Curriculum Vitae
Dr. Aldo Ianni
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PERSONAL INFORMATION

Name Aldo Ianni
ORCID 0000-0002-6962-3682
Date of birth 24-February-1968
Nationality Italian
Marital status married with one daughter and one son
Military Service second lieutenant, Army Technical Corp, Oct. 1993 - Jan. 1995

EDUCATION

1995-99 Università degli Studi di L'Aquila, PhD in Physics.
1993 Italian Army, Technical Corp, Scuola delle Trasmissioni, Roma, Officer Course.
1988-92 Università degli Studi di Perugia, Degree in Physics.

APPOINTMENTS

2018-20 Gran Sasso National Laboratory, Director of NOA infrastructure.
2015-18 Laboratorio Subterráneo de Canfranc, Director.
2011-15 Gran Sasso National Laboratory, Head of Research Division.
2008-15 Gran Sasso National Laboratory, Senior Researcher.
2007-08 Princeton University, Lecturer.
2001-07 Gran Sasso National Laboratory, Researcher.
1999-2001 Princeton University, Research Associate and Lecturer.
1994-95 Italian Army, Technical Corp, Second lieutenant.

HONORS

1992 Magna cum Laude, Università degli Studi di Perugia.
1987 Diploma of merit and award of study, Camera di Commercio Industria, Artigianato ed Agricoltura, Teramo, Italy.

PROFESSIONAL SERVICE AND MEMBERSHIPS

2017 Fisica de Particulas y Aceleradores Committee, member.
7/2016-6/19 Comision de Infrastructuras de Fisica de Particulas y Aceleradores, member.
2015 Fisica de Particulas y Aceleradores Committee, member.
2015 Evaluation Committee, Ramon y Cajal, Spain, member.
2013-15 CERN SPSC, member.
2014-16 Working Group on Dark Matter search in the context of What Next INFN program, member.
2012-13 Evaluation Committee, INFN Fellowships, member.
2009-11 INFN, National Review Committee for Astroparticle Phyisics, convener.
2009 INFN Laboratori del Gran Sasso, Search Committee for temporary researcher positions, chair
2006-08 ASPERA, Neutrino Working Group, co-chairman.

MAJOR COLLABORATIONS

2015- SABRE, Collaborator, Member of the Collaboration Council.
2011-15 DarkSide-50, Steering Committee, chairman.

2011-15 DarkSide-50, Collaborator.
2009-12 Borexino, anti-neutrino working group, chairman.
2009-11 INFN National Review Committee for Astroparticle Phyisics, member.
2007-10 Borexino, Editorial Board, chairman
2007-11 Borexino, Institutional Board, member.
2005-07 Borexino, Steering Committee, member.
2004-06 WArP, Collaborator.
1995- Borexino, Collaborator.

REFEREEING

2017 Fisica de Particulas y Aceleradores, Spain.
2017 Comision de Infrastructuras de Fisica de Particulas y Aceleradores, Spain.
2015 Fisica de Particulas y Aceleradores, Spain.
2013-15 CERN SPSC, Switzerland.
2009-11 INFN, National Review Committee for Astroparticle Phyisics, Italy.

GRADUATE STUDENTS ADVISED

2016 Simone Marcocci (GSSI)
2016 Ilia Drachnev (GSSI)
2013 Francesco Lombardi (Università degli Studi di L'Aquila)
2012 Chiara Ghiano (Università degli Studi di L'Aquila)
2009 Yury Suvorov (Università degli Studi di Milano)

SUPERVISION OF POSTDOCTORAL FELLOWS AND TEMPORARY YOUNG RESEARCHERS AND ENGINEERS

2015-16 Marco Carlini (Engineer, INFN LNGS)
2013-15 Romain Roncin (Post-Doctoral Fellow, INFN LNGS)
2013-14 Marcin Misiaszek (Post-Doctoral Fellow, INFN LNGS)
2013-14 Michele Montuschi (Engineer, INFN LNGS)
2014-15 Sirin Odrowsky (Post-Doctoral Fellow, INFN LNGS)
2010-11 Kirill Fomenko (Post-Doctoral Fellow, INFN LNGS)

