

Rasmi E. Hajjar Muñoz

B.S. PHYSICS · M.S. THEORETICAL PHYSICS · PH.D. STUDENT THEORETICAL PHYSICS

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Education

PhD Theoretical Physics: Neutrinos in Cosmology and Astroparticle Physics

IFIC (CSIC- UNIVERSITY OF VALENCIA). SUPERVISORS: OLGA MENA AND SERGIO PALOMARES RUIZ

Valencia, Spain

Sep. 2021 - PRESENT

Cosmology, Space Science and Space Technologies Fellowship

SCUOLA SUPERIORE MERIDIONALE. SUPERVISORS: NINETTA SAVIANO AND GENNARO MIELE

Naples, Italy

Nov. 2020 - Sep. 2021

M.Sc. in Advanced Physics: Theoretical Physics

UNIVERSITY OF VALENCIA - ESTUDI GENERAL

Valencia, Spain

Sep. 2019 - Jul. 2020

Erasmus Exchange Program

UNIVERSITY OF LEEDS

Leeds, UK

Sep. 2017 - Jul. 2018

B.Sc. in Physics

UNIVERSITY OF VALENCIA - ESTUDI GENERAL

Valencia, Spain

Sep. 2015 - Jul. 2019

Skills

LANGUAGES

SPANISH, mothertongue

CATALAN, mothertongue

ENGLISH, fluent

ITALIAN, intermediate

PROGRAMMING LANGUAGES

Python, own codes

C++ and C, modified CLASS and nuSQUIDS

Mathematica, own codes

LATEX, own documents

Publications

Origin of cosmological neutrino mass bounds: background *versus* perturbations

TONI BERTÓLEZ-MARTÍNEZ, IVÁN ESTEBAN, RASMI HAJJAR, OLGA MENA AND JORDI SALVADÓ.

arXiv number: arXiv:2411.14524

arXiv preprint

25th October 2024

Redshift-space distortions corner interacting dark energy

PIETRO GHEDINI, RASMI HAJJAR, OLGA MENA.

DOI: 10.1016/j.dark.2024.101671

Physics of the Dark Universe

5th October 2024

Shedding light to the Δm_{21}^2 tension with supernova neutrinos

RASMI HAJJAR, SERGIO PALOMARES-RUIZ, OLGA MENA.

DOI: 10.1016/j.physletb.2024.138719

Physics Letters B

13th May 2024

Earth tomography with supernova neutrinos at future neutrino detectors

RASMI HAJJAR, OLGA MENA, SERGIO PALOMARES-RUIZ.

DOI: 10.1103/PhysRevD.108.083011

Physical Review D

10th October 2023

Constraints on heavy decaying dark matter with current gamma-ray measurements

MARCO CHIANESE, DAMIANO F.G. FIORILLO, RASMI HAJJAR, GENNARO MIELE, NINETTA SAVIANO.

DOI: 10.1088/1475-7516/2021/11/035

JCAP

15th November 2021

Heavy decaying dark matter at future neutrino radio telescopes

MARCO CHIANESE, DAMIANO F.G. FIORILLO, RASMI HAJJAR, GENNARO MIELE, STEFANO MORISI, NINETTA SAVIANO.

DOI: 10.1088/1475-7516/2021/05/074

JCAP

28th May 2021

Neutrino Mass Ordering at DUNE: an Extra ν -Bonus

CHRISTOPH A. TERNES, STEFANO GARIAZZO, RASMI HAJJAR, OLGA MENA, MICHEL SOREL, MARIAM TORTOLA.

DOI: 10.1103/PhysRevD.100.093004

Physical Review D

21st November 2019

Secondments

Niels Bohr Institute - University of Copenhagen

Copenhagen, Denmark

SUPERVISOR: PROF. MAURICIO BUSTAMANTE

Oct. 2024 - Dec. 2024

Research secondment associated to the competitive grant EST24/00309. Devoted to test diverse properties of neutrino interactions with high-energy astrophysical neutrinos.

