Alice Leoncini

Curriculum vitae

Education

2021 – present **PhD in Physics**, 37th Cycle, University of Rome "Tor Vergata".

2018 – 2021 **Master's degree in Particle & Astroparticle Physics**, Sapienza University of Rome
Thesis title: Study of ββ decay processes in ^{106}Cd using $^{106}CdWO_4$ scintillators
Supervisors: Pierluigi Belli, Fabio Cappella
Final degree mark: 110/110 cum laude

2015 – 2018 **Bachelor 's degree in Physics**, Sapienza University of Rome
Thesis title: Nuclei stabili: da Giorgio Fea a Maria Goeppert Mayer
Supervisor: Giovanni Battista Bachelet
Final degree mark: 103/110

2010 – 2015 **High school leaving qualification in scientific studies**
"Stanislao Cannizzaro" State Scientific High School, Rome
Final mark: 100/100

Schools

May 2022 INFN-School of Statistics 2022, May 15-20 2022, Paestum (Salerno, Italy).

Academic experience

A.Y. 2021/22 – present Exerciser for Physics Laboratory for Mathematicians, belonging to the course of Bachelor's Degree in Mathematics.

Exerciser for Physics Laboratory 2, belonging to Bachelor's Degree course in Physics.

A.Y. 2020/21 – summer exam session Member of the examination commission for the Astroparticle Physics' course, belonging to the Master's Degree course in Physics of Fundamental Interactions and Experimental Techniques.

Other

2023 – present PhD student representative on the Physics Department Council, University of Rome "Tor Vergata".

Working experience

2022 – 2023 Collaboration grant for support activities in the development of cross-curricular skills and guidance programs proposed by the INFN Division of Rome “Tor Vergata" with the project "LAB2GO 2022-2023 – Aid to the dissemination of laboratory practice”.

2021 – 2022 Collaboration grant for support activities in the development of cross-curricular skills and guidance programs proposed by the INFN Division of Rome “Tor Vergata" with the project "LAB2GO 2021-2022 – Aid to the dissemination of laboratory practice”.

Scientific memberships

2022 – present Member of the Italian Physical Society (SIF).

2019 –present INFN scientific research association.

Research activity

My research activity concerns the study of rare processes in the field of astroparticle physics and using highly radiopure crystal scintillators with experimental activities conducted in underground laboratories such as the Gran Sasso National Laboratories (LNGS).

During my master thesis work, I contributed to the data taking and data analysis of an experiment for the study of double beta decay modes in ^{106}Cd using a radiopure crystal scintillator in $CdWO_4$ (215.4 g) enriched to 66% in ^{106}Cd which exploits a logic of coincidence with two other radiopure crystal scintillators of $CdWO_4$. The apparatus is being measured at the Gran Sasso National Laboratories (LNGS) of the INFN, in the intrinsic low background experimental set-up called DAMA/R&D.

Furthermore, I was involved in realizing an experiment to characterize two radiopure crystal scintillators in Cs_2ZrCl_6 and to study double beta decays in Zr isotopes. In particular, I am engaged both in data taking and in their analysis. Moreover, I am involved in the implementation of new experimental apparatuses for the study of rare processes using new generation crystal scintillators. For example, I am also involved in the characterization and implementation of $ZnWO_4$ crystals in order to optimize their radiopurification, as well as their optical properties, and possibly increase the light-yield of the scintillator. The aim is to evaluate the use of $ZnWO_4$ scintillator crystals with anisotropic response to study of directionality for those candidates of Dark Matter particles that can induce nuclear recoils.

Scientific dissemination activity

April 2023	Participation in the activity "IMPROBABLE RESEARCH: discovering the unusual in science", at the ISS "Amedeo d'Aosta", L'Aquila, within the Sharper project - European Researchers' Night.
2023 – present	Team member to manage the Instagram and Facebook pages of the INFN Division of Rome "Tor Vergata".
2022 – present	Member of the scientific commission of the Asimov Prize for popular scientific publishing.
Sept. 2022	Member of the organizing committee of the European Researchers' Night, for the INFN Division of Rome "Tor Vergata", September 30 - October 1 2022, Ex-Mattatoio, Testaccio, Rome.