TEACHING, EDUCATION, AND OUTREACH

2016 Summer School in Particle and Astroparticle Physics, Annecy-le-Vieux, lecturer.
2014 Summer Institute 2014, LNGS (https://agenda.infn.it/conferenceDisplay.py?confId=7524), chair and lecturer.
2014 "Viaggio nel centro del Sole", GSSI, Italy, lecturer.
2013 ISAPP (International School on Astroparticle Physics), Canfranc, Spain, lecturer.
2012 Solar, Atmospheric and Supernova neutrinos, IDPASC Neutrino School, Granada, Spain, lecturer.
2012 Direct search for Dark Matter with depleted liquid argon, Università degli Studi di Padova, Italy, lecturer.
2012 Lectures on Special Relativity, Istituto Istr. Sec. Sup. Patini-Liberatore di Castel di Sangro (AQ), Italy, lecturer.
2010 ISAPP (International School on Astroparticle Physics), Zaragoza, Spain, lecturer.
2005-07 Neutrino Physics for graduate students at Physics Department, University of Milano, Italy, course director.
2004-12 "Gran Sasso - Princeton Summer School", Organizing Committee member and teacher.
2007/08 Princeton, PHY102 (electromagnetism), preceptor.
2000/01 Princeton, PHY101 (mechanics/thermo), preceptor.

GRANTS AWARDED AS PRINCIPAL INVESTIGATOR OR LEAD PROPONENT

Spanish AEI, 2016-2021 Funding for maintenance and operations of Laboratorio Subterraneo de Canfranc (LSC) (9,704,100 €).

CPEE15-EE-3829, 2016-2017 Convocatoria 2015 Ayudas a Infraestructuras y Equipamiento Cientifico-Tecnico (320,860 €). Supports for development of a sensitive radon detector, a neutron detector based on CLYC scintillators, and purchase and installation of an IPC-MS at the LSC.

PAST GRANTS AWARDED AS PRINCIPAL INVESTIGATOR OR CO-PRINCIPAL INVESTIGATOR

INFN CSN2 2011-15 Participation as Gran Sasso Laboratory to DarkSide-50 (670,000 €).

MIUR PRIN 2007JR4STW Development and characterization of liquid scintillators for solar neutrinos and double beta decay (107,100 €).

INFN CSN5 2008-10 Development of an organic liquid scintillator loaded with Neodymium for double beta decay (57,000 €).

INFN CSN2 2007-14 Participation as Gran Sasso Laboratory to Borexino (2,289,500 €).

Most Relevant Papers

1. DarkSide Collaboration (P. Agnes *et al.*), *Results from the first use of low radioactivity argon in a dark matter search* , Phys. Rev. D**93**, 081101 (2017). (*92 citations*)
2. DarkSide Collaboration (P. Ágnes *et al.*), *First Results from the DarkSide-50 Dark Matter Experiment at Laboratori Nazionali del Gran Sasso* , Phys. Lett. B **743** (2015) 456-466. (*124 citations*)
3. Borexino Collaboration (G. Bellini *et al.*), *Neutrinos from the primary proton-proton fusion process in the Sun*, Nature **512** (2014) no.7515, 383–386. (*136 citations*)
4. Borexino Collaboration (G. Bellini *et al.*), *Final results of Borexino Phase-I on low energy solar neutrino spectroscopy*, Phys. Rev. D **89** (2014) no.11, 112007. (*170 citations*)
5. Borexino Collaboration (G. Bellini *et al.*), *Measurement of geo-neutrinos from 1353 days of Borexino* ,Phys.Lett. B **722** (2013) 295-300. (*88 citations*)
6. Borexino Collaboration (G. Bellini *et al.*) , *SOX: Short distance neutrino Oscillations with BoreXino* , JHEP 1308 (2013) 038 . (*111 citations*)
7. Borexino Collaboration (G. Bellini *et al.*), *First evidence of pep solar neutrinos by direct detection in Borexino*, Phys.Rev.Lett. 108 (2012) 051302. (*213 citations*)
8. Borexino Collaboration (M. Agostini *et al.*), *Spectroscopy of geoneutrinos from 2056 days of Borexino data*, Phys. Rev. **D92**, 031101 (2011). (*47 citations*)
9. Borexino Collaboration (G. Bellini *et al.*) *Precision measurement of the 7Be solar neutrino interaction rate in Borexino* , Phys.Rev.Lett. 107 (2011) 141302 . (*341 citations*)
10. Borexino Collaboration (C. Arpesella *et al.*), *Direct Measurement of the Be-7 Solar Neutrino Flux with 192 Days of Borexino Data* , Phys.Rev.Lett. 101 (2008) 091302 . (*407 citations*)

Most Recent Invited Talks

1. *Importance of underground laboratories for science and technology*, invited talk at EUFRAT 2017, JRC-Geel, 5-7 December, 2017.
2. *Supernova neutrino detection with Dark Matter experiments*, invited talk at Recent developments in neutrino physics and astrophysics, LNGS, 4-7 September, 2017.
3. *Considerations on Underground Laboratories*, invited talk at TAUP, Sudbury, 24-28 July, 2017.
4. *The Borexino experiment*, colloquium at NIKHEF, Amsterdam, 19 January, 2017.
5. *The Canfranc Underground Laboratory*, invited talk at Identification of Dark Matter 2016, Sheffield 18-22 July.
6. *Direct Detection of Dark Matter*, invited talk at IVth Meeting in Fundamental Cosmology, Barcelona 15-17 June, 2016.

