



## Curriculum Vitae of Prof. Riccardo Brugnera

### Address

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### Employment

- 2012 National Academic Qualification as Full Professor
- 2006 Associate Professor at the University of Padova
- 1991 Researcher at the University of Padova
- 1987 Winner of a INFN scholarship for young graduates

### Education Background

- 1992 PhD in Physics
- 1987 Degree in Physics with honors at the Padova University

### Previous Scientific Projects

- 1986 - 1988 member of the *NN2 experiment* located at the I.L.L. laboratory in Grenoble (France). The experiment was dedicated to the study of the neutron-antineutron oscillation. In this experiment I participated to the building and commissioning of the plastic scintillators system. The system was used for triggering and the measurement of the time of flight of the events. I worked in the definition/debugging of their dedicated electronics.
- 1989 - 2007 member of the *ZEUS experiment* at the HERA collider in Hamburg (Germany). The experiment was dedicated to the study of the electron-proton interaction at high energy. I contributed to the building, installation and running of the Barrel and Rear Muon Chambers (BRMUON)  
Responsibilities in ZEUS:
  - technical coordinator of the BRMUON from 1999 up to 2007.
  - from 1994 to 1995 convener of the physics group "Heavy Flavor-Soft Photoproduction"
  - convener of the diffractive physics working group during the international conference DIS99 (Zeuthen-Germany)
  - I made and coordinated many physics analysis concerning the elastic and inelastic photo

and electroproduction of the  $J/\psi, \psi', Y$  mesons, the photoproduction of beauty-quarks and the dimuon production at high transverse momentum

- I built various third level trigger filters for the selection of muons
  - wise persons of many scientific papers
- 2000-2014 member of the **OPERA experiment** at the National Laboratory of Gran Sasso (Italy). The experiment was dedicated to the study of the  $\nu_\mu \rightarrow \nu_\tau$  neutrino oscillations. I worked on the realization, tests and installation of the RPCs detectors, on the tests of the FE electronics and on the design of the slow control system.  
Responsibilities in OPERA:
    - run coordinator along all the data-taking (2008-2012).
  - scientific coordinator of the Padova research unit working in the Italian national project dedicated to the development and new applications of the RPC detectors (2003)
  - scientific coordinator of the Padova research unit working in the Italian national project: “Development of detectors of very low radioactivity for the study of the mass and nature of the neutrino through the double-beta decay” (2010-2011).

### Current Scientific Projects

My present scientific interest remains the neutrino physics with the participation to the following three experiments.

- **GERDA**, at the National Laboratory of Gran Sasso (Italy), is an experiment dedicated to the search for the neutrinoless double-beta decay in  $^{76}\text{Ge}$ . My group is involved in the development of the Slow Control and in Monte Carlo simulation and in data analysis.  
Responsibilities in GERDA:
  - project manager of the DAQ and online software
  - PI of the Padova group
  - national coordinator of all INFN groups involved in GERDA
  - member of the Project Manager Board
  - member of the Collaboration Board
  - I am deeply involved in the physics analysis (double-beta decay with and without neutrinos, majorana particle emission)
  - Spokesperson of the experiment
- **LEGEND**, at the National Laboratory of Gran Sasso (Italy), is an experiment dedicated to the search for the neutrinoless double-beta decay in  $^{76}\text{Ge}$ . My group is involved in the development of the Slow Control, in the detector characterization and in Monte Carlo simulation.  
Responsibilities in LEGEND:
  - project manager of the DAQ and Slow Control
  - PI of the Padova group

- national coordinator of all INFN groups involved in LEGEND
  - member of the Institutional Board
  - member of the Steering Committee
- **JUNO**, at Kaiping in the Guangdong province (China), is an experiment having, as its major goal, the determination of the neutrino mass hierarchy by precisely measuring the energy spectrum of reactor antineutrinos coming from reactors. The Padova group is involved in the design and realization of the electronics for the PMTs, of the clock distribution system and of the backend.  
Responsibilities in JUNO:
    - PI of the Padova group
    - member of the Institutional Board
  - scientific coordinator of the Padova research unit working in the Italian national project” “Zero radioactivity in future experiments “

#### **Academic and Institutional Responsibilities**

- member of the Executive Board of the Physics and Astronomy Department of the Padova University for 9 years (1997-2006)
- president of the Board dedicated to the control of the curricula of the students of the Department for 9 years (2009-2017)
- coordinator of the european ERASMUS program for the Physics and Astronomy Department for 9 years (2010-2017)
- member of the Scientific Board of the Physics and Astronomy Department of the Padova University starting from 2016
- member of the Board of Professors of the Doctoral School in Physics of the Physics and Astronomy Department of the Padova University starting from 2017

#### **Activity of Reviewer**

- Referee of the following scientific journals: Nature, Physical Review Letters, Reviews in Physics, Solid State Physics, NIM A
- Reviewer of scientific projects for the following organizations:
  - United States – Israel Binational Science Foundations (2000)
  - Israeli-Russian Cooperation Program in Physics (2006)
  - Narodowe Centrum Nauki-NCN (National Science Center) (2016)
  - Japan Society for the Promotion of Science (JSPS) (2019)

## Congress Organization

- Member of the local organization committee of the International Workshop GERDA-DOBEN09: Perspectives on the Double Beta Neutrinoless Decay for the GERDA experiment, 11-13 March 2009, Padova, Italy.