National and International conferences

July 10 – 23 2023	12th International Conference on New Frontiers in Physics (ICNFP 2023), online Invited talk's title: "Developments, features and perspectives of crystal scintillators of the Cs_2MCl_6 family (M = Hf or Zr) to search for rare processes".
Sept. 25 – 28 2022	International Conference on Neutrinos and Dark Matter (NuDM- 2022), online. Talk's title: "Study of Dark Matter with directionality approach using $ZnWO_4$ crystal scintillators".
Sept. 12 – 16 2022	108° National Congress of the Italian Physical Society (SIF 2022), Milan, Italy. Talk's title: "Studio di processi rari negli isotopi naturali di Hf e Zr utilizzando cristalli scintillatori di Cs_2HfCl_6 e Cs_2ZrCl_6".
Aug. 30 – Sept. 11 2022	11th International Conference on New Frontiers in Physics (ICNFP 2022), Kolymbari, Crete, Grece. Invited talk's title: "Study for rare processes in naturally occuring Zr isotopes using Cs_2ZrCl_6 crystal scintillators".
June 13 –17 2022	MEDEX (Matrix Elements for the Double beta decay EXperiments) conference, Prague, Czech Republic. Invited talk's title: "Study of double beta decay processes in ^{106}Cd using a $^{106}CdWO_4$ crystal scintillator".
May 2 – 6 2022	8th International conference on radionuclide metrology - low level radioactivity measurement techniques (ICRM-LLRT 2022), LNGS, Italy. Invited talk's title: "Low level measurements for rare nuclear transitions in Hf isotopes".
Sept. 13 – 17 2021	107° National Congress of the Italian Physical Society (SIF 2021), online.

Talk's title: "**Studio preliminare di processi 2β in ^{106}Cd usando un cristallo scintillatore arricchito di $^{106}CdWO_4$ in coincidenza/anticoincidenza con due $CdWO_4$**".

Aug. 23 – Sept. 2 2021

10th International Conference on New Frontiers in Physics (ICNFP 2021), online
Invited talk's title: "**Preliminary search for double beta decay processes in ^{106}Cd using $^{106}CdWO_4$ scintillator**".

List of pubblications

2023

P. Belli, R. Bernabei, F. Cappella, V. Caracciolo, R. Cerulli, A. Incicchitti, M. Laubenstein, A. Leoncini, V. Merlo, S.S. Nagorny, V.V. Nahorna, S. Nisi, P. Wang, **Development of low-background Cs_2ZrCl_6 detectors to study rare decays in Zr isotopes**, Eur. Phys. J. A 59, 2023, 176.

R. Bernabei, P. Belli, F. Cappella, V. Caracciolo, .R Cerulli, C. J. Dai, A. d'Angelo, A. Incicchitti, A. Leoncini, X. H. Ma, V. Merlo, F. Montecchia, X. D. Sheng, Z. P. Ye, **Dark Matter: DAMA/LIBRA and its perspectives**, SciPost Phys. Proc. 12, 2023, 025.

V. Caracciolo, V.Ya. Degoda, P. Belli, R. Bernabei, Yu.A. Borovlev, F. Cappella, R. Cerulli, F.A. Danevich, A. Incicchitti, A. Leoncini, V. Merlo, N. Cherubini, D.V. Kasperovych, Ya.P. Kogut, G.P. Podust, O.G. Polischuk, A.G. Postupaeva, V.N. Shlegel, V.I. Tretyak, **Dark Matter Directionality Approach Using $ZnWO_4$ Crystal Scintillators,** SciPost Phys. 12, 2023, 02.

R. Bernabei, P. Belli, A. Bussolotti, V. Caracciolo, R. Cerulli, N. Ferrari, A. Leoncini, V. Merlo, F. Montecchia, F. Cappella, A. d'Angelo, A. Incicchitti, A. Mattei, C. J. Dai, X. H. Ma, X. D. Sheng, Z. P. Ye, **New and recent results, and perspectives from DAMA/LIBRA-phase2**, Bled Workshops in Physics, 23, 2022, 1-20.

2022

A. Leoncini, L.A. Afanasieva,P. Belli, R. Bernabei, Yu.A. Borovlev, F. Cappella, V. Caracciolo, R. Cerulli, N. Cherubini, F.A. Danevich, V.Ya. Degoda, A. Incicchitti, D.V. Kasperovych, Ya.P. Kogut,V. Merlo, G.P. Podust, O.G. Polischuk, A.G. Postupaeva, V.N. Shlegel, and V.I. Tretyak, **Study of Dark Matter with directionality approach using $ZnWO_4$ crystal scintillators**, LHEP, 348, 2022.

