

Mattia Sormani

Curriculum Vitae

Institute for Theoretical Astrophysics
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Orcid: 0000-0001-6113-6241

Personal Details

Date of birth: 6th January 1988

Civil status: Married, 2 children (Stella, born 11.08.2016, Francesco, born 03.08.2021)

Citizenship: Italian

Employment

University of Heidelberg

Postdoctoral researcher

Heidelberg, Germany

2016–now

Bain & Company

Business consultant

Milan, Italy

11/2015–05/2016

Education

University of Oxford, Balliol College

DPhil in Astrophysics

Oxford, UK

2012–2015

- Thesis: Understanding the large-scale dynamics of the interstellar medium in barred galaxies
- Supervisor: Prof. John Magorrian and Prof. James Binney

Scuola Normale Superiore

Diploma in Physics

Pisa, Italy

2007–2012

- Final grade: 70/70 cum laude

University of Pisa

M.Sc. in Theoretical Physics

Pisa, Italy

2010–2012

- Thesis: Gravothermal catastrophe: The dynamical stability of a fluid model
- Supervisor: Prof. Giuseppe Bertin
- Final grade: 110/110 cum laude

University of Pisa

B.Sc. in Physics

Pisa, Italy

2007–2010

- Thesis: Entropy, mutual information and risk management
- Supervisor: Prof. Stefano Marmi
- Final grade: 110/110 cum laude

Internships:

- Scuola Internazionale Superiore di Studi Avanzati (SISSA), Trieste, Italy. 2011
- Stanford Linear Accelerator Center (SLAC), Stanford, CA, USA. Summer Exchange Student. 2010

Awards & Honours

University of Oxford

Finalist for the position of Associate Professor in Theoretical Astrophysics

Oxford, UK

2019

Max Planck Institute for Astronomy

Ernst Patzer Award

Heidelberg, Germany

2018

This award goes annually to the best refereed publications by a young astronomy researcher in Heidelberg. I received it for the paper "A theoretical explanation of the Central Molecular Zone asymmetry" (MNRAS,475,2383). Includes monetary prize of 2000€.

University of Oxford **Oxford, UK**
Clarendon Fund D.Phil scholarship 2012

3-years fully-funded doctoral scholarship. Very competitive (success rate 7%) awarded only at Oxford University on the basis of academic excellence.

Balliol College **Oxford, UK**
Jowett Scholarship 2012

In conjunction with the Clarendon Fund.

Scuola Internazionale Superiore di Studi Avanzati (SISSA) **Trieste, Italy**
Undergraduate 1-month scholarship 2011

Stanford Linear Accelerator Centre (SLAC) **Stanford, CA, USA**
Selected for the SLAC/INFN Summer Exchange Program 2010

This program promotes the exchange of students in science between Italy and USA. I was one of the four students selected across Italy. Includes full scholarship.

Scuola Normale Superiore **Pisa, Italy**
Admitted to the undergraduate course 2007

Through a very selective national contest (success rate 5%). Includes 5-years full scholarship.

XXXVIII International Physics Olympiad **Isfahan, Iran**
Bronze Medal 2007

Italian Physics Olympiad **Senigallia, Italy**
Gold Medal 2007

Teaching

Heidelberg University **Heidelberg, Germany**
Co-lecturer of the M.Sc. Course "Astrophysical Fluid Dynamics" 2017 and 2022

- Wrote extensive set of lecture notes + problem sets (publicly available at: <https://www.ita.uni-heidelberg.de/~mattia/teaching.html>)
- Gave lectures + tutorials

University of Oxford **Oxford, UK**
Tutor for 4th Year M.Sc. Theory Option 2015

- Subject: quantum theory and statistical physics

Jesus College, University of Oxford **Oxford, UK**
Tutor for 1st Year Electromagnetism 2014

- Stood out as "excellent" tutor in JCR feedback session

Oriel College, University of Oxford **Oxford, UK**
Tutor for 2nd Year Electromagnetism 2013

- Graded collection examination

Abdus Salam International Centre for Theoretical Physics **Trieste, Italy**
Coach for the Italian International Physics Olympiads (IPhO) Team 2013

- IPhO are an international competition for high school students based on problem solving
- I gave lectures on problem solving and crafted problems used in training and in final team selection test (Subjects: special relativity, classical mechanics, electromagnetism)

Student Supervision

Co-Supervision of 4 PhD Students:

