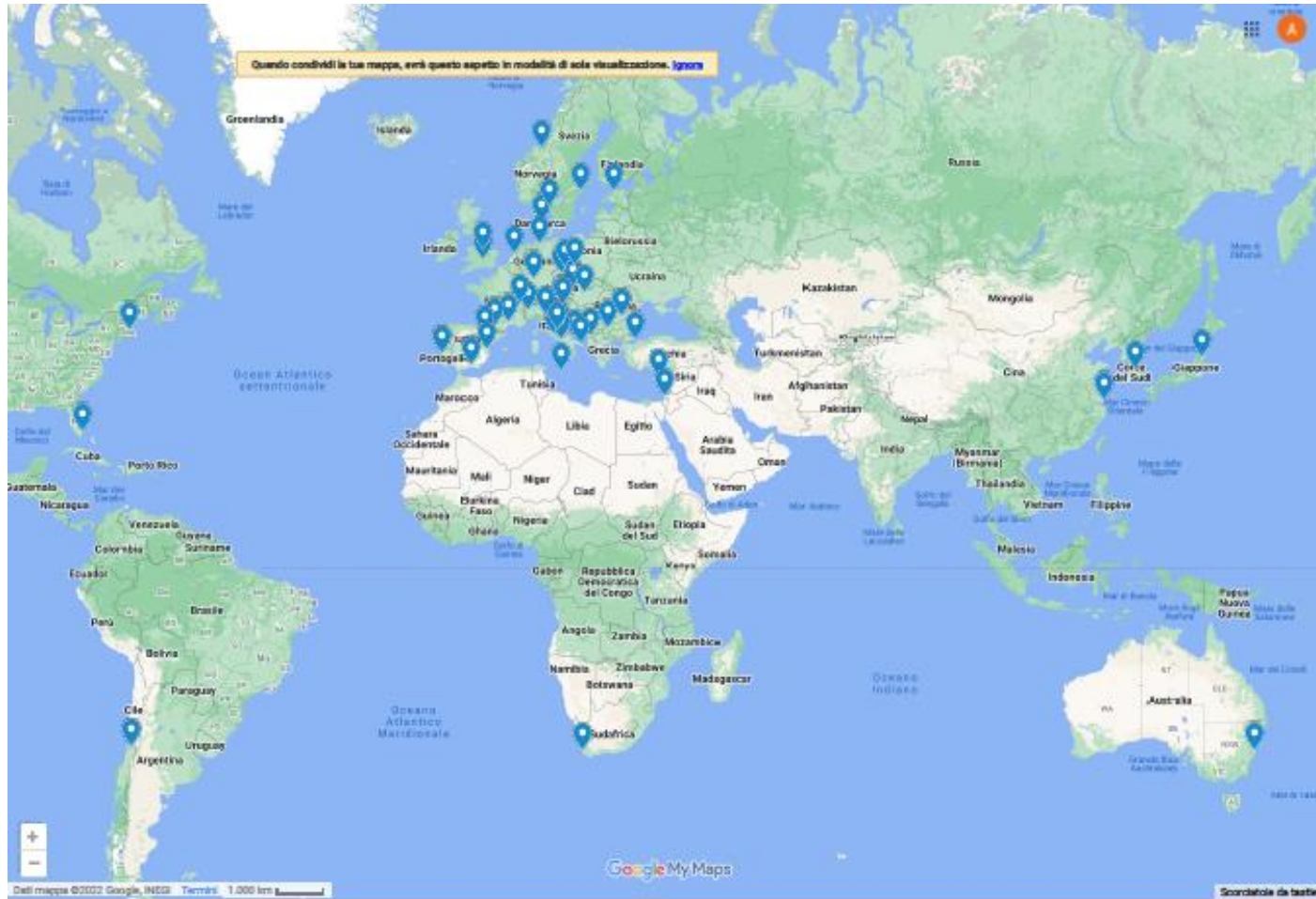
Kick-off Meeting of COST Action COSMIC WISPers (CA21106)

23–24 Feb 2023
Laboratori Nazionali di Frascati (Rome), Italy
Europe/Rome timezone

