Anna Małgorzata Suliga

Curriculum Vitae

SERF 407 CASS,
University of California, San Diego,
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Research Experience

11/2021-10/2024 **N3AS Postdoctoral Fellow**
Network for Neutrinos, Nuclear Astrophysics, and Symmetries (N3AS)
University of California, Berkeley and San Diego, University of Wisconsin-Madison

11/2024-10/2027 **NTN Postdoctoral Fellow**
Neutrino Theory Network (NTN), Upcoming position
New York University

Research interests

Astroparticle physics, neutrino physics, dark matter, stellar evolution, physics beyond the Standard Model, sterile neutrinos, nonstandard interactions

Education

8 Oct 2021 **PhD in Physics**
Niels Bohr Institute, University of Copenhagen, Denmark
Thesis topic: Recent developments in neutrino astrophysics with connections to physics beyond the Standard Model
Advisor: Professor Irene Tamborra

9 Jul 2018 **Msc in Physics**
Niels Bohr Institute, University of Copenhagen, Denmark
Thesis topic: Diffuse supernova neutrino background
Advisor: Professor Irene Tamborra

28 Jan 2016 **Engineering degree (BSc) in Technical Physics**
The AGH University of Science and Technology in Kraków, Poland
Thesis topic: Analysis of the impact imposed by neutron spectrum on production and burn-up of actinides in nuclear reactors
Advisor: Associate Professor Mariusz Kopeć

Awards

02/2021 **Flash Talk Award**, best Flash Talk at the XIX International Workshop on Neutrino Telescopes, Italy

08/2018 **Lørup Scholar Stipend**, award of 50,000 DKK for excellent MSc thesis work, Niels Bohr Institute, Denmark

07/2015 **Internship DESY, Hamburg, Germany**, grant of 2500 € to work with Peter Göettlicher the leader of Analogue Electronics and Microcontroller Applications group in DESY
• Installing and upgrading software on the high sensitivity electronic devices, e.g., pattern generator, logic analyzer, multichannel high voltage supplier.
• Testing the response quality of a new generation of chips and scintillator tiles for the Calice calorimeter (the International Linear Collider (ILC)).

Peer-reviewed publications

17. **On the properties of qudits**
A. Baha Balantekin and Anna M. Suliga, Eur.Phys.J.A 60 (2024) 124

16. **Probing self-interacting sterile neutrino dark matter with diffuse supernova neutrino background**
A. Baha Balantekin, George M. Fuller, Anupam Ray, Anna M. Suliga, Phys.Rev.D 108, 123011 (2023)

15. **Distinctive nuclear probes of low-energy atmospheric neutrinos**
Anna M. Suliga, and John F. Beacom, Phys.Rev.D 108 4, 043035 (2023)

14. **The uncertainties on the EFT coupling limits for direct dark matter detection experiments stemming from uncertainties of target properties**
Daniel J. Heimsoth, Brandon Lem, Anna M. Suliga, Calvin W. Johnson, A. Baha Balantekin, and Susan N. Coppersmith, Phys. Rev. D 108, 103031

13. **Entanglement in three-flavor collective neutrino oscillations**
Pooja Siwach, Anna M. Suliga, and A. Baha Balantekin, Phys. Rev. D 107, 023019 (2023)

12. **Exploiting stellar explosion induced by the QCD phase transition in large-scale neutrino detectors**
Tetyana Pitik, Daniel Heimsoth, Anna M. Suliga, and A. Baha Balantekin, Phys.Rev.D 106 (2022) 10, 103007

11. **Diffuse Supernova Neutrino Background**
Anna M. Suliga, Chapter in Handbook of Nuclear Physics. Springer, Singapore (2023)

10. **Non-Universal Stellar Initial Mass Functions: Large Uncertainties in Star Formation Rates at $z \approx 2-4$ and Other Astrophysical Probes**
Joshua J. Ziegler, Thomas D.P. Edwards, Anna M. Suliga, Irene Tamborra, Shunsaku Horiuchi, Shin'ichiro Ando, Katherine Freese, MNRAS 517 (2022)2, 2471-2484

9. **Snowmass White Paper: Beyond the Standard Model effects on Neutrino Flavor**
C.A. Arguelles, Anna M. Suliga, et al. (2022), Eur.Phys.J.C 83 (2023) 1, 15

