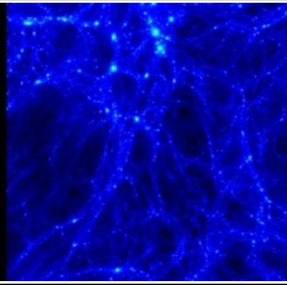


MultiDark

Multimessenger Approach
for Dark Matter Detection



Summary of MultiDark



15th MultiDark Consolidider Workshop & 1st MultiDark Consolidider Network UNIZAR, Zaragoza, April 3-5, 2019



ABOUT MultiDark

MultiDark was an excellence project in which most of the Spanish research community working in the field of DM was involved.

It was funded with 3,2 M€ for a period of 5-years (2010–2014), by the CONSOLIDER–Ingenio 2010 Programme of the Secretary of State for Research

MultiDark consisted of **11 theoretical and experimental groups with particle physicists, astrophysicists and cosmologists from 18 Spanish universities and research institutes**. It also included **14 researchers from foreign institutions**. In total the project involved about **120 researches**



Geographical distribution of the 18 institutions participating in MultiDark

	Group PI	Institution PI
1. UAM/IFT Universidad Autónoma de Madrid (UAM) & Instituto de Física Teórica (IFT)-UAM/CSIC Instituto de Física de Cantabria (IFCA)-UC/CSIC Universidad de Granada (UGR) Universidad de Salamanca (USAL)	- C. Muñoz	- S. Heinemeyer - M. Masip - M.A. Pérez-García
2. IFIC-AHEP Instituto de Física Corpuscular (IFIC)-UV/CSIC	- J.W.F. Valle	
3. UHU Universidad de Huelva (UHU)	- M.E. Gómez	
4. UCM-Th Universidad Complutense de Madrid (UCM)	- A.L. Maroto	
5. IAA Instituto de Astrofísica de Andalucía (IAA)-CSIC Instituto de Astrofísica de Canarias (IAC)	- F. Prada	- J. Betancort-Rijo
6. UZ Universidad de Zaragoza (UZ)	- M.L. Sarsa	
7. IFAE Instituto de Física de Altas Energías (IFAE)	- A. Moralejo	
8. UCM-GAE Universidad Complutense de Madrid (UCM)	- J.A. Barrio	
9. IFIC-Exp Instituto de Física Corpuscular (IFIC)-UV/CSIC	- J.J. Hernández-Rey	
10. UPV Universidad Politécnica de Valencia (UPV)	- M. Ardid	
11. U5 Universidad de Alcalá (UAH) Universidad de Santiago de Compostela (USC) Universidad de las Islas Baleares (UIB) Universidad de Murcia (UMU) Centro Extremeño de Tecnologías Avanzadas (CETA)-Ciemat	- M.D. Rodríguez-Frías	- G. Parente - A. Sintès - J. Bussons Gordo - R. Ramos

Organization

► Science Working Groups

- **Direct detection**
Coordinators: M. Ardid, D.G. Cerdeño, J. Collar, E. García
- **Indirect detection: gamma rays and cosmic rays**
Coordinators: J.A. Barrio, G. Bertone, N. Fornengo, R. Lineros, M.A. Sánchez-Conde
- **Indirect detection: neutrinos and high energy cosmic rays**
Coordinators: M. Masip, G. Ros, J.D. Zornoza
- **LHC, particle physics and dark matter**
Coordinators: M.E. Gómez, S. Heinemeyer, M. Hirsch
- **Cosmology**
Coordinators: S. Gottlober, A.L. Maroto

► Outreach Working Group

- Coordinators: D.G. Cerdeño, S. Hernández, S. Pastor

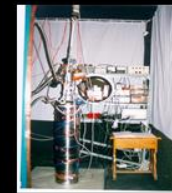
Infrastructures

MultiDark groups participated in the following collaborations related to DM searches:

- ANAIS, ROSEBUD, CDMS, COUPP/PICO, EURECA
- MAGIC, CTA, Fermi-LAT
- ANTARES, KM3NeT
- SDSS-III/BOSS
- AUGER, JEM-EUSO
- LISA



ANAIS



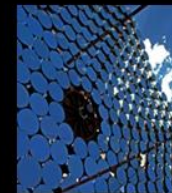
ROSEBUD



EURECA



MAGIC



CTA



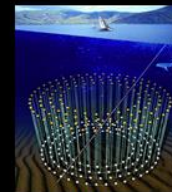
GAW



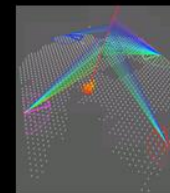
SDSS-III/BOSS



ANTARES



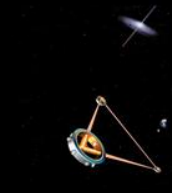
KM3NeT



AUGER



JEM-EUSO



LISA



FERMI



PAMELA



COUPP

THE LONG LIFE OF MultiDark

MultiDark 2010-14 ;