R.Bernabei, P. Belli, A. Bussolotti, V. Caracciolo, R. Cerulli, N. Ferrari, A. Leoncini, V. Merlo, F. Montecchia, F. Cappella, A. d'Angelo, A. Incicchitti, A. Mattei, C.J. Dai, X.H. Ma, X.D. Sheng, Z.P.Ye, **Recent results from DAMA/LIBRA and comparisons**, Moscow Univ. Phys. Bull. 77, 2, 2022, 291-300.

P. Belli, R. Bernabei, V. Caracciolo, R. Cerulli, A. Leoncini, V. Merlo, F. Cappella, A. Incicchitti, N. Cherubini, E. Piccinelli, F.A. Danevich, D.V. Kasperovych, O.G. Polischuk, V.I. Tretyak, **Crystal Scintillators for the Dark Matter Directionality Approach**, Moscow Univ. Phys. Bull. 77, 2, 2022, 306-309.

R. Bernabei, P. Belli, F. Cappella, V. Caracciolo, R. Cerulli, C. J. Dai, A. D'Angelo, A. Incicchitti, A. Leoncini, X. H. Ma, V. Merlo, F. Montecchia, X. D. Sheng, Z. P. Ye, **Dark Matter: DAMA/LIBRA and its perspectives**, SciPost Phys. Proc., 2022.

V.Ya. Degoda, L.A. Afanasieva, P. Belli, R. Bernabei, Yu.A. Borovlev, F. Cappella, V. Caracciolo, R. Cerulli, F.A. Danevich, A. Incicchitti, A. Leoncini, D.V. Kasperovych, Ya.P. Kogut, G.P. Podust, A.G. Postupaeva, V.N. Shlegel, **Luminescence of ZnWO4 crystals under X-ray excitation**, J. of Luminescence, 249, 2022, 119028.

V. Caracciolo, P. Belli, R. Bernabei, F. Cappella, R. Cerulli, A. Incicchitti, M. Laubestein, A. Leoncini, V. Merlo, S. Nagorny, S. Nisi, P. Wang, **Investigation on Rare Nuclear Processes in Hf Nuclides**, Radiation 2, 2022, 234-247.

A. Leoncini, P. Belli, Bernabei, F. Cappella, V. Caracciolo, R. Cerulli, F. A. Danevich, A. Inchicchitti, D.V. Kasperovych, V.R. Klavdiienko, V.V. Kobychev, V. Merlo, O. Polischuk, V.I. Tretyak, **New results on search for 2beta decay processes in ^{106}Cd using $^{106}CdWO_4$ scintillator**, Physica Scripta, 97, 2022, 064006.

P. Belli, R. Bernabei, , Yu.A. Borovlev, F. Cappella, V. Caracciolo, R. Cerulli, F.A. Danevich, V.Ya. Degoda, A. Incicchitti, D.V. Kasperovych, Ya.P. Kogut, A. Leoncini, G.P. Podust, A.G. Postupaeva d, V.N. Shlegel, **Optical, luminescence, and scintillation properties of advanced ZnWO4 crystal scintillators**, Nuclear Inst. and Methods in Physics Research A, 1029, 2022, 166400.

2021

R. Bernabei, P. Belli, A. Bussolotti, V. Caracciolo, F. Cappella, R. Cerulli, C.J. Dai, A. d'Angelo, N. Ferrari, A. Incicchitti, A. Leoncini, X.H. Ma, A. Mattei, V. Merlo, F. Montecchia, X.D. Sheng, Z.P.Ye, **Further results from DAMA/LIBRA–phase2 and perspectives**, Nucl. Phys. At. Energy 22 4, 2021, 329-342.

R. Bernabei, P. Belli, A. Bussolotti, V. Caracciolo, R. Cerulli, N. Ferrari, A. Leoncini, V. Merlo, F. Montecchia, F. Cappella, A. d'Angelo, A. Incicchitti, A. Mattei, C.J. Dai, X.H. Ma, X.D. Sheng, Z.P. Ye, **New and recent results, and perspectives from DAMA/LIBRA–phase2**, BLED Workshops in Physics, Vol. 22, 2021, 21-39.