I am author of about 360 scientific papers and I gave more than 25 talks during the main international workshops and conferences.

Below there is a list of 15 papers from the last 5 years:

1. F. An et al. (JUNO Collaboration), *Neutrino physics with JUNO*, JOURNAL OF PHYSICS G-NUCLEAR AND PARTICLE PHYSICS, Vol. 43, Issue 3, 30401 (2016), doi:10.1088/0954-3899/43/3/030401
2. M. Agostini et al. (GERDA Collaboration), *Background-free search for neutrinoless double-beta decay of  $^{76}\text{Ge}$  with GERDA*, NATURE, Vol. 544, Issue 7648, 47 (2017), doi: 10.1038/nature21717
3. M. Agostini et al. (GERDA Collaboration), *Improved Limit on Neutrinoless Double-beta Decay of  $^{76}\text{Ge}$  from GERDA Phase II*, PHYSICAL REVIEW LETTERS, Vol. 120, Issue 13, 132503 (2018), doi:10.1103/PhysRevLett.120.132503
4. N. Agafonova et al. (OPERA Collaboration), *Discovery of tau Neutrino Appearance in the CNGS Neutrino Beam with the OPERA Experiment*, PHYSICAL REVIEW LETTERS, Vol. 115, Issue 12, 121802 (2015), doi: 10.1103/PhysRevLett.115.121802
5. M. Agostini et al. (GERDA Collaboration), *Production, characterization and operation of  $^{76}\text{Ge}$  enriched BEGe detectors in GERDA*, EUROPEAN PHYSICAL JOURNAL C, Vol. 75, Issue 2, 39 (2015), doi: 10.1140/epjc/s10052-014-3253-0
6. M. Agostini et al. (GERDA Collaboration), *Results on  $\beta\beta$  decay with emission of two neutrinos or Majorons in  $^{76}\text{Ge}$  from GERDA Phase I*, EUROPEAN PHYSICAL JOURNAL C, Vol. 75, Issue 9, 416 (2015), doi: 10.1140/epjc/s10052-015-3627-y
7. N. Agafonova et al. (OPERA Collaboration), *Final Results of the OPERA Experiment on  $\nu_\tau$  Appearance In the CNGS Neutrino Beam*, PHYSICAL REVIEW LETTERS, Vol. 120, Issue 21, 211801 (2018), doi: 10.1103/PhysRevLett.120.211801
8. M. Agostini et al. (GERDA Collaboration), *Improvement of the energy resolution via an optimized digital signal processing in GERDA Phase I*, EUROPEAN PHYSICAL JOURNAL C, Vol. 75, Issue 6, 255 (2015), doi: 10.1140/epjc/s10052-015-3409-6
9. M. Agostini et al. (GERDA Collaboration), *Upgrade for Phase II of the GERDA experiment*, EUROPEAN PHYSICAL JOURNAL C, Vol. 78, Issue 5, 388 (2018), doi: 10.1140/epjc/s10052-018-5812-2
10. M. Agostini et al. (GERDA Collaboration), *Probing Majorana neutrinos with double-beta decay*, SCIENCE, Vol. 365, Issue 6460, 1445 (2019), doi: 10.1126/science.aav8613
11. N. Agafonova et al. (OPERA Collaboration), *Limits on muon-neutrino to tau-neutrino oscillations induced by a sterile neutrino state obtained by OPERA at the CNGS beam*, JOURNAL OF HIGH ENERGY PHYSICS, Issue 6, 69 (2015), doi: 10.1007/JHEP06(2015)069
12. M. Agostini et al. (GERDA Collaboration), *Flux modulations seen by the muon veto of the GERDA experiment*, ASTROPARTICLE PHYSICS, Vol. 84, 29 (2016), doi: 10.1016/j.astropartphys.2016.08.002
13. M. Agostini et al. (GERDA Collaboration),  *$2\nu\beta\beta$  decay of  $^{76}\text{Ge}$  into excited states with GERDA phase I*, JOURNAL OF PHYSICS G-NUCLEAR AND PARTICLE PHYSICS, Vol. 42, Issue 11,

- 115201 (2015), doi: 10.1088/0954-3899/42/11/115201
14. M. Agostini et al. (GERDA Collaboration), *Limit on the radiative neutrinoless double electron capture of  $^{36}\text{Ar}$  from GERDA Phase I*, EUROPEAN PHYSICAL JOURNAL C, Vol. 76, Issue 12, 652 (2016), doi: 10.1140/epjc/s10052-016-4454-5
15. Grassi M. et al., Charge reconstruction in large-area photomultipliers, JOURNAL OF INSTRUMENTATION, Vol. 13, P02008 (2018), doi: 10.1088/1748-0221/13/02/P02008

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