- *Glen Hunter*. Heidelberg University, Germany. Project: "Star formation in the Galactic Centre". Primary supervisor Prof. Ralf Klessen (2020-now)
- *Robin Tress*. Heidelberg University, Germany. Project: "ISM dynamics in simulated galaxies:

- bridging the scales". Primary supervisor Prof. Ralf Klessen (2016-graduated in 2021)
- *H Perry Hatchfield*. University of Connecticut, USA. Project: "Simulations of molecular clouds in the Galactic Center". Primary supervisor Prof. Cara Battersby (2018-now)
 - *Matthew Ridley*. University of Oxford, UK. Project: "Gas Dynamics in the Galactic Centre". Primary supervisor Prof. John Magorrian (2016-graduated in 2018)

Co-Supervision of 1 Master Student:

- *Yash Mandowara*. Heidelberg University, Germany. Project: "Formation of Arm Spurs/Feathers in Local Simulations of the Wiggle Instability". Primary supervisor Prof. Ralf Klessen (2019-2021)

Skills

Languages: Italian (mother tongue), English

Programming: C/C++, python, numpy, matplotlib, mathematica

Simulations: Arepo, Pluto

Academic Service

Co-organiser of the online talk series CMZOOM. A talk series focusing on star formation in the Central Molecular Zone. Recordings of past talks publicly available at <https://sites.google.com/view/cmzsftalkseries/home>. 2020-now

Co-organiser of the computational star formation group meetings at the Institute for Theoretical Astrophysics, Heidelberg University, Germany 2020-2021

Co-organiser of the ECOGAL collaboration journal club at the Institute for Theoretical Astrophysics, Heidelberg University, Germany 2020-now

Co-lead of the ACES Theory Working Group. ACES is a Large Program ALMA survey of the Milky Way's Central Molecular Zone. 2021-now

Committee member for hiring PhD students at the Institute for Theoretical Astrophysics, Heidelberg University, Germany 2020-2021

Referee for more than 20 articles on A&A, MNRAS, ApJ, Am.J.Phys, Science.

Professional service

Postdoc Representative at the Institute for Theoretical Astrophysics, Heidelberg University, Germany. Duties include (i) act as mediator between postdocs and the Zentrum für Astronomie (ZAH) council; (ii) participate in meetings of the ZAH internal scientific council. 2019-now

Student Representative ("Ministro della Mensa") for the quality of food in the canteen of the Scuola Normale Superiore, Pisa, Italy. Also involved organising recreational events for about 100 people. 2010

Outreach

Liceo Scientifico Galileo Galilei **Erba, Italy**
Outreach activity for high school students and the general public 2009–2021

- 7 seminars on various topics (quantum mechanics, relativity, least-action principle, The Milky Way Galaxy)
- Recording of my latest seminar «viaggio al centro della Galassia» («voyage to the centre of our Galaxy») is publicly available at <https://www.galileierba.edu.it/progetto-astrofili-pal/> (in italian)

Carlton House Terrace **London, UK**
Royal Society Summer Science Exhibition 2014

- Presented the work of the Oxford dynamics group to the general public and to Royal Society Fellows
- Prepared flyer for the exhibit of Oxford dynamics group «StarTracks»

International Research Collaborations

Group collaborations:

- Star Formation Theory Group, Institute for Theoretical Astrophysics, Heidelberg University, Germany (Klessen, Glover)
- Galactic Dynamics Group, Oxford University, UK (Binney, Magorrian)
- Galactic Nuclei Group, Max Planck Institute For Astronomy, Heidelberg, Germany (Neumayer)
- Star Formation in the Galactic Centre group, University of Connecticut, USA (Battersby)
- Galactic Centre Group, IAA, Granada, Spain (Schödel)

International Consortia:

- Member of the PHANGS collaboration (Physics at High Angular Resolution in Nearby Galaxies). PHANGS aims to use high resolution observations of nearby galaxies with several telescope, including ALMA, Hubble, and the VLT, to understand the interplay of the small-scale physics of gas and star formation with galactic structure and galaxy evolution. More info at <https://sites.google.com/view/phangs/home> since 2019
- Member of the ECOGAL collaboration. ECOGAL is an ERC synergy grant aimed at understanding the Galactic ecosystem that involves collaboration with 4 institutions: CEA in Paris-Saclay, INAF in Rome, ESO in Garching and ITA in Heidelberg. More info at <http://www.ecogal.eu> since 2019
- Co-I of ACES, the ALMA CMZ Exploration Survey (PI: Steve Longmore) since 2021
- Co-I of THOR-GC - The HI/OH/Recombination line survey (PIs: M. Rugel, H. Beuther) since 2018