8. **Synergy between cosmological and laboratory searches in neutrino physics: a white paper**
Kevork N. Abazajian, Anna M. Suliga, et al., Physics of the Dark Universe, (2023) 101333

7. **A Next-Generation Liquid Xenon Observatory for Dark Matter and Neutrino Physics**
   J. Aalbers, Anna M. Suliga, et al. (2021), J.Phys.G 50 (2023) 1, 013001
6. **Towards Probing the Diffuse Supernova Neutrino Background in All Flavors**
   Anna M. Suliga, John F. Beacom and Irene Tamborra, Phys.Rev.D 105 (2022) 4, 043008
5. **A closer look at the *pp*-chain reaction in the Sun: Constraining new light mediators**
   Anna M. Suliga, Shashank Shalgar and George Fuller, JCAP 07 (2021) 042
4. **Astrophysical constraints on the new mediators with non-standard coherent neutrino-nucleus scattering**
   Anna M. Suliga and Irene Tamborra, Phys.Rev.D 103 (2021) 8, 083002
3. **Lifting the core-collapse supernova bounds on keV-mass sterile neutrinos**
   Anna M. Suliga, Irene Tamborra, and Meng-Ru Wu, JCAP **08** (2020) 018
2. **Tau lepton asymmetry by sterile neutrino emission - Moving beyond one-zone supernova models**
   Anna M. Suliga, Irene Tamborra, and Meng-Ru Wu, JCAP **12** (2019) 019
1. **Measuring the supernova unknowns at the next-generation neutrino telescopes through the diffuse neutrino background**
   Klaes Møller, Anna M. Suliga, Irene Tamborra, and Peter B. Denton, JCAP **05** (2018) 066

Teaching experience

May 2024	Co-lecturer, Computational Astrophysics Research Preparation Program, UC San Diego
fall 2022	Co-lecturer, N3AS Undergraduate Fellowship Program, UC Berkeley
fall 2020	Teaching Assistant, Applied Statistics, University of Copenhagen
spring 2020, fall 2019	Teaching Assistant, Computer science for physicists, University of Copenhagen

Mentoring

02/2023 - 02/2024	Mentor, Gabrielle Stewart, undergraduate student at the University of California, Berkeley
02/2023 - onwards	Science mentor, Angela Beatty, undergraduate student at the University of California, Berkeley, Now: Master Student at the San Francisco State University
03/2022 - 06/2023	Science mentor, Brandon Lem, undergraduate student at the University of California, Berkeley, Now: Graduate fellow at University of Michigan and FRIB
12/2021 - 09/2023	Science mentor, Daniel Heimsoth graduate student at the University of Wisconsin-Madison

12/2021 - 09/2022 Science mentor, Tetyana Pitik graduate student at the University of Copenhagen → Postdoctoral Fellow at University of California, Berkeley winter 2023

03/2022 - 06/2023 Mentor, Emilie Cote, undergraduate student at the University of California, Berkeley

03/2022 - 09/2022 Mentor, Thierry Li, undergraduate student at the University of California, Berkeley, Now: Department of physics at Central China Normal University (CCNU)

08/2020 - 12/2020 Science mentor, Daniel Abdulla Bobruk, master student at the University of Copenhagen, Now: industry job

06/2020 - 09/2020 Mentor, Nanna Marie Baars Støvelbæk, master student at the University of Copenhagen, Now: middle school teacher

01/2020 - 04/2020 Mentor, Kristine Simone Nielsen, master student at the University of Copenhagen, Now: middle school teacher

Service and Outreach

06/2024 **"Unraveling the Mysteries of the Universe"**,
Pub talk, Lead, South Dakota, USA

05/2024 **Computational Astrophysics Research Preparation (CARP) Program**
Co-lecturer of the program for community college transfer students, University of California, San Diego

11/2023 **American-Japanese Workshop on Astrophysical Neutrinos at DNP-JPS 2023**
Co-organizer of the workshop, Hawaii, USA

07/2023 **Panel on advice to enter into and what it's like to be a theoretical physicist**
Co-panelist at a student event, Lead, SD, USA

10/2022 **N3AS Topical Meeting on Neutrinos and Physics beyond the Standard Model**
Co-organizer of the meeting, Madison, USA

09/2022 **International Conference on Neutrinos and Dark Matter**
Co-organizer of the conference, Sharm El Sheik, Egypt

09/2021 - 08/2022 **N3AS Seminars**
Co-organizer of bi-weekly seminars, University of California, Berkeley, USA

