

Fulvio Zonca
Brief Curriculum Vitae
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(<http://www.afs.enea.it/zonca>)

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- Miscellaneous** Fulvio Zonca, born on January 10th 1962. Italian citizen.
- Education** *Ph.D. in Astrophysical Sciences*–Program in Plasma Physics, Princeton University, Princeton, NJ.
Degree issued 08/06/1993.
Final Public Oral Examination 23/01/1993.
Thesis: *Continuum Damping of Toroidal Alfvén Eigenmodes in finite- β Tokamak Equilibria*
Italian Laurea (cum Laude) in Physics–Program in Nuclear/High–Energy Physics, University of Rome “La Sapienza”, Rome, Italy.
Final Public Oral Examination 26/06/1986.
Thesis: *Drift Waves and Instabilities in magnetically confined Plasmas*
- Honors** *Qiúshì Chair Professor*, Institute for Fusion Theory and Simulation and Department of Physics, Zhejiang University, Hangzhou, P.R.C. (01/20)
National Qualification as Full Professor, National Scientific [qualification](#) as full professor in the Italian higher education system (Academic Recruitment Field 02/B - Physics of matter) (06/23 – 06/34)
[Fellow](#) of the American Physical Society (09/05).
- Main fields of research:** Kinetic theory of plasmas
Linear and non-linear Magnetohydrodynamics (MHD)
Theory of turbulent transport in plasmas
Analysis of energetic ions/fusion products dynamics in thermonuclear plasmas
- Experience** *Work Experience*, E.N.E.A. C.R. Frascati (07/15–present) Research Director [(05/97–06/15) Head of the Plasma Physics Theory Group in the Magnetic Fusion Division; (01/91–05/97) Researcher].
Center for Nonlinear Plasma Science (CNPS), Frascati (02/20–present) Coordinator of CNPS.
SciDAC ISEP Project, (09/17–present). International Collaborator of the SciDAC (Scientific Discovery through Advanced Computing) project on “Integrated Simulation of Energetic Particles in Burning Plasmas” (ISEP)
EUROfusion ER MET Project, (01/19–12/20). Principal Investigator of the “Multi-scale Energetic particle Transport in fusion devices” (MET) Enabling Research Project for the implementation of the fusion roadmap by the Consortium EUROfusion.
EUROfusion ER NAT Project, (01/17–12/18). Contributor of the “Nonlinear interaction of Alfvénic and turbulent fluctuations in burning plasmas” (NAT) Enabling Research Project for the implementation of the fusion roadmap by the Consortium EUROfusion.
EUROfusion ER Project, (01/17–12/18). Contributor of the “Advancing diagnostic intelligence: How can we localize “non-local” transport and improve the energy confinement using meso-scale self-organization of instabilities?” Enabling Research Project for the implementation of the fusion roadmap by the Consortium EUROfusion.

EUROfusion ER NLED Project, (01/14–12/17). Principal Investigator of the “Theory and simulation of energetic particle dynamics and ensuing collective behaviors in fusion plasmas” (NLED) Enabling Research Project for the implementation of the fusion roadmap by the Consortium EUROfusion.

SciDAC GSEP Project, (11/07–12/12). International Collaborator of the SciDAC (Scientific Discovery through Advanced Computing) project on “Gyrokinetic Simulation of Energetic Particle Turbulence and Transport” (GSEP)

E.N.E.A. C.R. Frascati, (06/09–12/12). Coordinator of the Physics Group of the Conceptual Design Team for the “Fusion Advanced Studies Torus” (FAST), aimed at investigating complex burning plasma dynamics in D-D plasmas. (01/07–05/09). Member of the Conceptual Design Team

Zhejiang University, Hangzhou, China (06/19), (05/18), (05/17), (05/16), (05/15), (05/14), (05/13), (05/12), (05/11), (05/10), (04/09), as visiting physicist. Established the basis for ongoing collaborations with the Institute for Fusion Theory and Simulation (IFTS), Zhejiang University (ZJU) in the field of nonlinear dynamics and simulation of burning plasmas.

University of California, Irvine (07/12), (06/09), (11/99), (04/97–06/97), (04/95), (04/94–05/94) as visiting physicist. Continued the collaboration with Prof. L. Chen, focusing the attention on plasma Alfvénic instabilities driven by strong/spatially-localized energetic (MeV) particle sources and on the nonlinear transport caused by both electrostatic and electromagnetic plasma drift-turbulence.