References

- Prof. James Binney, University of Oxford binney@thphys.ox.ac.uk
- Prof. Ralf Klessen, University of Heidelberg klessen@uni-heidelberg.de
- Prof. John Magorrian, University of Oxford john.magorrian@physics.ox.ac.uk

Metrics

Publications:

- **39** articles in major peer-reviewed journals
 - **16** as first author
 - **4** as co-first author
 - **4** as second author
 - **15** as third or higher author.

- **1** review article.

Note: I played a major role in this review and wrote several sections as the only theorist among the co-authors

- **5** articles first-authored by students under my guidance
- **690** citations as of 25/10/2021
- H-index: **16**

Source: the SAO/NASA Astrophysics Data System (<https://ui.adsabs.harvard.edu/>)

Presentations:

- **16** Talks at international conferences & workshops, of which
 - **3** Invited Reviews
 - **6** Invited Talks
- **21** Seminars & Colloquia at internationally recognised universities & research institutions, of which
 - **5** Invited Colloquia

Successful Observing Proposals

Co-I	ALMA	Extragalactic Cloud Scale Observations of High Critical Density Tracers - Bridging the Gap to the Milky Way (PI: Ashley Barnes)	24.3 Hrs	2021
Co-I	ALMA	Beads-on-a-string: The formation and evolution of GMCs in NGC4321 (PI: Jonathan Henshaw)	22.7 Hrs	2021
Co-I	ALMA	A Top-down View of Massive Cluster Formation in a Nearby Nuclear Starburst Ring (PI: Jiayi Sun)	7.0 Hrs	2021
Co-I	ALMA	ACES: The ALMA CMZ Exploration Survey (PI: Steve Longmore) Note: I co-lead the Theory Working Group	121.4 Hrs	2021
Co-I	VLBA	Tracing the gas flows in the inner Galaxy with maser astrometric observations (PI: Katharina Immer) Note: I wrote most of the scientific justification	156 Hrs	2020
Co-I	GBT	Investigating the Star Forming Potential of the Galactic Bar Dust Lanes (PI: Natalie Butterfield)	27 Hrs	2020
Co-I	VLA	THOR-GC: An extension of THOR to the Galactic Center (PI: Michael Rugel)	185.4 Hrs	2019
Co-I	VLA	A New Probe of the Diffuse Galactic Center ISM (PI: Elizabeth Mills)	38.2 Hrs	2019
Co-I	GBT	Investigating the Star Forming Potential of the Galactic Bar Dust Lanes (PI: Natalie Butterfield)	13.0 Hrs	2019
Co-I	ALMA	Using absorption to constrain the 3D structure of the Galactic center ISM (PI: Elizabeth Mills)	6.1 Hrs	2019

Presentations

Conferences & Workshops:

Invited Review	Oxford Bar Workshop, Wadham college, Oxford, UK (Originally planned for 2020, postponed due to pandemic) ▪ «Gas dynamics in the central regions of the Milky Way»	TBD
Invited Talk	ESO Workshop «Inward Bound: Bulges from High Redshifts to the Milky Way», Garching, Germany (Originally planned for 2020, postponed due to pandemic) ▪ «Formation of nuclear discs and rings in simulations»	2022
Invited Discussion	ECOGAL Workshop, Paris, France ▪ «Large-scale simulations of the Milky Way»	2021
Invited Discussion	Ringberg Workshop «Puzzles of Star Formation», Ringberg Castle, Germany ▪ «Two puzzles about star formation in the Galactic centre»	2021
Invited Talk	ECOGAL post-processing workshop, Heidelberg, Germany (online) ▪ «Analysing gas flows in the central parts of the Milky Way»	2021