Enter your search term



COSMIC WISPerS NETWORK



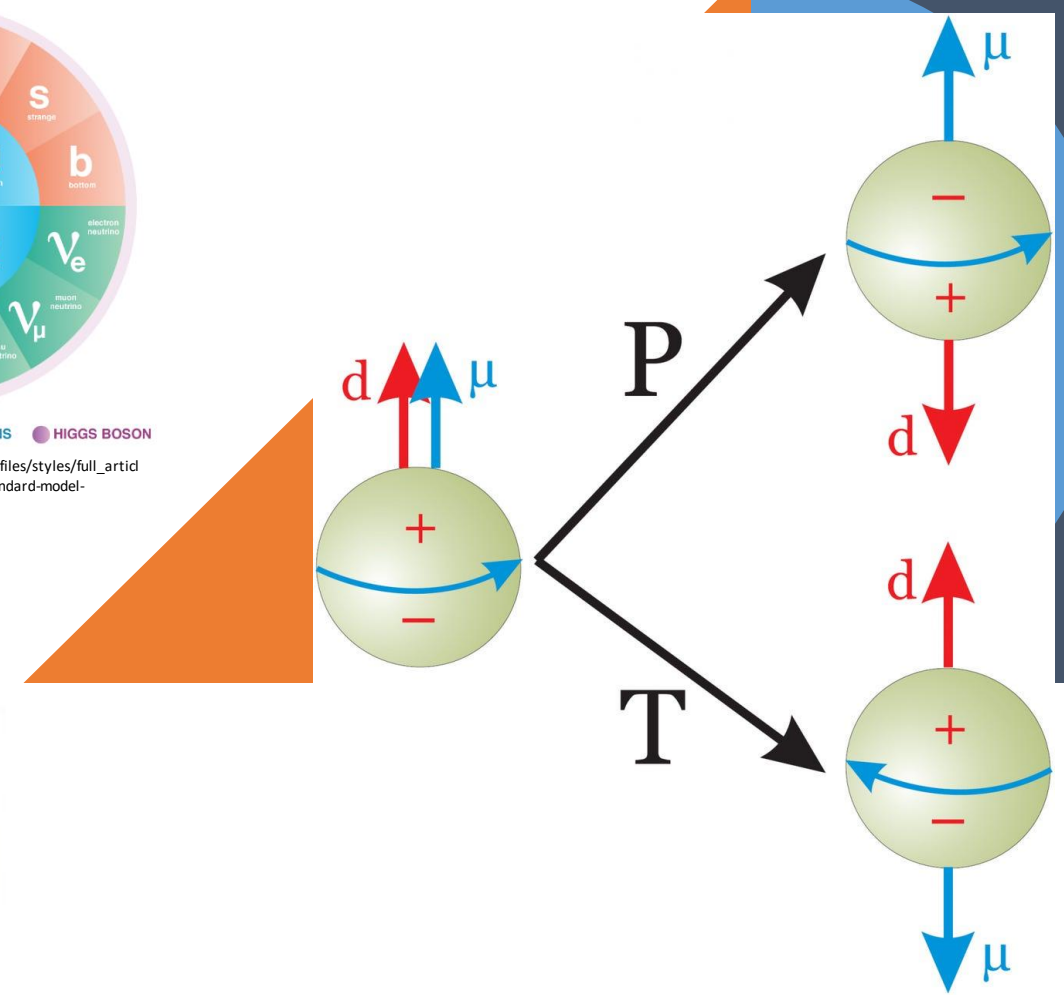
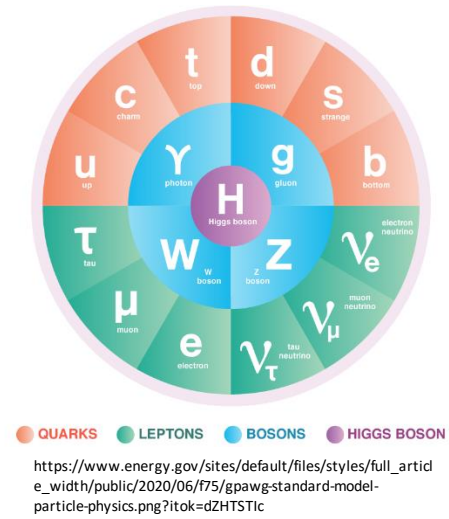
~ 70 proposers

**Currently 160
participants!**

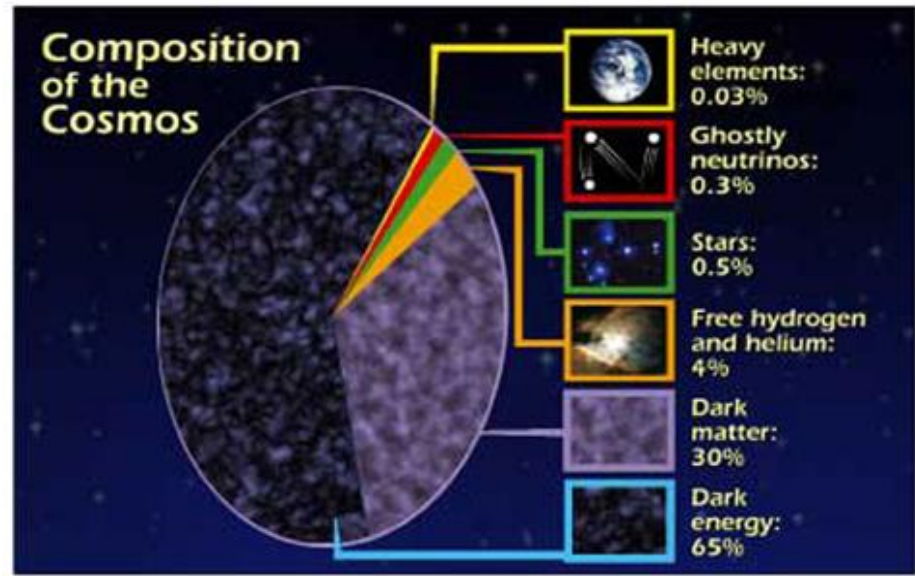
COST Country(25) : Albania , Austria , Bulgaria , Croatia , Cyprus , Czech Republic , Denmark , Estonia , France , Germany , Hungary , Israel , Italy , Malta , Netherlands , Norway , Poland , Portugal , Romania , Slovenia , Spain , Sweden , Switzerland , Turkey , United Kingdom
International Partner Country(7) : Australia, Chile, China, Japan, South Africa, South Korea, United States

What is it all about?