5 years

First extension 2015 ;

1 year

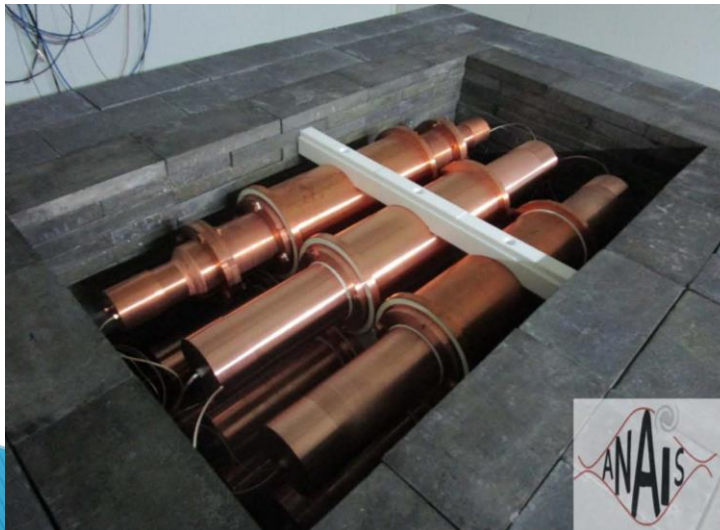
Second extension until June 2016 ;

0.5 years

Third extension until June 2017 ;

1 year

Total: 7.5 years



thanks to

What have we achieved in those years?

Summary of Activities	Achieved in 2010-17
Publications in refereed journals focused on dark matter	318
Other publications in refereed journals that could be relevant for the project	549
Publications in proceedings focused on dark matter	44
Other publications in proceedings that could be relevant for the project	90
International collaborations established	12
Databases created	2
Experiments and collaborations supported with equipment	7
Technology transfer	7
MultiDark Consolider Workshops	14
Meetings of the Working Groups	7
International Programs	3
Presentations to international congresses	801
Training Schools	3
PhD theses defended	42
PhD theses in progress	25
Scientific activities sponsored	35
Media interviews and public talks	> 140
Press releases	21
<u>Hired personnel</u>	
Postdocs	14 (4 of them co-financed)
Ph.D. students	18 (11 of them co-financed)
Technicians	3 (1 of them co-financed)
Summer students	55

Increase, consolidation and cooperation between the groups

- Works in collaboration among MultiDark groups



Last time we met:

14th MultiDark Consolider Workshop

Shedding light in our dark Universe


IFT UAM-CSIC, Madrid, 24-26 May, 2017

53 participants

14th MultiDark Consolider Workshop
Instituto de Física Teórica UAM-CSIC
Universidad Autónoma de Madrid
May 24 - 26, 2017

MultiDark
Multimessenger Approach
for Dark Matter Detection

Consolider
2010



Further Information
susana.hernandez@uam.es (IFT UAM-CSIC, MultiDark) www.multidark.es



Carlos Muñoz López
Universidad Autónoma de Madrid
Facultad de Ciencias
Dpto. Física Teórica Módulo 15-Dpcho 508
Campus de Cantoblanco
28049 Madrid
CSD2009-00064

Madrid 29 de noviembre de 2017

Estimado coordinador:

Su proyecto Consolider, CSD2009-00064, ha sido evaluado por un Comité de expertos internacionales nombrado por la Directora de la Agencia Estatal de Investigación.

Para su información le envío el resultado del panel de evaluación

PRODUCCIÓN CIENTÍFICA	NUEVAS SINERGIAS	TRASFERENCIA DEL CONOCIMIENTO	INTERNACIONALIZACIÓN	VALORACIÓN GENERAL
EXCELENTE	EXCELENTE	MUY BUENO	EXCELENTE	EXCELENTE

Un cordial saludo



Joaquín Ángel Serrano Agejas
Jefe de la Subdivisión de Programas Científico-Técnicos
Transversales, Fortalecimiento y Excelencia

Paseo de la Castellana 162
Planta 18 par
28071 Madrid

Although
Since then:

and we also applied **successfully**
to the Spanish Research Agency for a

MultiDark Consolider Network
(Red Española de Excelencia),
July 2018-20

funded with 30 k€
(because this is a Network, not a Project as before)

Organization is similar

(although several coordinators are new, Thanks to all of them!)

