

Curriculum vitae of Ciro Cecconi

CONTACTS

Department of Physics, Informatics and Mathematics,
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HIGHEST ACADEMIC DEGREE

Doctor of Philosophy (Ph.D.)

University of California, Berkeley, USA

Supervisor: Prof. Carlos J. Bustamante, Department of Physics and Molecular & Cell Biology

Thesis Title: Studies of the Mechanical Unfolding and Refolding of RNase H and T4 lysozyme.

SCIENTIFIC INTERESTS

- Folding pathways and energy landscapes of single proteins
- Protein misfolding and aggregation
- Mechanisms of action of chaperones studied at single molecule level
- Protein-ligand interaction mechanisms

PROFESSIONAL EXPERIENCE

2014-present Associate Professor

Department of Physics, Informatics and Mathematics

University of Modena and Reggio Emilia

Modena, Italy.

2010-2014 Group Leader

CNR Institute of Nanoscience S3

c/o Department of Physics, Informatics and Mathematics

University of Modena and Reggio Emilia

Modena, Italy.

2006-2010 Researcher

within the program “Rientro dei Cervelli - Scientific field: Applied Physics”

Department of Physics

University of Modena and Reggio Emilia

Modena, Italy.

2004-2006 Postdoctoral fellow

Supervisor: Professor Carlos J. Bustamante

Lawrence Berkeley National Laboratory

Berkeley, CA – USA.

- 1996-2003 Graduate student
Supervisor: Professor Carlos J. Bustamante
Department of Physics and Molecular and Cell Biology
University of California, Berkeley – USA.
- 1995-1996 Visiting Scholar
NATO-CNR Advanced Fellowship - Scientific field: Physics
Supervisor: Professor Carlos J. Bustamante
University of Oregon, Eugene – USA.
- 1992-1995 Researcher
Programma Nazionale di Ricerca e Formazione sulle Tecnologie per la
Bioelettronica (Technobiochip)
Supervisor: Professor Cesare Ascoli
Institute of Biophysics,
CNR Pisa - Italy.
- 1991-1992 Apprentice
Supervisor: Professor Cesare Ascoli
Institute of Biophysics,
CNR Pisa - Italy.

OTHER TITLES

- Eligible for the CNR fellowship as from Call no. 201.11.16 of 06/06/1990.
- Recipient of the INFM-CNR fellowship (call no. 999 of November 9 2005) to work at the CNR-INFM S3 Research Center in Modena. The candidate did not accept this fellowship as he had in the meanwhile been awarded the "Rientro dei Cervelli" competition.

FUNDED PROJECTS

- PRIN, “Protein function from disorder. Insight from single molecule optical tweezers, physical models, and computation”, 2022-2024 (partner).
- Grant RER "High competences for research and technology transfer", Emilia-Romagna Region, Italy, 2020-2021 (PI).
- PRIN, “The Interplay Between the “RNA/Protein Quality Control System” and “Exosomes” as a Spreading Mechanism in Amyotrophic Lateral Sclerosis”, 2019-2022 (partner).
- Fondo di Ateneo per la Ricerca 2016 - Progetti di ricerca FAR2016. “Biochemical and biophysical characterization of disease-linked mutants of HSPB8 and BAG3: unravelling their impact on protein-RNA homeostasis”, 2017-2019 (partner).
- Fondo di Ateneo per la Ricerca 2014 - Progetti di ricerca FAR2014. “Studio dei meccanismi di interazione del sensore al calcio NCS-1 con partner biologici e chaperon molecolari a livello di singola molecola”, 2015-2016 (PI).

- Lundbeck Foundation (DK) - “Single-molecule investigations of folding and misfolding pathways of NCS1: understanding ligand binding and chaperone interactions (R118-A11665)”, 15/04/2013 – 15/10/2014 (partner).
- Research Fellow Program for Training and Research in Italian laboratories (TRIL), ICTP, Trieste, Italy, May 2011 – May 2012 (PI).
- Marie Curie International Reintegration Grant (IRG) (Europe) – “SINgle protein folding PATHways - SINPATH”- 2006-2008. This Grant has been used to reintegrate Dr. Cecconi in Europe (PI).
- Fellowship “Rientro dei Cervelli”, MIUR, 2006-2010 (PI).

