

Alberto ALOISIO - Short CV

Education

- (1981) High School Diploma (Maturità Classica, marks 60 out of 60)
(1988) Master's degree (MSc) in Physics, Laurea cum laude, University of Naples 'Federico II', Italy

Temporary Research Fellowships

- (1985) Summer Student at CERN (Geneva, Switzerland)
(1989-1991) Two-year fellowship granted by Istituto Nazionale di Fisica Nucleare

Faculty Positions

- (1991-1998) Assistant Professor of Physics, University of Naples 'Federico II', Italy
(1999-2003) Associate Professor of Physics, University of Sannio, Italy
(2004-2011) Associate Professor of Physics, University of Naples 'Federico II', Italy
(2011-present) Full Professor of Physics at University of Naples 'Federico II', Italy
(SC: 02/A1, SSD: FIS/01)

Other affiliations

- (1991-present) Associate with *Incarico di Ricerca* to Istituto Nazionale di Fisica Nucleare (INFN);
(2017-present) Associate with *Incarico di Collaborazione* to Istituto superconduttori, materiali innovativi e dispositivi (SPIN), Consiglio Nazionale delle Ricerche (CNR).

Teaching Activities

- (1991-1995) Physics II, MSc in Physics, Univ. of Naples 'Federico II';
(1995-1998) Laboratory of Physics I, MSc in Physics, Univ. of Naples 'Federico II';
(1999-2003) Experimental Physics, MSc in Geology, Univ. of Sannio;
(1999-2003) Laboratory of Computer Architecture, BSc in Computer Science, Univ. of Naples 'Federico II';
(2004-2011) Laboratory of Digital Systems, MSc in Physics, Univ. of Naples 'Federico II';
(2006-2007) Field Programmable Gate Arrays Architecture, I-level Master in Microelectronics Circuit Design, Univ. of Padua;
(2004-present) Computer Architecture, BSc in Computer Science, Univ. of Naples 'Federico II';
(2012-present) Digital Electronics, MSc in Physics, Univ. of Naples 'Federico II';

Roles and Responsibilities in University, Research Institutions, Agencies

Italian Universities and Research Institutes:

- (2005-present) Member of the Board of the *PhD School of Physics*, Univ. of Naples 'Federico II';
(2006-2011) Member of the *INFN 5th National Scientific Committee for Accelerators and Applied Physics*;
(2016-2018) Member of the Department Board, Dept. of Physics, Univ. of Naples 'Federico II' (elective charge);
(2016-present) Member of the Management Board of the *Interdepartmental Center for Advances in Robotic Surgery*, Univ. of Naples 'Federico II';
(2017-2019) Member of the Council of the *School on Engineering and Sciences*, Univ. of Naples 'Federico II' (elective charge);
(2017-present) Member of the Academic Senate, Univ. of Naples 'Federico II' (elective charge);

Foreign Institutions:

- (2010) contributor to the NuPECC Long Range Plan 2010 – Perspectives of Nuclear Physics in Europe
(2011-2012) Member of the Scientific Standing Committee (SSC) of the *Km3Net Neutrino Telescope* EU Project
(2017) Reviewer for the National Science Centre, Poland
(2019-2021) Member of Expert Panels of the Research Foundation, Flanders – FWO (Fonds voor Wetenschappelijk Onderzoek – Vlaanderen), Bruxelles (B):
- *W&T7 Panel (Energy, Electrical Engineering, Electronics and Mechanics)*
- *Interdisciplinary Panel*

Quality-of-Research Evaluation Agencies:

- (2004) Member of the *Albo degli Esperti* of the Italian Committee for Evaluation of Research (CIVR);
(2012-2013) Reviewer of the VQR 2004-2010 (Evaluation of the Quality of the Research) for the Italian Research and University Evaluation Agency (ANVUR);
(2015-present) Member and Reviewer of REPRISE: Register of Expert Peer Reviewers for Italian Scientific Evaluation, Italian Ministry of Education, University and Research;
(2016-2017) Reviewer of the VQR 2011-2014 (Evaluation of the Quality of the Research) for the Italian Research and University Evaluation Agency (ANVUR);

- (2016-2018) Eligible Reviewer for the Italian National Scientific Qualification (ASN) (SC: 02/A1, SSD: FIS/01), Italian Ministry of Education, University and Research.
- (2018-present) Eligible Reviewer for the Italian National Scientific Qualification (ASN) (SC: 02/A1, SSD: FIS/01), Italian Ministry of Education, University and Research.

