

## Curriculum Vitae

# GABRIELE CESCUTTI

### PERSONAL DATA

Date of birth: 16 August 1977.

Place of birth: Udine, Italy.

Civil status: Married, with two children

Address/Office: INAF, Osservatorio Astronomico di Trieste,  
via G. B. Tiepolo 11, 34143 Trieste, Italy

Tel: +39 040 3199 106

Email: cescutti@oats.inaf.it or cescutti.gabriele@gmail.com

Citizenship: Italian.

### RESEARCH INTERESTS:

I am an expert in chemical evolution models of galaxies. I have achieved strong capabilities in analysis and interpretation of the trends in the abundance ratios observed in stellar populations: an essential way to extract information from these systems. I developed myself standard codes of chemical evolution and I create a model with a stochastic approach, which can be used now to test the dispersion of the chemical abundance in the ISM for different nucleosynthesis, in particular for the early phase of galactic formation. My most recent work has been focused on the chemical evolution in the Early Universe and First Stars and recently, my Astrofit<sup>1</sup> application “Revealing the Nature of the First Stars: the role of the chemical signatures in the primordial stars of our Galaxy” has received an excellent evaluation and has been founded. I have also worked on the galactic gradients in discs and I am now developing a new chemical evolution model considering spiral perturbations and the impact of the azimuthal gradients. From the point of view of the method, I have also worked on hydrodynamical simulations of galaxy formation with detailed metal enrichment and different feedback prescriptions. In this area I have already gained experience in collaboration with Pascale Jablonka at EPFL, with Cecilia Scannapieco at the AIP and I have further improved my skills thanks to the experience of Chiaki Kobayashi, at the University of Hertfordshire.

We are now in the survey era and I have the opportunity to be a member of one of the most promising next generation of surveys - 4MOST (<https://www.4most.eu/>). With these new facilities, together with the data GAIA is already gathering, we will be able to constrain the evolution of our Milky Way using together chemical and kinematical information (and possibly also stellar ages). Ideally, simulations can do this job, but it is likely that semi-analytical codes - as chemical evolution models - will play a pivotal role in the first exploration of the parameter space, basing the results on robust statistical procedures.

Moreover, I am used to working in synergy with experts in analysis and reduction of observational data, from one side; experts in stellar models and nucleosynthesis calculations, on the other side; for this reason, I have also become familiar with these research fields. I am PI of two accepted ESO proposal for a total of 3 nights at UVES - VLT and since a year, I have also started to work directly on stellar nucleosynthesis codes.

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<sup>1</sup>AstroFIT2 Programme, cofounded by the National Institute for Astrophysics and the European Commission, under H2020, Marie Skłodowska-Curie COFUND action

## Positions:

- From 1st October 2016 to 30th September 2019  
Astrofit Fellow at the Osservatorio Astronomico di Trieste, project title: “Revealing the Nature of the First Stars: the role of the chemical signatures in the primordial stars of our Galaxy”.  
Line manager: Carlo Morossi.
- From 1st October 2015 to 30th September 2018 (resigned at 30th September 2016)  
Research fellow at the University of Hertfordshire, member of the School of Physics, Astronomy and Mathematics and of the Centre for Research in Astrophysics.  
Line manager: Chiaki Kobayashi.  
**Highlights:** paper just accepted on impact of faint supernovae “ Does the chemical signature of TYC 844210361 originate from a rotating massive star that died in a faint explosion?”. Co-supervisor of a PhD student working on Sph simulation for the Milky Way with detailed chemistry. Involved in analysis of stellar nucleosynthesis results, member of the Shyne team (<http://www.astro.keele.ac.uk/shyne>) and on the BRIDGCE collaboration (<http://www.astro.keele.ac.uk/bridgece>) (paper just published on line “Uncertainties in the production of  $p$  nuclei in massive stars obtained from Monte Carlo variations”)
- From 1st December 2011 to 30th September 2015  
PostDoc in the Galactic Archeology group and Milky Way and Local Volume Group of Leibniz-Institut für Astrophysik Potsdam.  
Line manager: Cristina Chiappini/Roelof de Jong.  
**Highlights:** Started investigations on the First Stars, by means of the stochastic chemical evolution model. Invited talks at international conferences. Member of two 4MOST surveys and one working package. PI (and visitor) of an ESO proposal at UVES - VLT. Measured chemical abundances of an extremely metal poor star.
- From 1st March 2011 to 30th November 2011  
PostDoc at the Laboratoire d'astrophysique (LASTRO) of the Ecole Polytechnique Federale de Lausanne (EPFL).  
Line manager: Pascale Jablonka.  
**Highlights:** Brief Postdoc (9months). Collaboration to provide a detailed chemical input to sph simulations, in particular for heavy elements. First attempt to work on observational data.
- From August 2008 to December 2010  
PostDoc in the Astronomy Unit of the Physics Department of the Trieste University.  
Line manager: Francesca Matteucci.  
**Highlights:** Extended the application of the stochastic chemical evolution to the CNO, worked on the galactic bulge and start to extend my network (first papers without PhD supervisor)
- From May 2007 to July 2008  
Postdoc in the Physics Department of the Trieste University with two fixed-term contracts on “*Chemical evolution of iron-peak elements*” and “*Inhomogeneous model for the halo of the Milky Way*”.