- Strong CP problem
- Composition of the Universe



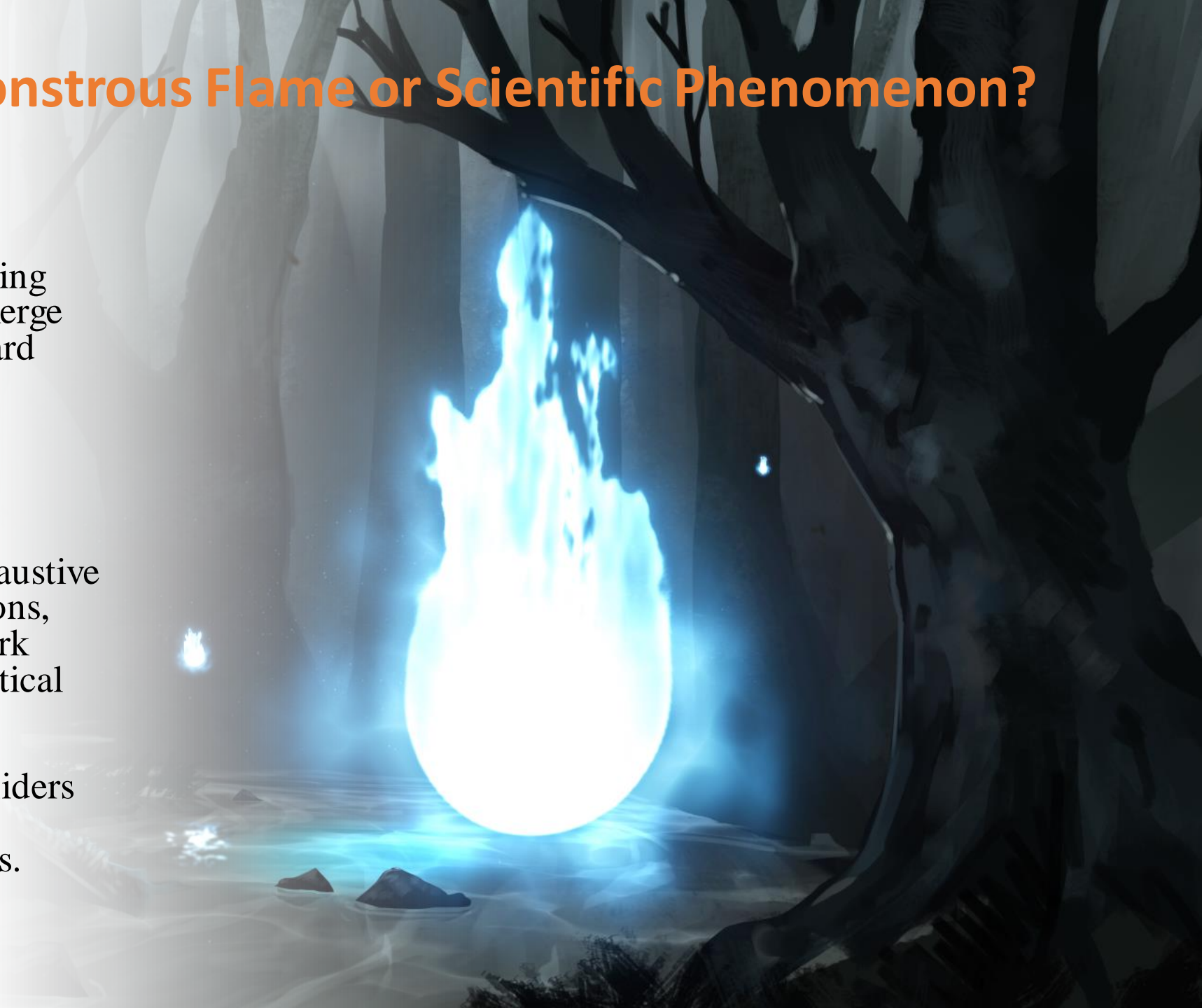
In the Standard Model, the neutron's electric dipole moment is predicted to be a factor of ten billion larger than our observational limits show. The only explanation is that somehow, something beyond the Standard Model is protecting this CP symmetry in the strong interactions. We can demonstrate a lot of things in science, but proving that CP is conserved in the strong interactions can never be done. However, solving the strong CP problem may be closer on the horizon than almost anyone realizes. [-] PUBLIC DOMAIN WORK FROM ANDREAS KNECHT



Ann Field (STScI)

Will-o'-the-Wisp: Monstrous Flame or Scientific Phenomenon?

- WISPS
- WISPs are very Weakly Interacting Slim ($m < \text{GeV}$) Particles which emerge in several extensions of the Standard Model of Particle Physics.
- CHALLENGE
- The aim of this Action is an exhaustive study of these WISPs, notably axions, axion-like particles (ALPs) and dark photons, ranging from their theoretical underpinning, over their indirect observational consequences in astrophysics, to their search at colliders and beam-dump and their direct detection in laboratory experiments.