Governmental Organizations:

- (2018-2020) Member of the *Working Group on Artificial Intelligence*, created by the Italian Ministry of Education, University and Research (MIUR)

Peer-reviewing

for Italian Agencies:

- (1999-2003) Reviewer for the Research Programs of Relevant National Interest (PRIN), MIUR
- (2004-present) Member of the Reviewer Board for the evaluation of Programs of Relevant National Interest (PRIN)
- (2010) Reviewer for the Program for Young Researchers 'Rita Levi Montalcini', MIUR
- (2010, 2013) Reviewer for the Program 'Future in Research - FIRB', MIUR
- (2017-2018) Reviewer of 'Progetti FAR (Fondi Agevolazione alla Ricerca) 2007/08', MIUR

for Journals:

- (2001-present) *IEEE Transactions on Nuclear Science*
- (2013-present) *Journal of Zhejiang University SCIENCE C*
- (2014-present) *IEEE Transactions on Circuits and Systems*
- (2016-present) *Review of Scientific Instruments*
- (2016-present) *Nuclear Instruments and Methods in Physics Research Section A: Accelerators, Spectrometers, Detectors and Associated Equipment*
- (2016-present) *International Journal of Parallel Programming*
- (2017-present) *Karbala Journal of Modern Physics (Elsevier)*
- (2018-present) *Journal of Renewable and Sustainable Energy (AIP)*
- (2018-present) *Ain Shams Engineering Journal (Elsevier)*

for Publishing Houses:

- (2012-present) *CRC Press Scientific Publishing House* (www.crcpress.com)

Organizations of International Conferences

Member of Scientific Committee:

- (2005) *IEEE Real-Time Conference* (Stockholm, Sweden)

Member of the Program Committee and Reviewer for the IEEE Nuclear Science Symposium:

- (2003) Portland, USA (*)
- (2005) Puerto Rico, USA
- (2006) San Diego, USA
- (2007) Honolulu, USA (*)
- (2008) Dresden, Germany (*)
- (2009) Orlando, USA
- (2010) Knoxville, USA
- (2011) Valencia, Spain (*)
- (2012) Anaheim, USA
- (2013) Seoul, Korea
- (2014) Seattle, USA
- (2016) Strasbourg, France
- (2017) Atlanta, USA
- (2018) Sydney, Australia

(*) also Session Chairman

Reviewer for:

- (2017) *2nd International Conference on New Energy and Future Energy System (NEFES 2017)*, Kunming, Yunnan, China
- (2017) *26th IEEE International Symposium on Industrial Electronics (ISIE17)* Edinburgh, Scotland, UK
- (2018) *3rd International Conference on New Energy and Future Energy System (NEFES 2018)*, Shanghai, China

Technology Transfer and Patents

- (2009) Member of Italian Delegation, International Visitor Leadership Program on Technology Transfer, organized by the Department of State of US, Bureau of Educational and Cultural Affairs
- (2014) Reviewer of the 'Future in Research' program, funded by Regione Puglia, Italy
- (2016) Co-inventor of the patent "Digitally Controlled Oscillator (DCO) Architecture", WO 2016/071813 A2

Coordination of Scientific Projects

- (1999-2001) Principal Investigator (PI) of the project *Parallel Optical Link Architecture (POLAR)*, approved and funded by INFN to explore the feasibility of optical busses for high-performance digital backbones in physics experiments.
- (2002-2003) PI of the project *COLOred Optical Read-out (COLOR)* approved and funded by INFN for a proof-of-concept of a Dense Wavelength Division Multiplexing (DWDM) network for detector read-out.
- (2005-2007) PI of the project *Dwdm REAL-time Module (DREAM)*, approved and funded by INFN to design a Dense Wavelength Division Multiplexing (DWDM) network with real-time features for detector read-out. The architecture has been deployed in an underwater neutrino telescope.
- (2010-2012) PI of the project *TWO2TEN* approved and funded by INFN to design and characterize electrical and optical layers for serial links up to 10Gb/s with fixed latency and low phase-noise.
- (2007-2008) Local Scientific Coordinator (Unit of the University of Naples) of the PRIN 2006 project *Design of a data acquisition system for a tracking calorimeter with imaging read out.*
- (2012-2018) PI of the *EOS* project (*EOS: Organic Electronics for innovative research instrumentation*), approved and funded by the Italian Ministry for Education, University and Research, Call 'Progetti Premiali 2012';
- (2014-present) Project Coordinator of the *LEOSIR* project (*Laboratory of Organic Electronics for Innovative Research Equipment*), funded by Region Campania within the POR FESR 2007/2013;

Bibliometric parameters (source: SCOPUS)

ORCID ID: orcid.org/0000-0002-3883-6693
H-index : 74
Total number of papers (document type -> articles): 1037
Total number of citations: ~35000

Brief overview of research activities

My research activity aims at developing and characterizing radiation detectors for High Energy Physics experiments and designing the related read-out electronics, data acquisition and trigger systems. I co-authored more than 1000 papers on international journals, with h-index of 74 (source: SCOPUS). The details of my research activities are presented hereafter, framed in the context of the most important experiments where the work has been carried out.