FELLOWSHIPS AND HONORS

- Rientro dei Cervelli - Scientific field: Applied Physics, 2006-2010.
- Marie Curie International Reintegration Grant (IRG), 2006-2008
- NATO-CNR Advanced Fellowship - Scientific field: Physics, 1995-1996.
- - First poster award of the 5th International Symposium on Optical Tweezers in Life Sciences, Berlin, Germany, 2013
- - Best oral communication of section IVb: Biophysics and Medical Physics, SIF-XCII National Congress - Turin, 2006
- The paper (Heidarsson et al., PNAS 2014) was the subject of a press release published in the CNR News and on the Bulletin Electronique du Service Scientifique de l'Ambassade de France à Rome with the title “Quand la protéine ne fait pas un pli ”.
- The papers (Heidarsson et al, JACS 2012; Heidarsson et al, PNAS 2014; Choudhary et al, Frontiers in Molecular Neuroscience 2018) were selected to be published in the highlights of the Activity Reports of CNR NANO in 2013, 2015 and 2020
<http://www.nano.cnr.it/?mod=men&id=511>

CAREER HIGHLIGHTS

Professor Ciro Cecconi has gained a long experience in the field of force spectroscopy working for several years, first as a PhD student and then as a postdoctoral fellow, at the University of California, Berkeley, in the laboratory of Professor Carlos Bustamante, one of the world’s leading scientists in the field of single molecule biophysics. During his stay in Berkeley, Professor Cecconi has developed a new experimental method to manipulate single proteins with optical tweezers, which has made it possible to revisit protein folding with a completely new approach. By manipulating one molecule at a time in the low force regime of optical tweezers, Cecconi et al. monitored in real time unfolding and refolding transitions of the proteins RNase H and T4 Lysozyme and characterized these reactions with unprecedented detail, uncovering information inaccessible to more traditional bulk techniques. The results of these studies, which were published in Science and Nature, represented a breakthrough in single molecule biophysics and gave rise to a new field of research that has been undertaken by several laboratories around the world.

In 2006 Professor Cecconi was awarded a Marie Curie International Reintegration Grant (IRG) from the European Community to return to Europe and work on a project entitled “Single protein folding pathways”,

at the University of Modena and Reggio Emilia (UNIMORE), Italy. The same year he won a competition named «Rientro dei Cervelli», issued by the Italian Ministry of Education, University and Research (MIUR), receiving funding to set up a single-molecule biophysics laboratory at UNIMORE, where he built a high-resolution force-measuring optical tweezers setup. In Modena, professor Cecconi has started several lines of research in the field of single molecule biophysics, establishing collaborations with national and international esteemed scientists, and publishing papers in prestigious journals, such as *Structure*, *JACS* and *PNAS*. Over the years, Professor Cecconi has been the scientific supervisor of several postdoctoral fellows and PhD students and he has been awarded national and international grants. Currently his research activity is focused on: i) folding pathways and energy landscapes of single proteins, ii) protein misfolding and aggregation, iii) mechanisms of action of chaperones studied at single molecule level, and iv) protein-ligand interaction mechanisms.

SUPERVISOR OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

Supervisor of 5 postdoctoral fellows at the Physics Department of the University of Modena and Reggio Emilia.

Supervisor of 4 graduate students of the PhD School in Nano and Physical Sciences at the University of Modena and Reggio Emilia.

Co-Supervisor of a graduate student of the PhD School of Science at the University of Copenhagen, Ole Maaløes vej 5, 2200 Copenhagen N, Denmark.

REFEREE FOR INTERNATIONAL JOURNALS AND PROPOSALS

International journals: *Nature Chemical Biology*, *Journal of the American Chemical Society*, *ACS Nano*, *The Journal of Physical Chemistry*, *Biophysical Journal*, *Journal of Molecular Recognition*, *International Journal of Molecular Sciences*, *Beilstein Journal of Nanotechnology*.

Proposal for a Lise Meitner-Postdoctoral position, for the Austrian Science Fund (FWF), 2013.

Proposal submitted to Netherlands Organization for Scientific Research (NWO) for a Vidi grant within the Innovational Research Incentives Scheme of the Domain Science, 2018.

Starting Grant Proposal, ERC STG 2021 LS1, for the European Research Council Executive Agency.

INTERNATIONAL COLLABORATIONS

- Professor Sander Tans, FOM Institute for Atomic and Molecular Physics [AMOLF], Science Park 104, 1098 XG Amsterdam, The Netherlands.
- Professor Serena Carra, Department of Biomedical, Metabolic and Neural Sciences, and Centre for Neuroscience and Neurotechnology, University of Modena and Reggio Emilia, Italy.
- Professor Birthe B. Kragelund - Structural Biology and NMR Laboratory, Department of Biology, University of Copenhagen, Ole Maaløes vej 5, 2200 Copenhagen N, Denmark.
- Professor Pétur O. Heidarsson, Department of Biochemistry, Science Institute, University of Iceland, Sturlugata 7, 102 Reykjavik, Iceland.
- Professor Vittorio Bellotti - National Amyloidosis Centre, Centre for Amyloidosis and Acute Phase Proteins, University College London, United Kingdom & Department of Molecular Medicine, Institute of Biochemistry, University of Pavia, 27100 Pavia, Italy.
- Professor Alessandro Mossa, Istituto Nazionale di Fisica Nucleare, Sezione di Firenze, Italy

Modena – June 13, 2024.

Sincerely,



Ciro Cecconi