18TH

PATRAS WORKSHOP ON AXIONS, WIMPS AND WISPS

03-07 JULY 2023
UNIVERSITY OF
RIJEKA, FACULTY
OF PHYSICS
RIJEKA, CROATIA

SCIENTIFIC PROGRAMME

The Physics Case for WIMPs,
Axions, WISPs /// Direct and
Indirect Searches for Dark
Matter and Dark Energy ///
Direct and Indirect Searches
for Axions and WISPs ///
Signals from Astrophysical
Sources /// Review of
Collider Experiments ///
New Theoretical Developments

INTERNATIONAL ORGANIZING COMMITTEE

Martin Karata (University of Rijeka) // Giovanni Cantatore (University and INFN Trieste) // Vasilisa Anastasiopoulos (University of Patras)
// Laura Dauds (University of Zurich) // Dmitry Budker (Helmholtz Institute and Johannes Gutenberg University Mainz) // Horst Fischer
(University of Freiburg) // Joerg Jaeckel (University of Heidelberg) // Axel Lindner (DESY) // Andreas Ringwald (DESY) // Marc Schumann
(University of Freiburg) // Yannis Sotiriadis (CAPSITIS & KAIST) // Arvo Wickenbrock (Helmholtz Institute and Johannes Gutenberg
University Mainz) // Konstantin Zoubas (University of Patras)

LOCAL ORGANIZING COMMITTEE

Martin Karata (Chair, University of Rijeka) // Giovanni Cantatore (Co-chair, University and INFN Trieste) // Diana Manca (University of Rijeka)
// Ana Zecan (University of Rijeka) // Aldo Arena (University of Rijeka) // Emma Hess (INFN Pisa) // Karlo Wolfan (University of Rijeka)

DEADLINE FOR ABSTRACT SUBMISSION AND EARLY ORSD REGISTRATION:
30 APRIL 2023

AXION
-WIMP2023.
DESY.DE



Sold by
BIGbox
ASIA

Take a look at the Poster Session



universität freiburg

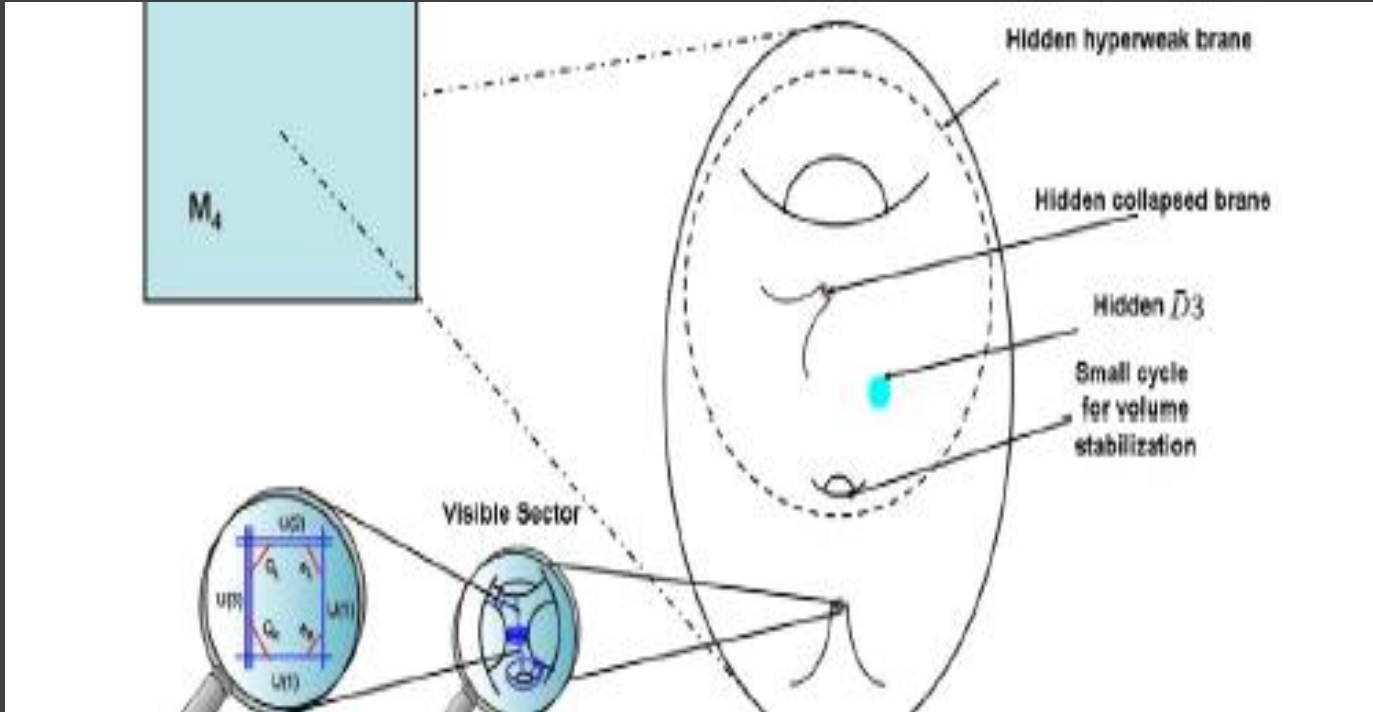


OBJECTIVES (from MoU)

- Provide a discussion forum for **European coordination** of WISPs Physics activities
- Develop a **Roadmap** for WISPs Physics in Europe
- Coordinate and support in a **synergic** way WISPs searches
- Compare WISPs **theoretical** models and assess performance of different **experimental** techniques
- Provide input to **Small and Medium Size Enterprises** (SMEs)
- **Disseminate** the research results
- Provide **cross community discussions** to enable new experiments
- Stimulate **transfer of knowledge** among established leading groups on the field and emerging excellent scientists in ITC
- Promote **gender balance**
- Involve **new research groups** from ITC
- Attract **young talented researchers**