KAVLI IPMU - The University of Tokyo

Kashiwa, Japan

SUPERVISOR: PROF. PATRICK DE PERIO

Jul. 2024 - Aug. 2024

Research secondment associated to the ASYMMETRY SE program. Collaborated with the Super-Kamiokande and Hyper-Kamiokande neutrino group.

Fermilab - Fermi National Accelerator Laboratory

Batavia, Illinois, USA

SUPERVISOR: PROF. STEPHEN PARKE

Jul. 2023 - Aug. 2023

Research secondment associated to the ASYMMETRY SE program. Examined the different ways of introducing neutrino perturbations evolution in cosmology in collaboration with other ASYMMETRY fellows visiting Fermilab. Derived neutrino fluid treatment of perturbations.

Center for Cosmology and Astroparticle Physics - The Ohio State University

Columbus, Ohio, USA

SUPERVISOR: PROF. IVÁN ESTEBAN

May. 2023 - Jul. 2023

Research secondment associated to the competitive grant EST23/00231. Inspected neutrino role in cosmological evolution. Modeled background cosmological neutrino evolution as a function of the equation of state. Programmed background modification inside the CLASS Boltzmann solver.

Università degli Studi di Napoli Federico II

Naples, Italy

SUPERVISORS: DR. NINETTA SAVIANO AND DR. MARCO CHIANESE

Feb. 2023 - May. 2023

Research secondment associated to the competitive grant UV-RI_MID-2515765. Reviewed literature on composite scenarios with two dark matter components: Primordial Black Holes and WIMPs. Developed code obtaining WIMP accretion profile around Primordial Black Holes. Obtained emission coming from WIMP annihilation in this scenario.

Short Visits

Universidad del País Vasco - Euskal Herriko Unibertsitatea

Bilbao, Spain

SUPERVISOR: IVÁN ESTEBAN

Apr. 2024

One week visit focused on diagnosing the CMB calculation and the different terms contributing to the observable. Tested the gauge-independence of the various terms. Focused on the ISW and EISW effects and their contribution at low multipoles.

Institut de Ciències del Cosmos - Universitat de Barcelona (ICCUB)

Barcelona, Spain

SUPERVISOR: JORDI SALVADO

Nov. 2023

One week visit associated to the competitive grant DRAC Formació Avançada. Developed new perturbation formalism to take into account neutrino cosmological perturbations.

Teaching

Physics I - University of Valencia

Valencia, Spain

JOINT DEGREE IN PHYSICS AND MATHEMATICS (15H) AND DEGREE IN CHEMISTRY (24H)

Fall 2021

Quantum Physics I - University of Valencia

Valencia, Spain

DEGREE IN PHYSICS (45H+45H) AND JOINT DEGREE IN PHYSICS AND CHEMISTRY (8H)

Fall 2022 and Fall 2023

Mentoring

Co-supervisor of Pietro Ghedini Master Thesis - University of Bologna

Bologna, Italy

SUPERVISORS: SILVIA PASCOLI AND OLGA MENA

Spring 2024

Title: Growth of structures in non-standard Dark-Energy model.

Seminars

SNEWS Supernova Seminar Series

“SUPERNOVA NEUTRINOS AND EARTH MATTER EFFECTS”

Online

30th January 2025

Niels Bohr Institute - The University of Copenhagen

“ADDRESSING TENSIONS IN NEUTRINO MASSES”

Copenhagen, Denmark

25th November 2024

KAVLI IPMU - The University of Tokyo

“EARTH MATTER EFFECTS AND SUPERNOVA NEUTRINOS”

Kashiwa, Japan

19th August 2024

CCAPP - The Ohio State University

“EARTH TOMOGRAPHY WITH SUPERNOVA NEUTRINOS AT FUTURE NEUTRINO DETECTORS”