Line manager: Francesca Matteucci.

**Highlights:** Finalized my paper on the stochastic chemical evolution for neutron capture elements, start to apply on different environments the same nucleosynthesis to constrain the results (Mn).

### Education:

- PhD in Physics awarded on the 2th April 2007 by the University of Trieste.  
Thesis Title: **Chemical evolution of neutron capture elements in our Galaxy and in the dwarf spheroidal galaxies of the Local Group** (astro-ph 0708.4163), under the supervision of Prof. F. Matteucci.
- Degree in Physics awarded on the 26 September 2002 by the Trieste University, with a final grade of 101/110.  
Thesis Title: **Formation of spiral galaxies with a cosmological approach**, under the supervision of Dr. P. Monaco.

### Publications:

- 31 refereed publications (A&A, MNRAS, ApJ, AJ)
- 13 refereed publications as first author
- ~800 citations
- h-index 19 (first author 10)

### Observations:

- **Principal investigator** for the proposal “Probing the sources of synthesis of neutron capture elements: Isotopic ratios of barium in halo stars”, 0.7 nights at UVES (VLT), in Designated Visitor Mode on 18th-19th October 2016, data received.
- **Principal investigator and visitor observer** for the proposal “Probing the sources of synthesis of neutron capture elements: Isotopic ratios of barium in halo stars”, 2 nights at UVES (VLT), visitor mode on 3rd-5th October 2014. Due to bad weather conditions the observation was not successful.
- Co-I for the proposal “Probing the explosion sites of Type Ia supernovae ” with 4 nights at The Nordic Optical Telescope (PI Tanja Petrushevska)
- Involved in the science case for 4MOST, spectroscopic survey facility under development for the VISTA telescope of ESO.
- Co-I for the accepted proposal “Primary Carbon Enrichment in the Galactic Halo” 12 hours at XSHOOTER (PI Brigitta Nordström)

### Teaching Activity:

- Co-supervisor for the PhD thesis of Chris Haynes at the University of Hertfordshire on evolution of heavy elements in cosmological simulation of spiral galaxies.
- Co-supervisor for the summer project (01/06/2016- 31/07/2016) of Michelle Bieger on “Elemental abundances in stars of the dwarf spheroidal galaxies of the Local Group”.
- Lecturer in “Galaxies from the point of view of stars” course held by prof. Maria-Rosa Cioni, for one lecture on “Chemical evolution” at the Potsdam University on 25th November 2014.
- Co-supervisor for the degree thesis of Carlo Alberto Neri “*Evoluzione chimica della via Lattea e dei suoi satelliti*” on May 2010, Trieste University.
- Lecturer of “Stellar Physics” course held by prof. Francesca Matteucci, for the lessons regarding the production of heavy elements by stars, 2007-2010 at the Trieste University.
- Member of the exam committee of the course “Stellar Physics”, 2006-2010, Trieste University.

### Referee for the journals:

- Monthly Notices of the Royal Astronomical Society
- Astronomy and Astrophysics
- The Astrophysical Journal
- The Astrophysical Journal Letters
- Revista Mexicana de Astronomía y Astrofísica

### Others achievements/membership:

- In April 2016, short-listed for a lecturer position at the University of Hertfordshire.
- The poster “Impacts of nuclear-physics uncertainty in stellar temperatures on the s-process nucleosynthesis” by N. Nishimura, **G. Cescutti**, R. Hirschi et al. won the silver prize at 14th International Symposium on Nuclei in the Cosmos, 2016.
- Member of the IAU Division G Stars and Stellar Physics and Division H Interstellar Matter and Local Universe
- In May 2015, short-listed for a lecturer position at the Hull University.
- In October 2013, my contribution The imprints of the First Stars in the oldest stars of the bulge was selected by the scientific advisory committee (BEIRAT) of the Leibniz-Institut für Astrophysik Potsdam.

- 14th in the rank for a permanent position in INAF in 2010 public context for Stellar Physics (6 positions) on my third year after PhD.
- Member of the committee for the PhD thesis defense of Monica Midori Uchida Anunciato Chemical evolution of discs: MilkyWay and nearby spiral galaxies, on 14th September 2010, at the Universidade de Sao Paulo.