Invited Review	MW-Gaia Workshop on the Galactic Centre and Inner Galaxy, Heidelberg, Germany (online) ▪ «Galactic centre: gas inflow and star formation»	2021
Talk	Heidelberg-Harvard workshop «Physics of Star Formation: From Milky Way clouds to protostellar disks» (online) ▪ «Galactic centre: gas inflow and star formation»	2020
Talk	Conference «New Horizons in Galactic Center Astronomy and Beyond», Yokohama, Japan ▪ «The geometry of the gas surrounding the central molecular zone: on the origin of localised molecular clouds with extreme velocity dispersions»	2019
Invited Review	European Week of Astronomy and Space Science (EWASS), Lyon, France ▪ «Gas dynamics in the Milky Way»	2019
Invited Talk	Workshop «The Multi-Scale Physics of Star Formation and Feedback during Galaxy Formation», Heidelberg, Germany ▪ «The CMZ in context: Understanding the gas dynamics in the central 3 kpc of the Milky Way»	2018
Talk	Conference «Galactic Rings: Signposts of Secular Evolution in Disk Galaxies», The University of Alabama, Tuscaloosa, Alabama ▪ «On the origin of nuclear rings»	2018
Talk	Conference «Piercing the Galactic Darkness: Stellar populations in the highly extincted regions of the Milky Way», MPIA, Heidelberg, Germany ▪ «Understanding the gas dynamics in the Galactic centre»	2017
Talk	Conference «The role of gas in galaxy dynamics», Valletta, Malta ▪ «Galactic shocks instabilities and their consequences for the central regions of the Milky Way»	2017
Invited Talk	Workshop «Disk Instabilities across Cosmic Scales», Sexten, Italy ▪ «A theoretical explanation for the Central Molecular Zone asymmetry»	2017
Talk	European Week of Astronomy and Space Science (EWASS), Prague, Czech Republic ▪ «Unsteady flow makes the Central Molecular Zone asymmetric»	2017
Talk	Conference «The Physics of the ISM. 6 years of ISM-SPP 1573: what have we learned?», University of Cologne, Germany ▪ «Gas dynamics in the Central Molecular Zone»	2017
Department Seminars & Colloquia:		
Solicited Seminar	Cambridge Dynamics group meeting, University of Cambridge, UK (online) ▪ «Modelling of the Milky Way's Nuclear Stellar Disc»	2021
Solicited Seminar	SFB 881 seminar - the Milky Way system, Heidelberg (online) ▪ «The nucleus of the Milky Way: gas inflow, star formation & stellar dynamics»	2021

Solicited Seminar	PHANGS dynamics working group, Heidelberg, Germany (online) ▪ «Simulations of the Milky Way's Central Molecular Zone»	2020
Solicited Seminar	TIMER collaboration group meeting ▪ «Dynamical Modelling of Nuclear Stellar Discs»	2020
Invited Colloquium	Virtual Astronomy Seminar, University of Connecticut, USA (online) ▪ «Gas dynamics, inflow and star formation in the innermost 3 kpc of the Milky Way»	2020
Solicited Seminar	ECOGAL collaboration seminar series (online) ▪ «The gravitational potential of the Milky Way»	2020
Invited Colloquium	American Museum of Natural History, New York, USA (online) ▪ «Understanding the gas dynamics in the central 3 kpc of the Milky Way»	2020
Invited Colloquium	Königstuhl Colloquium, Max Planck Institute for Astronomy (MPIA), Heidelberg, Germany (online) ▪ «Understanding the gas dynamics in the central 3 kpc of the Milky Way»	2020
Solicited Seminar	Galactic Nuclei group meeting, MPIA, Heidelberg, Germany ▪ «Dynamical Modelling of the Milky Way's Nuclear Stellar Disc»	2020
Special Seminar	As part of the interviews for the position of Associate Professor of Theoretical Astrophysics, University of Oxford, UK ▪ «Understanding the gas dynamics in the central 3 kpc of the Milky Way»	2019
Special Colloquium	Awarding ceremony of the Ernst Patzer Prize, MPIA, Heidelberg, Germany ▪ «A theoretical explanation for the Central Molecular Zone asymmetry»	2018
Invited Colloquium	General colloquium, Strasbourg Observatory, France ▪ «Understanding the gas dynamics in the central 3 kpc of the Milky Way»	2018
Seminar	Galaxy Coffee, MPIA, Heidelberg, Germany ▪ «Why Rings??»	2018
Invited Colloquium	Arcetri Observatory general colloquium ▪ «Understanding the gas dynamics in the central 3 kpc of the Milky Way»	2018
Solicited Seminar	SFB retreat, Kloster schoental, Germany ▪ «Gas dynamics in the Central Molecular Zone»	2017
Seminar	ITA blackboard colloquium, Heidelberg, Germany ▪ «Christmas thermodynamics: Solve the riddle!»	2017
Seminar	Galaxy coffee, MPIA, Heidelberg ▪ «Periodicity makes galactic shocks unstable»	2017
Solicited Seminar	SFB 881 seminar - the Milky Way system, Institute for theoretical physics, Heidelberg ▪ «Periodicity makes galactic shocks unstable»	2017
Seminar	ITA blackboard colloquium, Heidelberg, Germany ▪ «Periodicity makes galactic shocks unstable»	2017