Columbus, Ohio, USA

19th May 2023

Scuola Superiore Meridionale (SSM)

“EARTH TOMOGRAPHY WITH SUPERNOVA NEUTRINOS AT FUTURE NEUTRINO DETECTORS”

Naples, Italy

14th March 2023

Conferences

Neutrino Frontiers: Focus Week and Astrophysical Week 1

GALILEO GALILEI INSTITUTE

· Talk: Shedding light to the Δm_{21}^2 tension with supernova neutrinos

Florence, Italy

Jul. 2024

PLANCK2024

INSTITUTO SUPERIOR TÉCNICO

· Talk: Shedding light to the Δm_{21}^2 tension with supernova neutrinos

Lisbon, Portugal

Jun. 2024

@FlipPhysics 2024 workshop

INSTITUTO DE FÍSICA CORPUSCULAR (IFIC)

· Talk: Shedding light to the Δm_{21}^2 tension with supernova neutrinos

Valencia, Spain

Mar. 2024

XX International Workshop on Neutrino Telescopes

ISTITUTO VENETO DI SCIENZE, LETTERE ED ARTI

· Talk: Earth tomography with supernova neutrinos at future neutrino detectors

Venice, Italy

Sep. 2023

TeV Particle Astrophysics

UNIVERSITY OF NAPLES FEDERICO II

· Talk: Earth tomography with supernova neutrinos at future neutrino detectors

· Talk: Multi-messenger lifetime constraints on heavy decaying dark matter

Naples, Italy

Sep. 2023

Invisibles 2023 workshop

UNIVERSITY OF GOETTINGEN

· Talk and poster: Shedding light to the Δm_{21}^2 tension with supernova neutrinos.

Goettingen, Germany

Aug. 2023

Invisibles 2022 workshop

UNIVERSITY PARIS-SACLAY

· Talk and poster: Supernova neutrino Earth tomography: myth or reality?

Orsay, France

Jun. 2022

@FlipPhysics 2022 workshop

INSTITUTO DE FÍSICA CORPUSCULAR (IFIC)

Valencia, Spain

Mar. 2022

3rd GNN Workshop on Indirect Dark Matter Searches with Neutrino Telescopes

FACULTY OF SCIENCE - UNIVERSITY OF GRANADA

· Talk: Multi-messenger lifetime constraints on heavy decaying dark matter

Granada, Spain

Mar. 2022

17th International Conference on Topics in Astroparticle and Underground Physics

INSTITUTO DE FÍSICA CORPUSCULAR (IFIC)

· Talk: Multi-messenger lifetime constraints on heavy decaying dark matter

Valencia, Spain (online)

Aug. 2021

NuCo 2021 - Neutrinos in Colombia

CONHEP

· Talk: Heavy decaying dark matter at future neutrino radio telescopes

Colombia (online)

Jul. 2021

37th International Cosmic Ray Conference (ICRC)

DESY

· Talk: Testing the stability of heavy dark matter with up-coming radio neutrino telescopes

Berlin, Germany (online)

Jul. 2021

Invisibles 2021 workshop

INSTITUTO DE FÍSICA TEÓRICA (IFT)

· Poster: Heavy decaying dark matter at future neutrino radio telescopes

Madrid, Spain (online)

Jun. 2021

XIV Interconnections between Particle Physics and Cosmology

UNIVERSITY OF OKLAHOMA

· Talk: Heavy decaying dark matter at future neutrino radio telescopes

Oklahoma, USA (online)

May. 2021

WOPM (Workshop on Optically Pumped Magnetometers)

HELMHOLTZ INSTITUTE OF MAINZ (HIM)

Mainz, Germany

Aug. 2019

HOW 2018

INSTITUTO DE FÍSICA CORPUSCULAR (IFIC)