05/2019 - 09/2021 **Transient Tuesdays**
Co-organizer of bi-weekly discussions about astrophysical transient objects' physics at DARK, Neils Bohr Institute, Denmark

Peer-Reviewer
Physical Review Letters, Physical Review D, Physics Letters B, Letters of High Energy Physics

Computer skills

Advanced python, julia, C++, C, LaTeX, bash, git, MATLAB, Mathematica, OpenMP, Fortran

Invited talks

10/2024 **Sterile Neutrinos and the Neutrino Self-interaction in Supernovae**
Lead talk in a minisymposium, 2024 DNP Fall Meeting, Boston, USA, Host: Ramona Vogt, Nicole Vassh

09/2024 **Probing self-interacting sterile neutrino dark matter with the diffuse supernova neutrino background**
Workshop talk, NuFACT 2024, Argonne National Laboratory, USA, Host: Matheus Hostert

08/2024 **Core-collapse supernovae as probes of (not only) non-standard neutrino physics**
Virtual Seminar, Tsung-Dao Lee Institute in Shanghai, China, Host: Shao-Feng Ge, Andrew Cheek

07/2024 **Core-collapse supernovae as probes of (not only) non-standard neutrino physics**
Workshop talk, Solving the Boltzmann Equation for Neutrino Transport in Relativistic Astrophysics, ICERM, Providence, USA, Host: Francois Foucart, David Radice

07/2024 **Probing self-interacting sterile neutrino dark matter with the diffuse supernova neutrino background**
Workshop talk, CETUP, Lead, South Dakota, USA, Host: Barbara Szczerbinska

06/2024 **Strategies for detecting low-energy neutrino fluxes**
Seminar, KEK Theory Center, Tskuba, Japan, Host: Volodymyr Thakistov

06/2024 **Entanglement in three-flavor collective neutrino oscillations**
Workshop talk, Joint N3AS-iTHEMS Meeting on Quantum Information Science in Multimessenger Astrophysics, RIKEN, Wako, Japan, Host: Tetsuo Hatsuda

05/2024 **Core-collapse supernovae as probes of (not only) non-standard neutrino physics**
Seminar, New York University, USA, Host: Glennys Farrar

04/2024 **Core-collapse supernovae as probes of (not only) non-standard neutrino physics**
Seminar, University of Melbourne, Australia, Host: Stephan Meighen-Berger

03/2024 **Core-collapse supernovae as probes of (not only) non-standard neutrino physics**
Plenary colloquium, Workshop: Neutrinos cosmology and astrophysics, TRIUMF, Canada, Host: Gopolang Mohlabeng

02/2024 **Strategies for detecting low-energy neutrino fluxes**
Seminar, Lawrence Berkeley National Laboratory, Berkeley, USA, Host: Dimitra Pefkou

01/2024 **Strategies for detecting low-energy neutrino fluxes**
Seminar, Neutrino Seminar Series, Fermilab, Batavia, USA, Host: Bei Zhou

11/2023 **Strategies for detecting low-energy neutrino fluxes**
Seminar, SLAC, Menlo Park, USA, Host: Ian Padilla-Guy

11/2023 **Probing self-interacting sterile neutrino dark matter**
Workshop talk, MITP workshop on interacting dark sectors, Germany (Virtual event), Hosts: Amol Patwardhan, Manibrata Sen, Ermal Rapaj, Lukas Graf

10/2023 **Distinctive nuclear probes of low-energy atmospheric neutrinos**
Seminar, Mitchell Institute Texas A&M University, College Station, USA, Host: Doojin Kim

07/2023 **Core-collapse supernovae as probes of (not only) non-standard neutrino physics**
Conference talk, "Astrophysical neutrinos and the origin of the elements", Institute for Nuclear Theory, Seattle, USA , Hosts: George Fuller, Gail McLaughlin, David Radice, and Kate Scholberg

07/2023 **Distinctive nuclear probes of low-energy atmospheric neutrinos**
Workshop talk, CETUP∗ 2023, the Institute for Underground Science at SURF, Lead USA, Hosts: Barbara Szczerbinska and Kaladi Babu

05/2023 **Core-collapse supernovae as probes of not only non-standard neutrino physics**
Workshop talk, Mainz Institute for Theoretical Physics, Johannes Gutenberg University, Mainz, Germany, Hosts: Eve Armstrong, A. Baha Balantekin, and Cristina Volpe

