Robert J. J. Grand

Curriculum Vitae

Personal Information

Name	Dr. Robert John James Grand
Institute(s)	Max-Planck-Institute for Astrophysics, Karl-Schwarzschild-Str. 1, D-85748 Garching, Germany
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Citizenship	United Kingdom
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Research Employment

11.18 - present **Independent Research Fellow**, *Max-Planck Institute for Astrophysics*.
Fixed-term staff scientist

10.14-11.18 **Postdoctoral researcher**, *Heidelberg Institute for Theoretical Studies (HITS), Heidelberg Centre for Astronomy (ZAH)*.
Employed by ZAH and funded by SFB grant 881 under project A1: "The Milky Way System". Delegated to HITS under guidance of Prof. Dr. Volker Springel.

Education

10.10-07.14 **PhD at Mullard Space Science Laboratory, University College London**.
Thesis entitled: "A numerical study of spiral galaxies and dynamical effects of spiral arms", under the supervision of Dr. Daisuke Kawata and Prof. Mark Cropper.

2009 **Friedrich-Alexander-Universität, Nürnberg**.
Summer Internship at Friedrich-Alexander-Universität, Nürnberg, 2009, working in the High Energy Gamma Ray detection group for the HESS instrument, 2009.

2006-2010 **Masters in Physics and Astrophysics**, *Leeds University, department of Physics & Astronomy*, Leeds, *1st class with Honours*.
inc. Erasmus semester at Universität de Valencia, 2009. Thesis topic: feedback & star formation.

Research Interests and Scientific Achievements

Numerical simulations of galaxy formation and evolution.

- *I lead the Auriga project* - the largest, most advanced suite of Milky Way cosmological "zoom" simulations. I published the main method paper and first science paper.
- I have produced the *highest ever resolution* simulation of the Milky Way.
- I showed that black hole feedback limits the size of galactic stellar discs for the first time.

Galactic archaeology and chemical evolution.

- *I discovered a new mechanism* for the formation of the Milky Way's thick disc.
- I developed *AuriGaia* - the first cosmological mock catalogues for ESA's *Gaia* mission.

Galactic dynamics.

- I discovered a *new theory for galactic spiral arms*, and showed they drive non-axisymmetric kinematic and metallicity patterns, which I verified in NGC 6754 using VLT/MUSE data.

- I derived a *new Milky Way mass estimate based on the first study* of stellar streams in cosmological MHD simulations.

International Research Collaborations

09.2019 **SAS collaboration**, International collaboration between U. Ghent (Baes, Camps), the MPA (Grand) and University of Western Australia (Cortese), to develop the SKIRT radiative transfer model to make detailed mock observations of the Auriga galaxies to compare to Dustpedia galaxies observed with SAMI. Core team member.

09.2017 **CLUES collaboration**, Large international collaboration specialising in the Local Group (Milky Way + Andromeda galaxy pair). I am a core team member of the collaboration's flagship HESTIA project (Local Group simulations).

10.2019 **Auriga collaboration**, Large (>30 scientists) international collaboration with a broad focus on galaxy formation and the Milky Way. As leader of the collaboration, I have shaped its direction since its inception through making management-level decisions and project organisation and coordination. My years of experience leading this collaboration in addition to student supervision has honed my planning, decision-making, communication, delegation and time-management skills.

10.2014 **Virgo Consortium**, Large international collaboration with a broad focus on computational galaxy formation and cosmology. Long-term science team member and Auriga flagship project leader.

Awards

Prizes **The Alan Johnstone award**, 2013.
Outstanding Scientific Achievement by a Research Student, UCL

UK National Astronomy Meeting (NAM) Poster Prize, *NAM*, 2011.