Research monographs

1. A. Ianni, *Review of technical features in underground laboratories*, Int. J. Mod. Phys. A 32, 1743001 (2017).
2. A. Ianni, *Solar Neutrinos*, Progress in Particle and Nuclear Physics, 94 (2017) 257-281.
3. A. Ianni, *Solar neutrinos and the solar model*, Physics of the Dark Universe 4 (2014) 44-49.
4. G. Bellini, A. Ianni, L. Ludhova, F. Mantovani, W.F. McDonough, *Geo-neutrinos*, Prog.Part.Nucl.Phys. 73 (2013) 1-34.
5. G. Bellini, A. Ianni and G. Ranucci (2012), *Borexino and solar neutrinos*, Riv.Nuovo Cim. 035N09 (2012) 481-537.
6. F. Calaprice, C. Galbiati, A. Wright and A. Ianni, *Results from the Borexino Solar Neutrino Experiment*, Ann.Rev.Nucl.Part.Sci. 62 (2012) 315-336.
7. G. Fiorentini *et al.*, *Nuclear physics for geo-neutrino*, Phys Rev C, vol. 81, 034602, ISSN: 0556-2813.

Organization of international conferences

1. *Nuclear Astrophysics at the Canfranc Underground Laboratory*, Canfranc Underground Laboratory, Spain, 29 Feb. - 1 Mar., 2016, *Chairman of the Local Organizing Committee.*
2. *DULIA-bio*, Canfranc Underground Laboratory, Spain, 13-14 October, 2015, *Chairman of the Local Organizing Committee.*
3. *Gran Sasso Summer Institute*, Gran Sasso Laboratory, Sept 22 ct 3, 2014 *Chairman of the Local Organizing Committee.*
4. *PHYSUN 2012*, Gran Sasso Laboratory, Oct 8-10, 2012, *Chairman of the Local Organizing Committee.*
5. *Neutrino geoscience 2010*, Gran Sasso Laboratory, Oct. 2010, *Chairman of the Local Organizing Committee.*
6. *The physics of the sun and solar neurinos II*, Gran Sasso Laboratory, Oct. 2010. *Chairman of the Local Organizing Committee.*

Contributions to Neutrinos Science

I have been working on solar neutrinos since 1995 in Borexino at the LNGS providing crucial contributions in the construction and commissioning of the detector and in the analysis of its data. Borexino has performed a spectroscopy measurement of solar neutrinos from the pp-chain in 10 years of data taking. In particular, Borexino has measured the low energy pp solar neutrinos, which drive the evolution of the star over billions of years and make 99% of the energy. In the framework of Borexino I had a number of different responsibilities. I had the responsibility to make a system to compensate the Earth's magnetic field for testing the photomultipliers of Borexino. I had the responsibility of the Borexino prototype, the Counting Test Facility (CTF) during the commissioning of the Borexino detector. Operations on the CTF were crucial to fill the detector with a high radio-purity scintillator. I had the responsibility on-site of the liquid scintillator containment vessel construction, a stainless steel sphere with 13.7 m diameter. I put in operation a quantitative method to measure the cleanliness of the Borexino fluid handling system as-built. I had the responsibility of calibrations for the CTF to determine the quenching of the scintillator and optimize the pulse shape discrimination between α-like and β-like events. I worked on the analysis of ^{7}Be, pp, and ^{8}B solar neutrinos. At present, I am involved in the CNO solar neutrino measurement in Borexino, which could be achieved when the ^{210}Bi background supported by ^{210}Pb will be determined from ^{210}Po. This method was proposed by me and other colleagues in 2011 (Phys.Lett. B701 (2011) 336-341).
In the framework of Borexino I have chaired the working group which led to the first observation of geo-neutrinos, electron anti-neutrinos produced by uranium and thorium radioactivity within the Earth. The idea to observe geo-neutrinos goes back to 1970s. However, only recently with massive and high radio-purity liquid scintillator detectors, such as Borexino, it has been possible to detect these neutrinos. They are important to understand the formation and evolution of the Earth. I have proposed and put forward a precision measurement (5σ) of geo-neutrinos in Borexino. I have worked on the data selection and analysis. I have worked in the study of forbidden beta spectra involved in the geo-neutrino production by using uranium and thorium sources in the CTF. Understanding the energy spectrum of these β decays is crucial for an accurate geo-neutrino measurement. A number of innovations in low background