The L3 experiment

The L3 experiment was designed to study the e+e- collisions up to a cm energy of 200 GeV on the Large Electron Positron Collider (LEP) at CERN. The most important achievements were the mass and total width measurements of the Z and W, their coupling with leptons and quarks, the study of quarks and leptons in the Z decays. In 1990, I had the responsibility of the trigger system of the forward/backward muon detectors, based on RPC detectors. This architecture represents one of the first examples of FPGA-based logic in a DAQ and trigger system for a High-Energy Physics experiment, supporting real-time data analysis and compression.

The KLOE experiment

In 1993, I joined the KLOE experiment at the INFN National Laboratory, Frascati (Italy). The experimental apparatus has been optimized to study the CP violation in the decays of the phi. The DAFNE accumulator ring has an interaction frequency of 330 MHz, asking for a novel approach to the detector read-out and trigger scheme. I proposed and realized the DAQ backbone for the entire apparatus. Custom processors read out the detectors and they perform the first steps of event building in real-time, keeping the pace with the nearly continuous DAFNE beam interaction rate.

The ARGO-YBJ experiment

ARGO-YBJ was an apparatus for the detection of cosmic radiation based upon RPC, installed at the High Altitude Cosmic Ray Laboratory, nearby YangBaijing (Tibet, PRC) at 4300m a.s.l... The research program covered the cosmic ray study, the gamma astronomy at an energy threshold as low as few hundreds of GeV and the detection of gamma ray bursts from galactic and extragalactic sources. From 2001, I participate to the definitions of the trigger algorithms and I have implemented the trigger logic which have been successfully deployed and tested since the first pilot runs started in 2003.

The ATLAS experiment

ATLAS is one of the experiments presently taking data at the LHC accelerator at CERN. The apparatus has been designed aiming at the detection of the Higgs boson (eventually discovered in 2012) in the widest mass range as well as of supersymmetric and heavy W and Z-like particles. The experimental program also covers the CP violation in the B decay and a detailed study of the top. I was responsible for the design and construction of the optical read-out for the Level-1 trigger of the RPC detectors in the muon spectrometer. I also designed the FPGA logic and embedded microprocessors to accelerate the execution of the event building algorithms.

Optical Networks and novel DAQ architectures.

From 1999 to 2012, I was the Principal Investigator of R&D programs (COLOR, POLAR, DREAM, TWO2TEN) funded by INFN on the application of the Dense Wavelength Division Multiplexing (DWDM) technology and high speed serial links to the DAQ systems of HEP experiments. In the DWDM network, each user modulates a laser source tuned on a specific wavelength (or *color*) belonging to a standard grid. *Colors* are then muxed on a single strand of optical fiber and then demuxed at the far end of the fiber. The research programs produced a novel DWDM network architecture,

considered as a reference in the literature. Such an architecture has been adopted by the NEMO-KM3NET experiment (an underwater neutrino telescope) for the DAQ system of the first prototype, and eventually deployed in 2007 at 2000m below the sea level, 20 km offshore the Catania's harbor.

The Belle II Experiment

In 2013, I joined the Belle II experiment, presently taking data at KEK (Tsukuba, JP). The detector will play a key role in the detection of signal of New Physics beyond the Standard Model, as flavor changing neutral currents, charged Higgs, new sources of CP violation, and search for dark photon.

I am involved in the operations of the electromagnetic calorimeter based on CsI crystals, read-out by silicon photo-diodes and phototubes. This activity is also carried out in the framework of the JENNIFER EU project.

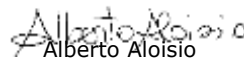
The 'Premial Project EOS'

I have been the Principal Investigator for the EOS project (EOS: Organic Electronics for innovative research instrumentation), jointly presented by INFN and CNR in the framework of 2012 Call of *Progetti Premiali* of the Italian Ministry of University and Research. The project has been approved and funded by the Ministry in 2014. Organic Electronics is opening unbeaten paths to the use of heterogeneous electronic components in the form of thin, lightweight, flexible and low cost systems. The ability to integrate onto organic supports a wide range of new features is at the same time an opportunity and a technological challenge. The topic of Organic Electronics is now universally considered of strategic interest in a variety of applications, from lighting to the development of bio-compatible sensors. In particular, EOS aims at developing advanced digital and analog organic circuits to provide a vast research community with innovative solutions of deep-embedded electronics for lab-grade instruments.

LEOSIR

I am the Project Coordinator of LEOSIR (Laboratory of Organic Electronics for research instrumentation), funded by Regione Campania in the framework of POR FESR 2007/2013. LEOSIR aims at reducing the technology divide between fundamental research in organic electronics and design of reliable sensors and circuits. The lab includes state-of-art instruments for device characterization in the time, frequency and optical domains.

Naples, Mar.1st 2019


Alberto Aloisio