STRATEGIES

- Common platform to connect WISP research activities in different areas. Collaborations in a structured way through Working Groups, Workshops and Short-Term Missions
- Organize much of the scientific foundation for present and next generation WISPs experiments. Develop a European roadmap for experiments. Interplay between theorists, experimentalists and representatives of SMEs
- Training activities to offer inter-disciplinary research competences which are difficult to obtain locally
- Offer to ECI the opportunity to develop management skills sharing responsibility in the management of the Action. Particular emphasis on the gender balance
- Promote the visibility of researchers from ITC connecting them with leading scientists in EU countries
- Outreach activities. Improve the communication skills of the young participants



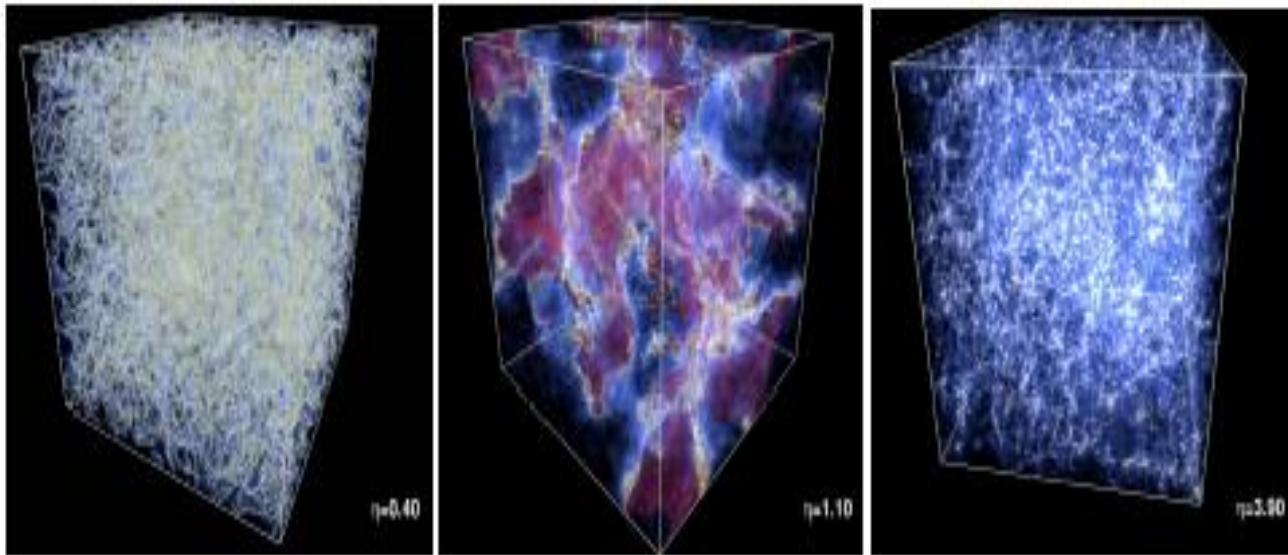
WG Leaders

Michele Cicoli (Bologna Univ., IT)
 Ilaria Brivio (Bologna Univ., IT)

44 participants

WG1: THEORY AND MODEL BUILDING

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



WG Leaders

Nick Rodd (CERN, CH)
Javier Redondo (Zaragoza Univ., ES)

95 participants

WG2: DARK
MATTER AND
COSMOLOGY

Obtain precise predictions of axion and WISP DM relic abundance and identify distinguishing features of WISP DM in Large Scale Structure data

A satellite with two large blue solar panel arrays is shown in space. The Earth's horizon is visible at the bottom, and a bright, fiery nebula or star is in the upper left. The background is a dark field of stars.

WG3: WISPs IN ASTROPHYSICS

Deepen the studies of the signatures of WISPs in astroparticle physics. These include WISP oscillations into photons, WISP-induced energy loss in stellar systems and signatures from gravitational waves and from primordial black-hole superradiance.