E.N.E.A. C.R. Frascati, Frascati (10/96–03/97), member of an internal *Working Group* with the task of further pursuing and finalizing the proposal for a high- β tokamak device to be possibly built at the Frascati Research Center, as specified in a previous *Working Group*, Frascati (01/95–01/96).

E.N.E.A. C.R. Frascati, Frascati (01/95–01/96), expert member of an internal *Working Group* with the task of individuating relevant research topics to be pursued in future experiments to be held at the Frascati Research Center.

**Teaching
Experience**

Visiting Qiúshì Chair Professor, Institute for Fusion Theory and Simulation, Zhejiang University, Hangzhou, P.R.C. Period: 01/20–present

Adjunct Professor, Institute for Fusion Theory and Simulation, Zhejiang University, Hangzhou, P.R.C. Period: 04/09–12/19

1. Intensive Course on *Kinetic theory and global dispersion relation of Alfvén waves in tokamaks* (06/19)
2. Intensive Course on *Physics of Alfvén waves and energetic particles in fusion plasmas: Mode structures and global dispersion of Alfvén waves in tokamaks* (05/18)
3. Intensive Course on *Physics of Alfvén waves and energetic particles in fusion plasmas: Linear physics and stability in tokamaks* (05/17)
4. Intensive Course on *Introduction to Nonlinear Plasma Physics, Part I: Nonlinear Wave-Particle Interactions* (05/16)
5. Intensive Course on *Theory and simulation of nonlinear physics of the beam-plasma system* (05/15)
6. Intensive Course on *Nonlinear dynamics of phase-space zonal structures and energetic particle physics in fusion plasmas* (05/14)
7. Intensive Course on *Kinetic Theory of meso- and micro-scale fluctuations in magnetic fusion plasmas* (04/09), (05/13)
8. Intensive Course on *Non-linear charged particle dynamics in tokamaks: theory and applications* (05/12)
9. Intensive Course on *Advanced Plasma Physics (I): Non-linear charged particle dynamics* (05/11)
10. Intensive Course on *Resonant and non-resonant interactions in beam-plasma systems* (05/10)

Other Teaching Activities, Short Courses:

1. Master in Technologies for Nuclear Fusion Part I – Physics: *Introduction to plasma physics* (University of Tuscia, Viterbo, Italy – Mechanical Engineering Program A.A. 2016-2017; 2017-2018; 2018-2019; 2019-20; 2020-21; 2021-22; 2022-23)
2. ENEA MASTER 2013 Module 1: Plasma Physics. Magnetic Confinement: *Instabilities and transport in burning plasmas* (“Tor Vergata” University of Rome, March 20–28, 2013)
3. Max-Planck-Institut für Plasmaphysik Lecture Series-Winter 2013: *on Kinetic theory of meso- and micro-scale Alfvénic fluctuations in fusion plasmas* (Max-Planck-Institut für Plasmaphysik, Garching, February 19–22, 2013)
4. Winter School on Nonlinear Energetic Particle Physics in Burning Plasmas: *Linear and nonlinear theory of Alfvén modes in toroidal plasmas* (University of California, Irvine, January 9–10, 2012)
5. 8.th High Level Course for the EFDA GOTiT (Goal Oriented Training in Theory) Project: *Resonant and Non-Resonant Interactions in Beam-Plasma Systems and Magnetic Fusion Plasmas* (ENEA Frascati, June 13–17, 2011)

Thesis Advisor, Thesis in candidacy to Doctor of Philosophy Degree:

1. Nonlinear kinetic theory and simulation of toroidal fusion plasmas
University: University of Rome “Roma Tre” Period: 11/19–10/22
2. Alfvén waves excited by energetic particles in tokamak plasmas of fusion interest
University: Institute for Fusion Theory and Simulation, Zhejiang University, Hangzhou, P.R.C. Period: 02/14–03/19
3. Gyrokinetic theory for particle transport in fusion plasmas
University: University of Rome “Roma Tre” Period: 10/14–12/16
4. Propagation and absorption of Lower Hybrid waves in tokamak plasmas of fusion interest
University: Peking University, P.R.C. Period: 11/10–05/12
5. Nonlinear excitation of low frequency Alfvén modes by MHD fluctuations
University: University of Pisa Period: 12/06–12/10
6. Linear and nonlinear dynamics of Alfvén Modes in burning plasmas
University: University of Rome “Tor Vergata” Period: 12/06–06/09

Tutor, Research activities for Post-Doctoral and Research Fellowships:

1. Extended/kinetic MHD and energetic particle physics
Research Institute: Center for Nonlinear Plasma Science and ENEA C.R. Frascati, Frascati – CREATE Consortium, Napoli Period: 04/23–*present*
2. Extended/kinetic MHD and energetic particle physics
Research Institute: Center for Nonlinear Plasma Science and ENEA C.R. Frascati, Frascati – CREATE Consortium, Napoli Period: 05/21–06/22
3. Transport processes in magnetically confined plasmas
Research Institute: ENEA Research Center, Frascati Period: 01/17–07/21
4. Structures of the low frequency Alfvén continuous spectrum and their consequences on MHD and microturbulence
University: Institute for Fusion Theory and Simulation, Zhejiang University, Hangzhou, P.R.C. Period: 11/10–07/11
5. Simulation of collective mode excitation by energetic ions in burning plasmas
University: Institute for Fusion Theory and Simulation, Zhejiang University, Hangzhou, P.R.C. Period: 02/12–04/12; 11/10–01/11; 02/09–04/09; 02/08–04/08
6. Tutor for 2 Trainees in the EFDA GOTiT (Goal Oriented Training in Theory) Project
Period: 05/09–05/10
7. Linear and nonlinear dynamics of Alfvén modes in burning plasmas
Research Institute: ENEA Research Center, Frascati Period: 11/08–01/09
8. Theory and simulation of turbulent transport processes in thermonuclear plasmas
Research Institute: ENEA Research Center, Frascati Period: 03/07–03/09

Thesis Advisor, Thesis in candidacy to Italian Laurea (V.O. - Magistralis):

1. Drift wave instabilities driven by ion temperature gradients in burning plasmas
University: University of Rome “La Sapienza” Period: 01/04–05/06
2. Study of high- β magnetohydrodynamic equilibria and analysis of their relevance to plasmas of fusion interest
University: University of Pisa Period: 08/98–07/99
3. Alfvén waves and instabilities driven by fast particles in reactor relevant plasmas
University: University of Rome “La Sapienza” Period: 05/95–11/96

Teaching Assistant, Dept. of Astrophysical Sciences, Princeton University (9/90–01/91). Graded homework and held classes for AST 551: General Plasma Physics I (Fall 90).

**Other
Experience**

BEST – PAC, (07/21–present), Member of the international Program Advisory Committee of the Burning Experimental Superconducting Tokamak (BEST), at the Academy of Sciences Institute of Plasma Physics (ASIPP), Hefei, Anhui, China.

RMPP – EB, (01/20–present), Member of the Editorial Board of Reviews of Modern Plasma Physics.

E-TASC – SB, (03/19–present), Member of the Scientific Board of the EUROfusion-Theory and Advanced Simulation Coordination.

POP – EB, (01/19–present), Member of the Editorial Board of Physics of Plasmas.

AMSA – AEB, (05/15–present), Member of the Associate Editorial Board of Annals of Mathematical Sciences and Applications.

EAST – IAC, (10/06–present), Member of the International Advisory Committee of the EAST Superconducting Tokamak, Institute of Plasma Physics, Chinese Academy of Sciences (ASIPP), Hefei, Anhui, China.

IFTS – ZJU, (06/06–present), Member of the International Advisory Committee of the Institute for Fusion Theory and Simulation (IFTS), Zhejiang University (ZJU) at Hangzhou, China.

Joint Varenna-Lausanne International Workshop on Theory of Fusion Plasmas, (08/08–present), Member of the Scientific Program Committee.

CFETR – IAC, (02/15–12/20), Member of the International Advisory Committee of the China Fusion Engineering Test Reactor (CFETR), at the Collaborative Innovation Center, University of Science and Technology of China, Hefei, Anhui, China.

PPCF – EB, (10/06–12/18), Member of the Editorial Board of Plasma Physics and Controlled Fusion (IoP).

8.th IAEA TCM, (11/16–06/17), Member of the International Advisory Committee for the 8th IAEA Technical Committee Meeting on Theory of Plasma Instabilities, Vienna, Austria, 12-14 June 2017.

42.nd EPS PPC, (06/14–06/15), Member of the Programme Committee for the 42.nd EPS Plasma Physics Conference, 2015.

7.th IAEA TCM, (09/14–03/15), Member of the International Advisory Committee and Chairman of the Local Organization Committee for the 7th IAEA Technical Committee Meeting on Theory of Plasma Instabilities, Frascati, Italy, 4-6 March 2015.

EFDA STAC, (10/07–04/14), Member of the EFDA Science and Technology Advisory Committee.

GOTiT – PMB, (10/08–12/12), Member of the Goal Oriented Training in Theory (GOTiT) Project Management Board (PMB).