Grants **Large (>1M CPU hours) computing grants**.
LRZ large project award, 30M CPU hours (2016), CI; STFC Dirac 9th call, 1.28M CPU hours (2017), CI; DECI-13 PRACE award, 8.64M CPU hours (2016), CI

Research funding grants.
Flanders Research Foundation (FWO) proposal 2019: "Galaxy evolution: a comparison between simulations and observations on spatially resolved scales" - 312,000 Euro (2 PhD students), CI

Outreach and Media

Auriga Project website, *https://wwwmpa.mpa-garching.mpg.de/auriga*.
Contains simulation overview, images, movies, publication list and public data release

Nature research highlight, *'How galaxies grew'*, June 19th, 2017.
Nature, Volume 546, Issue 7659

SET (now STEM) for Britain Exhibition Finalist, March 17th, 2014.
Presentation to non-scientific and cross-disciplinary audience

Numerous press releases and scientific news articles.
including 2 Royal Astronomical Society press releases (2011, 2017)

Teaching responsibilities and Student supervision

02.20-06.20 **PhD exchange supervisor**, IAC Tenerife - Max-Planck-Institute for Astrophysics.

10.19-pres. **PhD Co-supervisor**, U. Ghent (2 students).

11.18-pres. **PhD Co-supervisor**, Max-Planck-Institute for Astrophysics.

2011-2012 **Undergraduate problem class demonstrator**, University College London.

2006 **Student Mentor**, Leeds University.

Professional and Scientific responsibilities

07.20-pres. **Weekly Cosmology Seminar Organiser**, MPA.

06.2019 **Scientific Organising Committee & session chair**, EAS symposium: 'The dynamics of disc galaxies'.

11.18-pres. **Selection committee member for new PhD students**, MPA.

02.2018 **Conference session organiser & Keynote speaker**, Heidelberg Astronomical Convention.

02.2017 **Conference session convenor & organiser**, Heidelberg Astronomical Convention.

2017-pres. **UK STFC Dirac Resource Allocation Committee Peer Review**.

2014-pres. **Referee for international journals (>30 reviews)**, including Nature, Astrophysical Journal, Astronomy & Astrophysics, Monthly Notices of the Royal Astronomical Society.

2013 **Journal club organiser**, MSSL, UCL.

Conference talks, Seminars and stays

46 talks, of which 24 are invited, listing those from 2019 - present.

02.2021 Seminar, Donostia International Physics Centre (invited)

10.2020 Colloquium, Liverpool John Moores University Astrophysics Research Institute (invited)

02.2020 Conference, 'Galactic Dynamics in the Era of Gaia EDR3', RAS, London

01.2020 Conference, 'Computational galaxy formation 2020', Durham (invited)

11.2019 Conference, 'First Shanghai Assembly on Cosmology and Galaxy Formation', Shanghai, China (invited)

10.2019 Conference, 'The Milky Way 2019: LAMOST and other leading surveys', Three Gorges University, China (invited)

09.2019 Conference, Clues meeting 2019, Lyon (invited)

06.2019 Conference, EWASS 2019 'The dynamics of disc galaxies', Lyon

05.2019 Research Stay, 'Dynamical Models for Stars and Gas in Galaxies in the Gaia Era', KITP UCSB

03.2019 Conference, 'Constraining the formation history of galaxies with signatures of accretion events', La Serena, Chile (invited)

02.2019 Seminar, Aarhus University (invited)

Publications (as of March 4th, 2021)

83 peer-reviewed articles, *16 first author*, (ADS link for published papers).

>2,800 citations, *>900 first author citations*.

H-index: 32, (number, H, of publications that have at least H citations).

Top 5 most cited 1st author papers (reverse chronological order. Source: ADS)

- **Grand et al. 2018, MNRAS, 474, 3629**, *(58 citations)*.
'Spiral arm pitch angle and galactic shear rate in N-body simulations of disc galaxies'

- **Grand et al. 2017, MNRAS, 467, 179**, *(219 citations)*.
'The Auriga Project: the properties and formation mechanisms of disc galaxies across cosmic time'

- **Grand et al. 2016, MNRAS, 459, 199**, *(95 citations)*.
'Vertical disc heating in Milky Way-sized galaxies in a cosmological context'

- **Grand et al. 2012b, MNRAS, 426, 167**, *(86 citations)*.
'Dynamics of stars around spiral arms in an N-body/SPH simulated barred spiral galaxy'

- **Grand et al. 2012a, MNRAS, 421, 1529**, *(139 citations)*.
'The dynamics of stars around spiral arms'