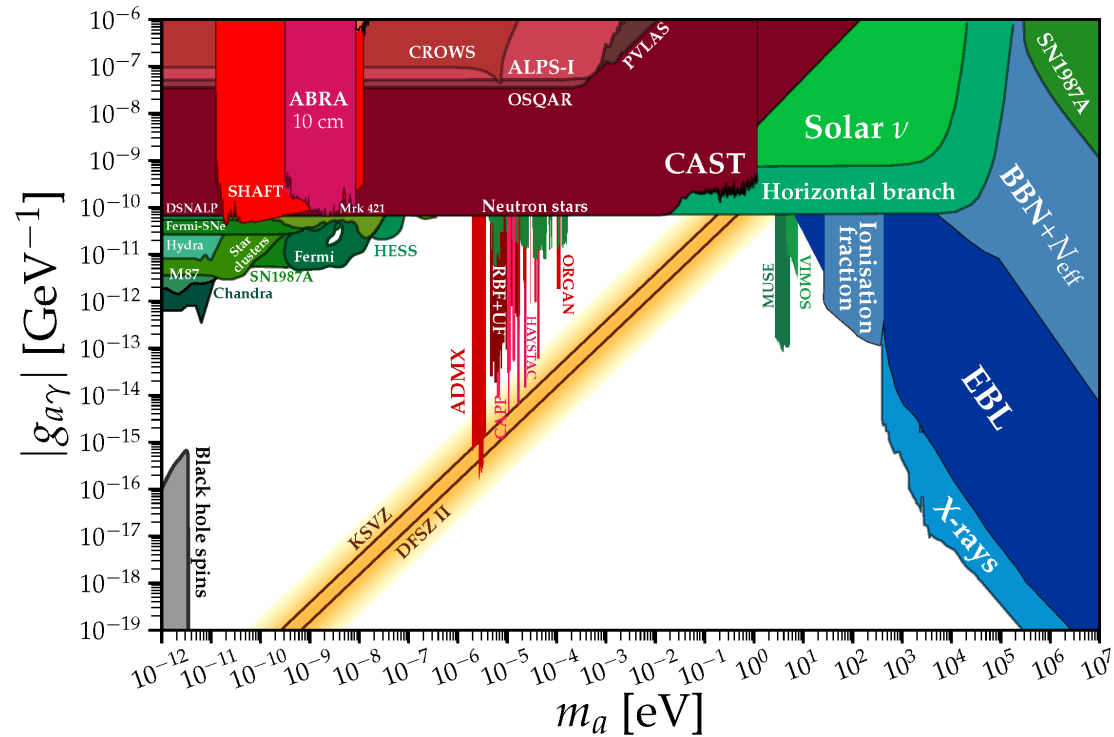
WG Leaders

Andrea Caputo (CERN, CH)
Oscar Straniero (INAF, IT)

58 participants

WG4: DIRECT WISPs SEARCHES

Produce a complete, updated and revised summary of the status of WISP searches, highlighting parts of the parameter space, models or couplings that are not under test by present or future searches. Outline a roadmap to WISP discovery and a way to disentangle among different WISP models

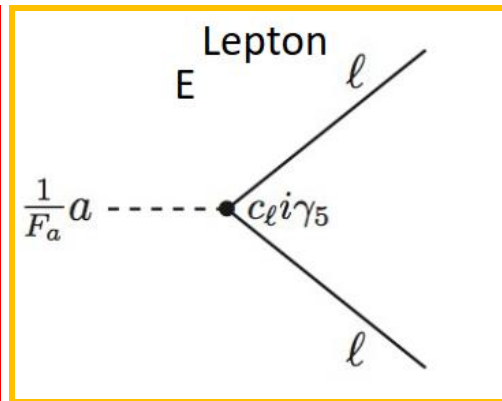
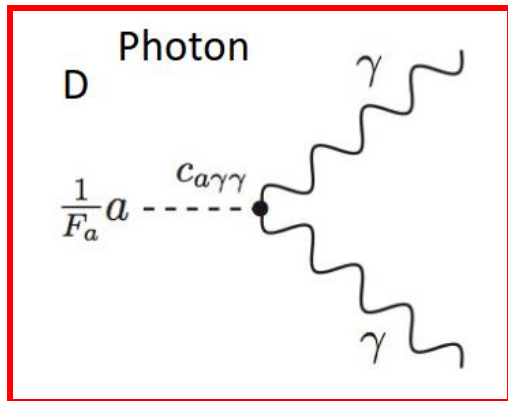
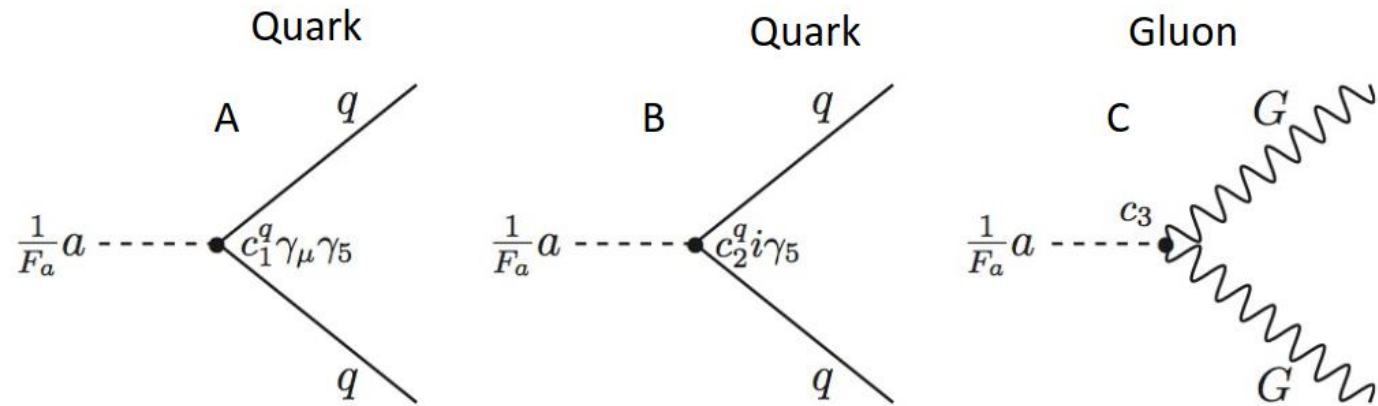


WG Leaders

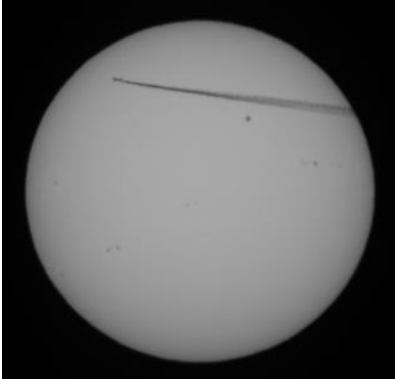
Claudio Gatti (LNF, IT)
Marina Karuza (Rijeka Univ., HR)