Science Working Groups

- **Direct detection**
Coordinators: M. Ardid, D.G. Cerdeño, E. García
- **Indirect detection: gamma rays and cosmic rays**
Coordinators: D. Nieto, M.A. Sánchez-Conde
- **Indirect detection: neutrinos and high energy cosmic rays**
Coordinators: M. Masip, M. Tórtola, J.D. Zornoza
- **Particle physics, LHC and dark matter**
Coordinators: M.E. Gómez, S. Heinemeyer, M. Hirsch
- **Cosmology**
Coordinators: A. Knebe, A.L. Maroto, A. Sintès

Here we are now:

15th MultiDark Consolider Workshop

Shedding light in our dark Universe

UNIZAR, Zaragoza, 3-5 April, 2019

56 participants

15th MultiDark Consolider Workshop

Zaragoza, 3th-5th April 2019

MultiDark

Multimessenger Approach
for Dark Matter Detection



Universidad
Zaragoza



Consolider



Consolider Network

Multimessenger Approach for Dark Matter Detection - MultiDark

More info:

Local Organizers: misarsa@unizar.es, edgarcia@unizar.es, mariam@unizar.es

MultiDark Office Manager: susana.hernandez@uam.es

<http://www.multidark.es>

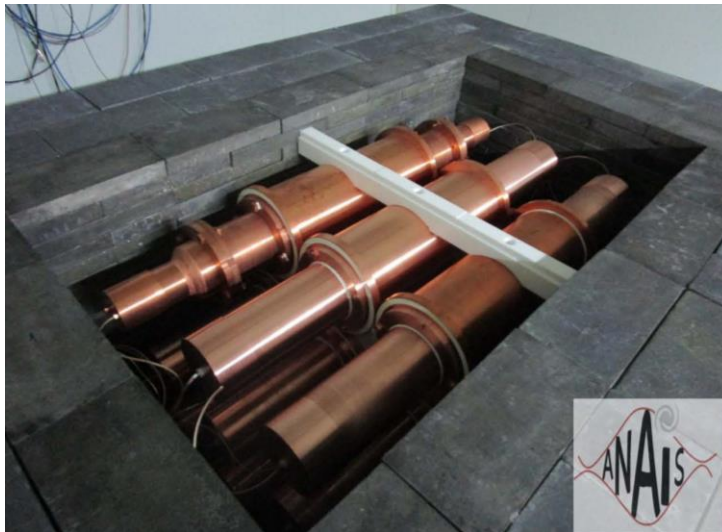
Participant

Institutions:



Results of annual modulation of ANAIS experiment

The GIFNA Group of UZ, participant in MultiDark, just [publish the results of 1.5 years from ANAIS-112 experiment](#) of direct detection of dark matter. Results are compatible with the absence of modulation and incompatible with DAMA/LIBRA signal at 90% C.L.



Future activities:

16th MultiDark Consolider Workshop

Shedding light in our dark Universe

La Rábida, Huelva, 25-27 September, 2019



MultiDark

Multimessenger Approach
for Dark Matter Detection



IBS-MultiDark Joint Focus Program starts next week!

The following members of MultiDark will participate in the Focus Program on "WIMPs and axions" taking place in Daejeon (S. Korea) from October 10 to 21, 2014: D.G. Cerdeño, J. Collar, M. Gómez, G. Gómez-Vargas, S. Heinmeyer, J.H. Huh, F. Iocco, G. Lambard, R. Lineros, Y. Mambrini, M. Martínez, A. Morselli, C. Muñoz, M.A. Sánchez-Conde, M.L. Sarsa, O. Seto, J.D. Vergados.

03/10/2014
[more information](#)

IBS-MultiDark-IPPP again!
Daejeon, S. Korea, 7-11 October 2019

IBS-MultiDark Joint Focus Program: WIMPs and Axions

10-21 October 2014
IBS Center for Theoretical Physics of the Universe (CTPU), Daejeon, Korea

Group and excursion photo uploaded.

Overview

- Participant List
- Timetable
- Travel Information
- Accommodation
- Conference Photo
- Excursion Photo

Support

IBS-MDProgram@ib...
+82-42-878-8401

IBS-MultiDark Joint Focus Program: WIMPs and Axions

This program is oriented towards WIMP (10th-15th) and axion (17th-21st) dark matter searches, covering also other candidates. The aim is to promote the collaboration and exchange of ideas. The list of invited speakers includes theoretical as well as experimental experts. Main topics of the workshop include: Dark Matter, WIMP, Axion, Astro-particle physics.

Invited Speakers

WIMP Session

- David G. Cerdeno (IFT UAM-CSIC, COMS)
- Bhaskar Dutta (Texas A&M University)
- Richard Gaitskill (Brown University, LUX/LZ)
- Mano Gomez (Huelva University)
- German Gomez-Vargas (Catholic University of Chile)
- Paolo Gondolo (University of Utah)
- Sven Heinmeyer (IFGA LCC-CSIC)
- Dan Hooper (FNAL, University of Chicago)
- Alejandro Ibarra (TUM, Munich)
- Fabio Iocco (IFT, Madrid)
- Yong-Yeon Kaum (SNJU)
- Pyeongwon Ko (KIAS)
- Guillaume Lambard (CUP, IBS)
- Hyun Su Lee (Ewha Womens University, KIMS)
- Tim Linden (University of Chicago)
- Yann Mambrini (LPT, Orsay)



Thank you for your attention!