04/2023 **Core-collapse supernovae as probes of not only non-standard neutrino physics**
Virtual Seminar, Academia Sinica, Taipei , Taiwan, Host: Dave Yeeles

02/2023 **Core-collapse supernovae as probes of not only non-standard neutrino physics**
Seminar, Arizona State University, Phoenix, USA, Hosts: Cecilia Lunardini & Lars Alama

02/2023 **Exploiting stellar explosion induced by the QCD phase transition in large-scale neutrino detectors**
NPAC Seminar, University of Wisconsin-Madison, Madison, USA, Hosts: Lu Lu & Albrecht Karle

12/2022 **Neutrino physics beyond the Standard Model in core-collapse supernovae**
Seminar, Washington University in St. Louis, USA, Host: Bhupal Dev

11/2022 **Neutrino physics beyond the Standard Model in core-collapse supernovae**
Seminar, YITP, Stony Brook University, USA, Host: Mauro Valli

11/2022 **Towards probing the diffuse supernova neutrino background in all flavors**
Seminar, Brookhaven National Laboratory, USA, Hosts: Konstantin Asteriadis and Peter Denton

09/2022 **Neutrino physics beyond the Standard Model in core-collapse supernovae**
Conference talk, Neutrino Oscillation Workshop 2022, Ostuni, Italy, Hosts: Paolo Bernardini and Eligio Lisi

08/2022 **Neutrino physics beyond the Standard Model in core-collapse supernovae**
Workshop talk, Dark Matter in Compact Objects, Stars, and in Low Energy Experiments, Institute for Nuclear Theory, Seattle, US, Hosts: Masha Baryakhtar, George Fuller, Sanjay Reddy, Tien-Tien Yu

06/2022 **Towards probing the diffuse supernova neutrino background in all flavors**
Seminar, Neutrino Theory Network Workshop, Fermi National Accelerator Laboratory, Batavia, USA, Host: Pedro Machado

04/2022 **Towards probing the diffuse supernova neutrino background in all flavors**
Seminar, University of California, San Diego & State University of San Diego, USA, Hosts: Kate Rubin and George Fuller

03/2022 **The effects of sterile neutrinos on core-collapse supernovae**
Conference talk, The Kavli Institute for Theoretical Physics, University of California, Santa Barbara, USA, Hosts: Alexander Friedland and Ian Shoemaker

03/2022 **Towards probing the diffuse supernova neutrino background in all flavors**
Virtual talk, Feebly Interacting Sectors Impact on Cosmology & Astrophysics, Mainz Institute for Theoretical Physics, Johannes Gutenberg University, Germany, Hosts: Edoardo Vitagliano and Andrea Caputo

02/2022 **Towards probing the diffuse supernova neutrino background in all flavors**
Virtual seminar, The Sydney Consortium for Particle Physics and Cosmology, Australia, Host: Ciaran O'Hare

02/2022 **Towards probing the diffuse supernova neutrino background in all flavors**
Virtual seminar, Dark Matter and Neutrino Forum, INPAC/TDLI of Shanghai Jiao Tong University, China, Host: Shao-Feng Ge

01/2022 **Towards probing the diffuse supernova neutrino background in all flavors**
Virtual journal club, OSU CCAPP AstroParticle Lunch, USA, Host: Po-Wen Chang

09/2021 **Towards probing the diffuse supernova neutrino background in all flavors**
Virtual talk, INT Virtual Workshop: New Directions in Neutrino Flavor Evolution in Astrophysical Systems, Institute of Nuclear Theory, University of Washington, USA, Host: Amol V. Patwardhan

04/2021 **Physics beyond the Standard Model in astrophysical environments**
Virtual seminar, Theory of Elementary Particles, Astroparticle Physics, and Phenomenology, University of California Los Angeles, USA, Host: Edoardo Vitagliano

01/2021 **Physics beyond the Standard Model in astrophysical environments**
Pheno coffee CHEP, Centre for High Energy Physics, Indian Institute of Science, Bangalore, India, Host: Ranjan Laha

11/2020 **Astrophysical constraints on non-standard coherent neutrino-nucleus scattering**
Virtual Seminar, Center for Cosmology and Astroparticle Physics, Columbus, Ohio
Hosts: Anna Porredon and Yi-Kuan Chiang

07/2020 **The impact of keV sterile neutrinos on core-collapse supernovae**
Brookhaven Neutrino Theory Virtual Seminar, Brookhaven National Laboratory, Upton, New York, Host: Peter B. Denton