experiments were developed in Borexino. At present, a number of experiments on rare events are using the technology introduced by Borexino in radon detection and monitoring, purification techniques, and cleanliness protocols.
I worked on the development of a neodymium-loaded liquid scintillator for neutrinoless double beta decay. The project was named MetaLS and aimed to build a detector using the CTF water tank with an inner sphere containing 10 tons of neodymium-loaded scintillator. I worked on the characterization of the liquid scintillator from the radio-purity and optical point of view. I also worked on a program to enrich the neodymium in ^{150}Nd in collaboration with the Kurchatov Institute.
I worked on the phenomenology of SN1987A (Phys. Rev. D70 (2004) 043006, Astrop. Phys.31:163-176,2009, and Phys. Rev. D80: 043007, 2009). I worked on the phenomenology of supernova neutrino detection in liquid scintillators focusing on present and future detectors.
I have worked on the use of a neutrino source with sub-MeV threshold neutrino detectors (Astrop. Phys. 10 (1999), 331 and Eur. Phys. J. C 8, 609-617 (1999)).

Contributions to Dark Matter Science

I worked on dark matter direct detection in the WArP experiment at the LNGS, where I studied the sensitivity to probe spin-independent WIMP interactions. In addition, I worked on the possibility to detect neutrinos from a supernova in the WArP liquid argon veto by neutrino-nucleus coherent scattering. I have been involved in DarkSide-50 at the LNGS, where I have served as chair of the Steering Committee. In DarkSide-50 I have worked on the development and characterization of the boron-loaded scintillator for the active neutron veto. The active neutron veto developed by DarkSide-50 has been an important innovation for future Dark Matter detectors. I had the responsibility to prepare the TPC components before the assembling and deployment of the detector inside the cryostat. I worked on the sensitivity of WIMP interactions in DarkSide-50.
I have been working since 2015 on SABRE at the LNGS, an ultra radio-pure NaI scintillator array, to measure the annual modulation of dark matter particles. I have been involved in the calculations of detector sensitivity and on the design of the experiment. The NaI array will be installed inside an active liquid scintillator veto. I have been involved in the fluid handling system related to the scintillator veto.

Contributions to the development of the Canfranc Underground Laboratory

As Director of the Laboratorio Subterraneo de Canfranc (LSC I have put forward a program to support the start-up of ANAIS and NEXT. At present, ANAIS is taking data to search for the dark matter annual modulation and probe the finding of DAMA/LIBRA. NEXT is running a 10 kg demonstrator with depleted xenon. The LSC owns 100 kg of xenon enriched at 90% in ^{136}Xe. In order to allow NEXT to use the enriched xenon I put in place a number of safety risk assessment reviews for the gas system to be used by the experiment. I also put in place an internal protocol for reviewing operation procedures and action plans. At present, NEXT has achieved very important results on the energy resolution and tracking. In Spring 2018 NEXT will be ready to use enriched xenon. I have guided the installation of a sensitive radon detector (mBq/m^3), which is being used to probe radon-free air delivered to NEXT and other experiments.
I have worked to re-start operations with two laser strain-meters for geophysics. At present, there are only three underground laboratories with such an equipment, namely: LSC Kamioka, and Baksan.
I have approved the installation of three new experiments: one on geophysics in the framework of the next generation gravitational wave detectors; a second one for low mass WIMPs, named TREX; and, a third one on neutrinoless double beta decay with bolometers, named CROSS.
I have received funding to purchase an ICP-MS. I have put forward an outreach program and an exhibition room for visitors. In the outreach program I have received funding to make muon telescopes and an App for mobile phones, named Cosmic Rays Live, which can read in real time muons detected at LSC and other locations.
I have been in charge to submit to the Governing Body of LSC a strategic plan for the period 2018 - 2021.

Contributions to the development of the NOA infrastructure at the Gran Sasso Laboratory

Since May 2018 I have the responsibility to delivery a new infrastructure, named NOA, at the Gran Sasso Laboratory. The NOA is divided into three main parts: 1) R&D and packaging of light detectors based on SiPMs for particle and astro-particle physics; 2) radio-purity assay by ICP-MS for applications of low

radioactivity light detectors based on SiPMs; 3) additive manufacturing with metals for applications in the search for rare events, such as dark matter and neutrinoless double beta decay.