Valencia, Spain

Nov. 2018

Schools

Neutrino Frontiers: Training Week

THE GALILEO GALILEI INSTITUTE FOR THEORETICAL PHYSICS

Florence, Italy

Jun. 2024

CosmoVerseSchool@Corfu

MON REPOS

Corfu, Greece

May. 2024

First EUCAPT School: Cosmology

INSTITUTO DE FÍSICA CORPUSCULAR (IFIC)

Valencia, Spain

Sep. 2023

XXXIII Canary Island Winter School

INSTITUTO DE ASTROFÍSICA DE CANARIAS (+ POSTER PRESENTATION)

La Laguna, Spain

Nov. 2022

Invisibles 2022 school

UNIVERSITY PARIS-SACLAY (+ POSTER PRESENTATION)

Orsay, France

Jun. 2022

TAE 2021 International School on High Energy Physics

CENTRO DE CIENCIAS DE BENASQUE PEDRO PASCUAL

Benasque, Spain

Sep. 2021

Invisibles 2021 school

INSTITUTO DE FÍSICA TEÓRICA

Madrid, Spain (online)

Apr. 2021

Theoretical Aspects of Astroparticle Physics, Cosmology and Gravitation

THE GALILEO GALILEI INSTITUTE FOR THEORETICAL PHYSICS (+ TALK)

Florence, Italy (online)

Feb. 2021

Challenges for the Standard Cosmological Model

IV JOINT ICTP-TRIESTE/ICTP-SAIFR SCHOOL ON COSMOLOGY

São Paulo, Brazil (online)

Jan. 2021

Outreach

Expciencia Fair 2024

PARC CIENTÍFIC UNIVERSITAT DE VALÈNCIA (PC-UV)

Valencia, Spain

11th May 2024

High School Outreach talks of Astroparticle Physics (IFIC)

1- COLEGIO LA PURÍSIMA, ALZIRA 2-CUMBRES SCHOOL, MONCADA

Comunitat Valenciana, Spain

Mar. 2024

II Fira de la Ciència - Activity: How much Dark Matter do you have?

PARC "MOLÍ D'ANIMETA"

Quart de Poblet, Spain

23rd September 2023

Expciencia Fair 2023

PARC CIENTÍFIC UNIVERSITAT DE VALÈNCIA (PC-UV)

Valencia, Spain

6th May 2023

Collaborator of XIV Fair-Contest Experimenta

PRINCÍPE FELIPE SCIENCE MUSEUM

Valencia, Spain

7th April 2019

Collaborator of XII Fair-Contest Experimenta

PRINCÍPE FELIPE SCIENCE MUSEUM

Valencia, Spain

2nd April 2017

Equity and Diversity

Member of the Equality and Diversity Committee of the IFIC

INSTITUTO DE FÍSICA CORPUSCULAR (IFIC)

Valencia, Spain

Nov. 2023 - PRESENT

Fellowships

FPU Fellowship, code FPU19/03348

THE NEUTRINO ROLE IN COSMOLOGY AND ASTROPARTICLE PHYSICS

Valencia, Spain

Sep. 2021 - Aug. 2025

Mainz Summer Program

ANOMALOUS MAGNETIC MOMENT OF THE MUON PROBLEM

Mainz, Germany

Aug. 2019 - Sep. 2019

Spanish Ministry of Education Collaboration Fellowship

NEUTRINO OSCILLATION PHYSICS AND HIERARCHY

Valencia, Spain

Jan. 2019 - Jun. 2019

JAE Intro CSIC Fellowship

DARK MATTER SURVEY WITH NEUTRINO TELESCOPES ANTARES AND KM3NET

Valencia, Spain

Sep. 2018 - Dec. 2018

IFIC's Severo Ochoa Summer Student Fellowships

NEUTRINO ASTRONOMY WITH ANTARES NEUTRINO TELESCOPE

Valencia, Spain

Jul. 2018

Erasmus+ Fellowship

PHYSICS STUDENT AT THE UNIVERSITY OF LEEDS

Leeds, UK

Sep. 2017 - Jul. 2018