58 participants

Strategy?



adapted from G. Ruoso



Helioscopes

"a la Sikivie"

- CAST
- SUMICO
- BabyIAXO
- IAXO



Haloscopes

- CAST
- GRAHAL
- ADMX
- CAPP
- MADMAX
- QUAX
- DM Radio
- ABRACADABRA
- ORPHEUS
- WISPDMMX
- HAYSTAC
- FLASH



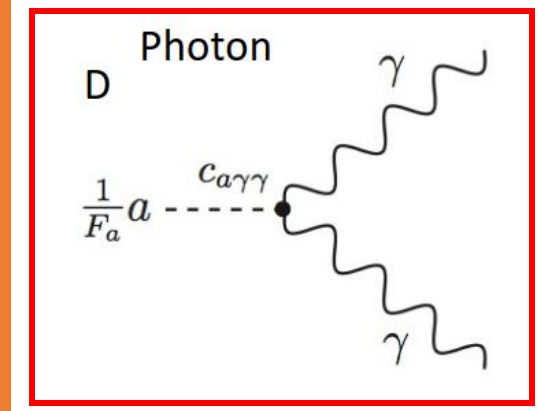
Laboratory

LSW

- ALPS
- OSQAR

Polarization

- PVLAS
- BFRT
- BMV
- OSQAR
- Q@A



WG5: DISSEMINATION AND OUTREACH

Enhance the dissemination and communication of the results, and to structure outreach activities to attract public awareness to the challenges and achievements in astro-particle physics.



WG Leaders

Olga Mena (IFIC, ES)

Science Communication Coordinator

Loredana Gastaldo (Heidelberg Univ , DE)

44 participants

- Action Chair: Alessandro Mirizzi (Bari Univ, IT)

- Action Vice-Chair



Francesca Calore

CNRS Researcher (CRCN)

CNRS

HORIZONTAL COMMITTEES



Grant Evaluation Committee: provides to the Action MC a proposal of selected grants and amounts for their approval

Grant Awarding Coordinator: **Venelin Kozhuharov** (Sofia Univ., BG)



Young Researchers and Innovators Representative Council: involve the ECI in the management of the Action and in organization of the Activities

Coordinator: **Pierluca Carenza** (Stockholm Univ., SW)



Gender and Diversity Advisor: monitor the gender balance and provide a plan to implement gender balance

Deniz Sunar Cerci (Adiyaman Univ., TR)

- **Journal Club Organizers:** Maria Benito Castano (Tartu Obs., EE), Michele Tammaro (Jozef Stefan Inst., SI)
- **Colloquium Organizers:** Arturo de Giorgi (Inst. De Fis. Teor, ES), Giuseppe Lucente (Bari Univ., IT) , Hugo Tercas (Ist. de Plasma, Lisboa, PT)
- **Newsletter Editors:** Damiano Fiorillo (NBI, Copenhagen, DE), Giovanni Grilli de Cortona (INFN, IT)

CORE GROUP

The Action MC decided to delegate part of their power to a **Core Group** that may carry-on day by day management and urgency cases

The **Core Group** is constituted by Chair, Vice-Chair, WG Leaders, Grant Holder Scientific Repr., Science Comm. Coordinator, Grant Award. Coord., Young Researc. Council Repres., Gender Advisor

2023 EVENTS



22-23 Febr: Kick-off Meeting
(Frascati, IT)



5-8 Sept: General Meeting
+ MC Meeting
(Bari, IT)



11-14 Sept: Training School
(Lecce, IT)