### Invited seminars:

- Institute of Astronomy, University of Cambridge, 20th June 2016, Cambridge (UK)
- University of Hertfordshire, 18th May 2016, Hatfield (UK)
- Osservatorio Astronomico di Trieste, 7th January 2015, Trieste (Italy).
- ESO Vitacura, Science Colloquia, 3rd October 2014, Santiago (Chile).
- Institute for Nuclear Physics, University of Darmstadt, 5th December 2013, Darmstad (Germany).
- Leibnitz Institut for Astrophysics, 6th September 2013, Potsdam (Germany).
- Observatoire de Geneve, 25th June 2013, Sauverny (Swiss).
- University of Central Lancashire, 11th December 2012, Preston (UK).
- Observatoire de Geneve, 21st June 2011, Sauverny (Swiss).
- Astronomy Department, Universidade de Sao Paulo, 17th September 2010, Sao Paulo (Brazil).
- Osservatorio Astronomico di Trieste, 10th March 2009, Trieste (Italy).
- Max Planck Institute for Astrophysics, 27th January 2009, Garching (Germany).
- Max Planck Institute for Extraterrestrial Physics, 18th September 2007, Garching (Germany).

### Conferences and International Workshops (talk contributions):

- Galactic Archaeology and Stellar Physics Conference, 21-25 November 2016, Canberra (Australia). Contribution: “What process(es) produced neutron capture elements in the Early Universe?” .
- **Invited Speaker** to the BRIDGCE workshop: “Stars, Supernovae and Nucleosynthesis III”: 7-8 September 2016, Keele (UK). Contribution: “Constraints to the nature of the r-process events” .

- **Invited Speaker** at the Workshop “Galactic Surveys: New Results on Formation, Evolution, Structure and Chemical Evolution of the Milky” Sesto Pusteria (Italy), 25 - 29 January, 2016. Contribution: “Chemical evolution models in the Era of Galactic surveys: new 2D model for the Milky Way disc”.
- **Invited Speaker** to the BRIDGCE workshop: “Stars, Supernovae and Nucleosynthesis II”: 16-17 September 2015, Keele (UK). Contribution: “Hunting the nature of the First Stars: the role of the isotopic ratios of barium”.
- Conference “First Stars, galaxies, and black holes: Now and Then”, 15-19 June 2015, Groningen (Netherlands). Contribution: “Probing the nature of first stars: the isotopic ratio of Ba” .
- 11th Potsdam Thinkshop: “Satellite galaxies and dwarfs in the local group”, Potsdam 25-29 August 2014. Contribution: “Chemical signatures in dwarfs”.
- **Invited** to the Program: “Nucleosynthesis and Chemical Evolution: Recent Progress and Future Directions”, at the Institute for Nuclear Theory, Seattle (USA), 28th July -29th August 2014, Attended two week 28th July-8 August.  
Contribution, during the first week - Workshop “The r-process: status and challenges”: “Chemical evolution models, the special case of neutron capture elements in the Early Galaxy” .  
Contribution during the second week - regular Program: “Chemical evolution of neutron capture elements in the Galactic bulge and in the dwarf galaxies”.
- **Invited Speaker** at the Workshop “Formation and Evolution of the Galactic Bulge” Sesto Pusteria (Italy), 20 - 24 January, 2014. Contribution: “The imprints of the First Stars on the neutron capture elements in the Bulge” .
- **Invited Speaker** at the Workshop “Chemical evolution in the Universe: the next 30 years”, Castiglione della Pescaia, Italy, 16-20 September, 2013. Contribution: “Very heavy elements in the early Universe”.
- **Invited Speaker** at the international Workshop on Astrophysics and Nuclear Structure, Hirschegg, Austria, 26-31 January 2013. Contribution: “Spinstars in the Early Universe: an s-process signature in the oldest Galactic stars?”.
- **Invited Speaker** at the XII International Symposium on Nuclei in the Cosmos. Cairns Convention Centre (Australia), 5-10 August, 2012 Contribution: “Galactic chemical evolution: The role of the first stars”.
- Workshop “The Chemical Evolution of the Milky Way” Sesto Pusteria (Italy), 23 - 27 January, 2012 Contribution: “From Carbon to europium: Chemical evolution models of the Galaxy & its closest companions”.
- Conference “Origin of Matter and Evolution of the Galaxies (OMEG10)”, Osaka University (Japan), 8 March - 10 March, 2010. Contribution: “Chemical evolution of heavy elements in the Local Group”.

- Conference “The Milky Way and the Local Group - Now and in the Gaia Era”, University of Heidelberg (Germany), 31 August - 4 September, 2009. Contribution: “Chemical Evolution Models in the Local Group”.
- IX Torino Workshop on Evolution and Nucleosynthesis in AGB Stars, Perugia (Italy), 22-26 October 2007. Contribution: “The Chemical Evolution in the Solar Vicinity and the Nucleosynthesis of Neutron Capture Elements.”.
- IAU Symposium No. 228 “From Lithium to Uranium: Elemental Tracers of Early Cosmic evolution”, Paris (France), 22-27 May 2005. Contribution: “The chemical evolution of Barium and Europium in the Milky Way”.

**Languages:**

- English (fluent)
- German (B1-B2)
- Italian (mother tongue)