

# Donatella Fiorucci

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## Researcher

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## Experience

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### 08 April 2019 to Current

Researcher on nuclear fusion at RFX consortium, Padua, Italy.

Development and maintenance of laser-based diagnostics for plasma in nuclear fusion experiments. The main part of the work concerns the maintenance of the interferometer for the RFX experiment in Padua, Italy, and the design of the interferometer and interferometer/polarimeter for the DTT tokamak. In parallel, the feasibility study of the photo-neutralization process for the next generation of nuclear fusion reactors is carried on as well as the data analysis on current nuclear fusion experiments (such as the JET experiment).

### 01 October 2018 to 31 March 2019

Postdoc on Gravitational Waves at GSSI, L'Aquila, Italy.

Study of atmospheric Newtonian Noise mitigation strategies in gravitational wave detectors. The considered technique is the coherent noise cancellation based on the Wiener filter exploiting LIDARS and microphones.

### 16 November 2015 to 30 September 2018

Postdoc on Gravitational Waves at APC, Paris, France.

Feasibility study of a low-frequency (below 1Hz) gravitational-wave detector prototype, exploitable for earthquake early warning systems to detect the prompt gravity signals induced by earthquakes. The work is divided in two parts: the development of an interferometric readout system sensitive to the displacement between the detector test masses due to gravity perturbations; the modeling of the atmospheric Newtonian Noise.

## Education

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### 2012-2015

#### Ph.D. in Physics

**Artemis laboratory-Observatoire de la côte d'azur, University Nice-Sophia-Antipolis, CEA (centre de Cadarache).**

Feasibility study of an optical resonator for applications in Neutral-Beam Injection systems for the next generation of Nuclear Fusion reactors. Ph.D. mark: Summa cum Laude.

### 2007-2011

#### Master in "Astronomy and Astrophysics", Sapienza, Rome University, Italy

Master thesis subject - "Non-analytical power law correction to the Einstein-Hilbert action: gravitational wave propagation". Mark: 110/110 cum Laude. The degree also covers one academic year (18/09/2009 - 18/06/2010) at the University of Leeds (England), in the frame of the Erasmus European study-abroad program to the aim of improving English skills.

**2003-2007**

**Bachelor in “Physics and Astrophysics”, Sapienza, Rome University, Italy**

Bachelor thesis subject - “Cosmological evidences for dark matter”. Mark: 110/110. The degree includes the attendance of several modules at the Philosophy department of “Sapienza” University, for personal interest.

**1998-2003**

**Liceo classico, Mariano Buratti, Viterbo, Italy**

**Baccalaureate**, literary high school awarded with first class results : 98/100.

## Skills

### Main scientific competences

- Theoretical and experimental optics
- Theoretical and experimental gravity
- Nuclear fusion reactors
- Plasma physics
- Theoretical and experimental acoustics
- Code programming for simulations
- Analytical and numerical calculations
- Statistical treatment of experimental data

### Linguistic competences

- Italian Mother tongue
- English Fluent
- French Fluent

### Computer science

- Specialist knowledge of Python, MATLAB, Mathematica, basics of FORTRAN, C and C++, OpticStudio, CAD.
- Knowledge of COMSOL, basics of ANSYS
- Main operating systems: Windows, Mac OS, Linux

## Teaching

**11/2019-02/2020:** Electromagnetism laboratory course assistant for students of the management engineering faculty, University of Padua.

**03/2019:** PhD-level lectures on atmospheric Newtonian Noise at GSSI.

**07/2018:** Teaching high school teachers about gravitational wave discovery, Athens.

**04/2018:** PhD-level lectures on gravitational wave detectors, APC laboratory, University Paris 7 (Paris Diderot).

**06/2018-07/2018:** Supervision of a master student (2-months stage), University Paris 7 (Paris Diderot).

**09/2017-12/2017:** Master-level lectures on lasers at EIDD (Ecole d'ingénieur Denis Diderot), University Paris 7.

**03/2014-08/2014:** Supervision of a master student (6-months stage) at the University of Nice-Sophia Antipolis.

**08/02/2018-31/12/2022 Qualification (Abilitazione)** for the french academic position of teacher-researcher (Maître de conférences) in class 34, i.e. Astronomy, Astrophysics.

## Main Publications

D. Fiorucci, O. M. Lecian, G. Montani. *Non-analytical power-law correction to the Einstein- Hilbert action : Gravitational wave propagation*. Modern Physics Letters A Vol. 29, No. 33 (2014) 1450178.

A. Simonin et al, *R&D around a photo-neutralizer-based NBI system (Siphore) in view of a DEMO Tokamak steady state fusion reactor*. Nucl. Fusion 55 (2015) 123020 (19pp).

D. Fiorucci et al., *Telescope based cavity for negative ion beam neutralization in future fusion reactors*, Appl. Opt.57(7), B122-B134, 2018.

D. Fiorucci, J. Feng, M. Pichot, W. Chaibi. NIBS (Negative Ions, Beams and Sources) conference proceeding, 2014. Thermal effects in high power cavities for photo-neutralization of D- beams in future neutral beam injectors.

D.Fiorucci, J. Harms, M. Barsuglia, I.Fiori, F. Paoletti. Impact of infrasound atmospheric noise on gravity detectors used for astrophysical and geophysical applications. Phys. Rev. D 97, 062003. 03/2018.

K. Juhel et al, *Earthquake Early Warning Using Future Generation Gravity Strainmeters*, JGR Solid Earth, Volume 123, Issue 12, December 2018.

LIGO-Virgo collaboration. *Observation of Gravitational Waves from a Binary Black Hole Merger*. Phys. Rev. Lett. 116, 061102.

A. Longo et al, *Adaptive denoising of acoustic noise injections performed at Virgo Interferometer*. Pure and Applied Geophysics (PAAG) 31/01/2020.

D. Fiorucci et al., *Design of an interferometer/polarimeter for DTT*, Journal of Instrumentation, Volume 15, February 2020, 2020\_JINST\_15\_C02041.

L. Balbinot et al., *Dispersion scanning beam medium infra-red interferometry for divertor plasma density measurements in DTT*, Journal of Instrumentation, Volume 15, February 2020, <https://doi.org/10.1088/1748-0221/15/02/C02028>.