07/2020 **The impact of keV sterile neutrinos on core-collapse supernovae**
Virtual Journal Club, Virginia Tech, Blacksburg, Virginia, Host: Natalia Tapia Arellano

06/2020 **Non-standard physics scenarios in the supernovae**
Plenary talk, QUARKS 2020, Pereslavl Zalessky, Russia, Host: Sergey Troitsky, Canceled due to the pandemic

08/2019 **Tau lepton asymmetry by sterile neutrino emission – Moving beyond one-zone supernova model**
Neutrino Quantum Kinetics in Dense Environments, Copenhagen, Denmark, Host: Shashank Shalgar

03/2019 **Determining supernova unknowns with the diffuse supernova neutrino background**
Seminar, Max Planck Institute for Physics, Munich, Germany, Host: Francesco Capozzi

Contributed talks

10/2023 **Core-collapse supernovae as probes of (not only) non-standard neutrino physics**
Brookhaven Forum 2023 Advancing Searches for New Physics, USA (Virtual event)

09/2022 **Exploiting stellar explosion induced by the QCD phase transition in large-scale neutrino detectors**
14th Conference on the Intersections of Particle and Nuclear Physics (CIPANP 2022), Lake Buena Vista, USA

05/2022 **Towards probing the diffuse supernova neutrino background in all flavors**
Pheno-2022, Pittsburgh, USA

12/2021 **A closer look at the *pp*-chain reaction in the Sun:**
AstroDark-2021, Japan

05/2021 **Astrophysical constraints on nonstandard coherent neutrino-nucleus scattering**
First EuCAPT Annual Symposium, CERN

02/2021 **A closer look at the *pp*-chain reaction in the Sun: Constraining new light mediators**
The XIX International Workshop on Neutrino Telescopes, Italy

04/2020 **The impact of keV sterile neutrinos on core-collapse supernovae**
Transient Tuesday, DARK, Neils Bohr Institute, Denmark

05/2019 **Determining supernova unknowns with the diffuse supernova neutrino background**
Supernova Neutrinos at the Crossroads: astrophysics, oscillation, and detection, Trento, Italy

01/2019 **Neutrinos - Introverts among elementary particles**
Introduction to University Pedagogy, Copenhagen, Denmark

01/2019 **Determining supernova unknowns with the diffuse supernova neutrino background**
Nordic Winter School on Particle Physics and Cosmology, Skeikampen, Norway

06/2018 **Determining supernova unknowns with the diffuse supernova neutrino background**
NBIA and Dark Summer School: Multi-Messengers from Compact Sources, Copenhagen, Denmark

Posters: 3 posters

06/2021 **A closer look at the *pp*-chain reaction in the Sun: Constraining new light mediators**
Weak Interactions and Neutrinos ($W^{\pm}I\nu$), Minneapolis, Minesota, online

08/2020 **Lifting the core-collapse supernova bounds on keV-mass sterile neutrinos**
SLAC Summer Institute, Menlo Park, California, online

06/2020 **Lifting the core-collapse supernova bounds on keV-mass sterile neutrinos**
Neutrino 2020, Chicago, Illinois, online

Scientific references

The following senior scientists are familiar with my studies and research activity:

1. **Full Professor of Particle Astrophysics Irene Tamborra**
   E-mail: tamborra@nbi.ku.dk, Tel: +45 35 33 32 27,
   Affiliation: Niels Bohr Institute, University of Copenhagen, Denmark
2. **Eugene P. Wigner Professor A. Baha Balantekin**
   E-mail: baha@physics.wisc.edu, Tel: +1-608-263-7931,
   Affiliation: University of Wisconsin-Madison, Madison, United States
3. **Distinguished Professor of Physics George M. Fuller**
   E-mail: gfuller@ucsd.edu, Tel: +1-858-534-9085,
   Affiliation: University of California, San Diego, United States

4. **Henry L. Cox Professor of Physics and of Astronomy John F. Beacom**
E-mail: beacom.7@osu.edu, Tel: +1-614-247-8102,
Affiliation: Ohio State University, Columbus, United States
5. **Associate Research Fellow Meng-Ru Wu**
E-mail: mwu@gate.sinica.edu.tw, Tel: +886-2-2789-6779,
Affiliation: Institute of Physics, Academia Sinica, Taiwan

Date: August 15, 2024