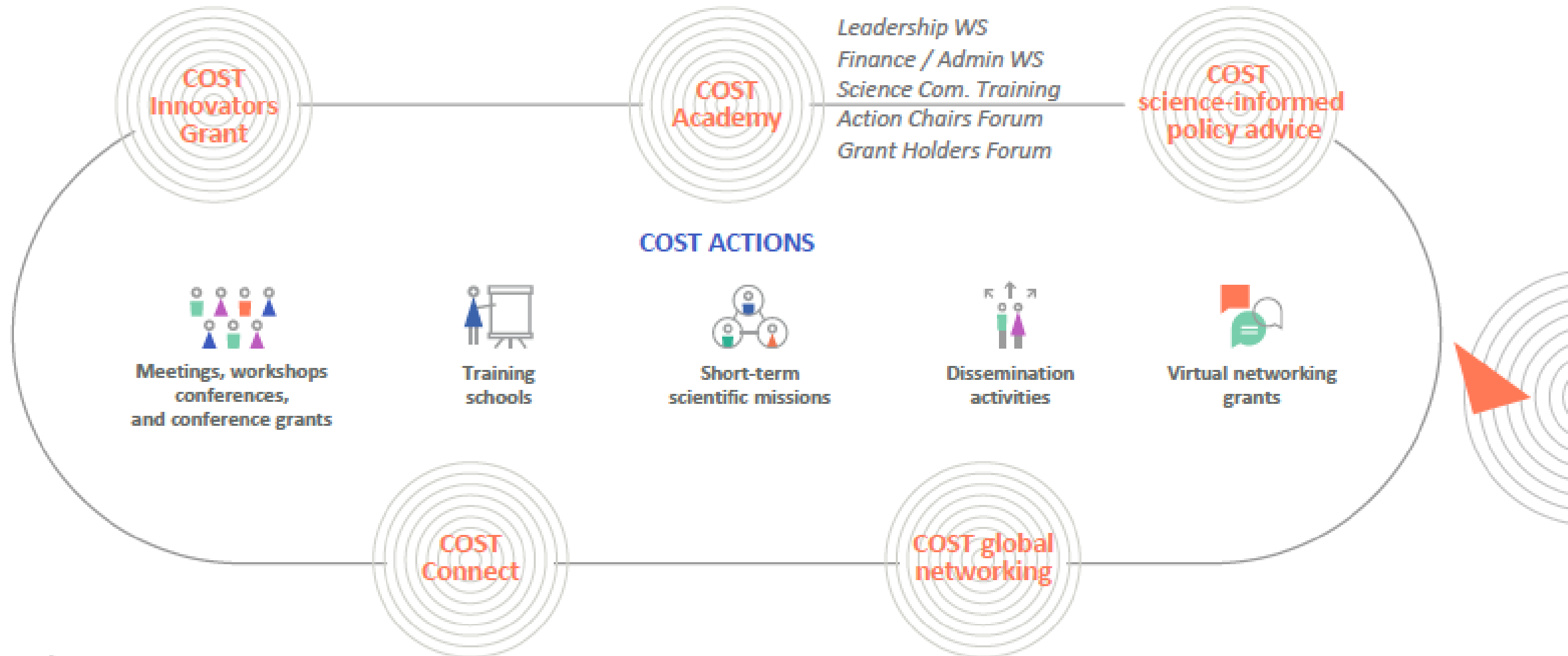


DELIVERABLES (from MoU)

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
D2.1	Draft Report on DM and cosmology	2	12
D2.2	Interim Report on DM and cosmology	2	24
D2.3	Final Report on DM and cosmology	2	48
D2.4	Public code to simulate axion effects on LSS	2	40
D3.1	Draft Report on astroph.	3	12
D3.2	Interim Report on astroph.	3	24

D3.3	Final Report on astroph.	3	48
D4.1	Draft Report on direct detection	4	12
D4.2	Interim Report on direct detection	4	24
D4.3	Final Report on direct detection	4	48
D4.4	Report on Technologies Forums	4	36
D5.1	Action webpage, twitter and repositories	5	6
D5.2	Set Dissemination and Communication Scheme	5	6, 18,30
D6.1	Lecture notes of the training schools	1,2,3,4	12,24,32,48
D7.1	Final White Paper on the Physics case	1,2,3,4	48

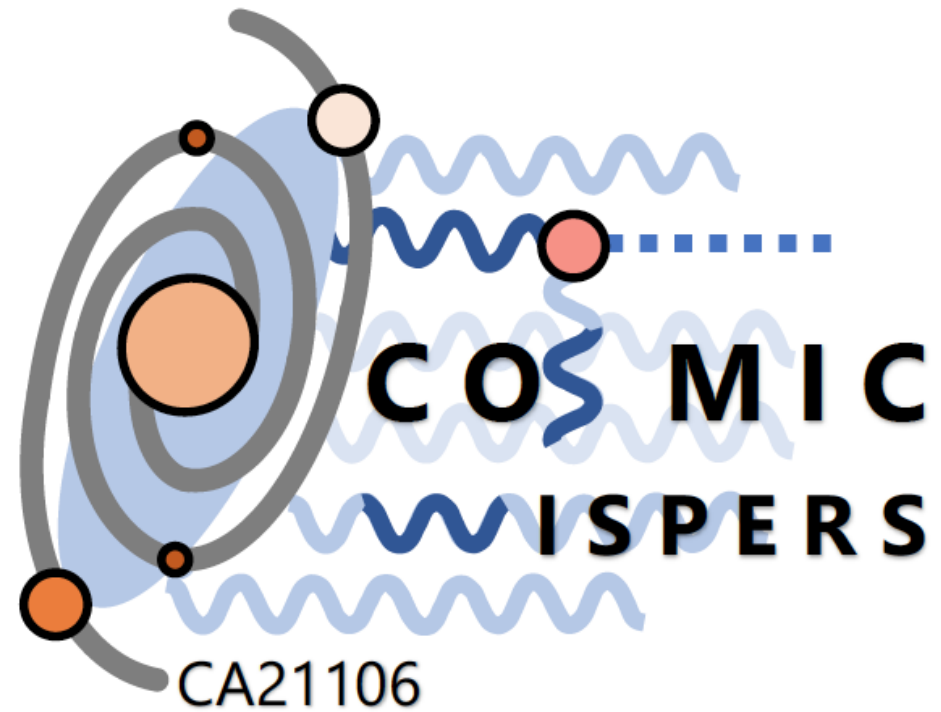
COST support beyond the COST Action



WHAT YOU CAN DO FOR THE ACTION?

- Advertise the Action on social media and through press release
- Ask your colleagues and collaborators to register
- Post interesting events and papers on twitter and to the e-mail
- Put acknowledgements on your publication: "This article/publication is based upon work from COST Action COSMIC WISPerS CA 21106, supported by COST (European Cooperation in Science and Technology)"
- Use Action Logo and COST visual identity in your talks
-

CA21106 LOGO



By Igor Irastorza