Ad Hoc Group, (06/10–09/10), Member of the EFDA STAC Ad Hoc Group on JET Feasibility Studies of Resonant Magnetic Perturbation & Electron Cyclotron Resonance Heating Systems

NDSF – ENEA, (07/08–10/09), Chairman of the Scientific and Organizing Committees for the Workshop on “Nonlinear Dynamics and Structure Formation in Complex Systems: Challenges and Open Problems for Modern Physics”, ENEA Frascati, 21-22 September 2009.

11.th IAEA TCM, (11/08–09/09), Member of the International Advisory Committee for the 11th IAEA Technical Committee Meeting on Energetic Particles in Magnetic Confinement Systems, Kyiv, Ukraine, 21-23 September 2009.

EFDA Facilities Review, (07/07–05/08). Member of the Working Group 3 “Mission of the Satellite Tokamak program in parallel to ITER” in the discussion for preparing the document for input to the “EFDA Facilities Review”. Author of Annex 5.B, *The mission of a Satellite Tokamak in support of ITER (focused on the burning plasma physics needs)*, of the final document.

EFDA ITM-TF, (03/05–12/07), Deputy Task Coordinator of Integrated Tokamak Modeling Task Force ITM-TF IMP5: Modeling heating and fast particle physics for ITER.

10.th IAEA TCM, (04/07–10/07), Member of the International Advisory Committee for the 10th IAEA Technical Committee Meeting on Energetic Particles in Magnetic Confinement Systems, Kloster Seeon , Germany, 8-10 October 2007.

Ad Hoc Group, (04/06–09/06), Member of the Ad Hoc Group on Support measures for theory and modeling activities under EFDA

E.F.T.C. Scientific Committee, (10/01–09/05), Chairman of the Scientific Committee for the European Fusion Theory Conference

9.th IAEA TCM, (01/05–11/05), Member of the International Advisory Committee for the 9th IAEA Technical Committee Meeting on Energetic Particles in Magnetic Confinement Systems, Takayama-shi , Japan, 9-11 November 2005.

2005 Festival de Théorie, (01/05–07/05), Member of the Scientific Committee of the 2005 for the Festival de Théorie on Turbulence overshoot and resonant structures in fusion and astrophysical plasmas, Aix-en-Provence, France, 4-22 July 2005.

32.nd EPS PPC, (06/04–09/05), Member of the Programme Committee for the 32.nd EPS Plasma Physics Conference, Tarragona, Spain, 27 June -1 July 2005.

Large Tokamak Agreement, (09/00–12/05), “Key Person” for the “Fast Particle Task” to be carried out under the IEA Large Tokamak Agreement (2001-2005).

8.th IAEA TCM, (11/02–10/03), Member of the Programme Committee for the 8th IAEA Technical Committee Meeting on Energetic Particles in Magnetic Confinement Systems, San Diego, California, USA, 6-8 October 2003.

19.th IAEA FEC, (02/02–10/02), Member of the Programme Committee for the 19.th IAEA Fusion Energy Conference, Lyon, France, 14-19 October 2002 .

7.th IAEA TCM, (11/00–10/01), Member of the Programme Committee for the 7th IAEA Technical Committee Meeting on Energetic Particles in Magnetic Confinement Systems, Gothenburg, Sweden, 8-11 October 2001.

Ad Hoc Group, (09/99–04/00), Member of the Ad Hoc Group on Code Review - Subgroup I: First Principles based numerical codes, as expert for transport and turbulence simulations. Group nominated by the European Programme Committee to assess the status of numerical simulation codes in the European Fusion Programme

F.P.C. Scientific Committee, (06/99–12/02), Member of the EURATOM Fusion Physics Committee

ITER Expert Groups, (03/99–10/01), Member of the ITER Expert Group on “Energetic Particles, Heating and Steady-State” for the ITER Transition Phase

E.F.T.C. Scientific Committee, (01/96–10/01), Member of the Scientific Committee for the European Fusion Theory Conference

Patents *Plasma Momentum Meter for Momentum Flux Measurements*, patent application SN 726076, July 5th, 1991; U.S. Patent No. 5,239,563 - May 25th,1994.

Publications Summary Journal Papers: 207
Conference Papers: 154
To be published: 3
Total citations: 6780 (WoS)
h-index ([Hirsch number](#)): 45 (WoS), 48 (Scopus), 54 (Google Scholar)
List of 10 most cited papers: [download](#)
Complete list of publications: [download](#)

Invited Talks: 53 A variety of Invited presentations at International Conferences and Seminars in International Research Centers and Universities.

Foreign Languages *English*, fluent
German, fluent