Seminar	Galaxy coffee, MPIA, Heidelberg, Germany ▪ «A model for periodic blazars»	2016
Seminar	ITA blackboard colloquium, Heidelberg, Germany ▪ «A model for periodic blazars»	2016

Publications

Reviews:

- [1] Henshaw, J., Barnes, A., Battersby, C., Ginsburg, A., **Sormani**, M. C., and Walker, D., “Star Formation in the Central Molecular Zone of the Milky Way”, PPVII Review Chapter, submitted (2021).

Publications in major peer-review journals:

- [39] Bešlić, I. et al. (incl. **Sormani**, M. C.) “Dense molecular gas properties on 100 pc scales across the disc of NGC 3627”, MNRAS 506, 963–988 (2021).
- [38] Treß, R. G., **Sormani**, M. C., Smith, R. J., Glover, S. C. O., Klessen, R. S., Mac Low, M.-M., Clark, P., and Duarte-Cabral, A., “Simulations of the star-forming molecular gas in an interacting M51-like galaxy: cloud population statistics”, MNRAS 505, 5438–5459 (2021).
- [37] Soler, J. D. et al. (incl. **Sormani**, M. C.) “The filamentary structures in the CO emission toward the Milky Way disk”, A&A 651, L4 (2021).
- [36] Schultheis, M. et al. (incl. **Sormani**, M. C.) “The nuclear stellar disc of the Milky Way: A dynamically cool and metal-rich component possibly formed from the central molecular zone”, A&A 650, A191 (2021).
- [35] Hatchfield, H. P., **Sormani**, M. C., Tress, R. G., Battersby, C., Smith, R. J., Glover, S. C. O., and Klessen, R. S., “Dynamically Driven Inflow onto the Galactic Center and its Effect upon Molecular Clouds”, Accepted for publication in ApJ, arXiv:2106.08461 (2021).
- [34] Williams, T. G. et al. (incl. **Sormani**, M. C.) “Applying the Tremaine-Weinberg Method to Nearby Galaxies: Stellar-mass-based Pattern Speeds and Comparisons with ISM Kinematics”, AJ 161, 185 (2021).
- [33] Leroy, A. K. et al. (incl. **Sormani**, M. C.) “PHANGS-ALMA: Arcsecond CO(2-1) Imaging of Nearby Star-Forming Galaxies”, Accepted for publication in the Astrophysical Journal Supplement series, arXiv:2104.07739 (2021).
- [32] Orr, M. E., Hatchfield, H. P., Battersby, C., Hayward, C. C., Hopkins, P. F., Wetzel, A., Benincasa, S. M., Loebman, S. R., **Sormani**, M. C., and Klessen, R. S., “Fiery Cores: Bursty and Smooth Star Formation Distributions across Galaxy Centers in Cosmological Zoom-in Simulations”, ApJ 908, L31 (2021).
- [31] Izquierdo, A. F., Smith, R. J., Glover, S. C. O., Klessen, R. S., Treß, R. G., **Sormani**, M. C., Clark, P. C., Duarte-Cabral, A., and Zucker, C., “The Cloud Factory II: gravoturbulent kinematics of resolved molecular clouds in a galactic potential”, MNRAS 500, 5268–5296 (2021).
- [30] Tress, R. G., **Sormani**, M. C., Glover, S. C. O., Klessen, R. S., Battersby, C. D., Clark, P. C., Hatchfield, H. P., and Smith, R. J., “Simulations of the Milky Way’s central molecular zone - I. Gas dynamics”, MNRAS 499, 4455–4478 (2020).
- [29] **Sormani**, M. C., Magorrian, J., Nogueras-Lara, F., Neumayer, N., Schönrich, R., Klessen, R. S., and Mastrobuono-Battisti, A., “Jeans modelling of the Milky Way’s nuclear stellar disc”, MNRAS 499, 7–24 (2020).

- [28] **Sormani**, M. C., Tress, R. G., Glover, S. C. O., Klessen, R. S., Battersby, C. D., Clark, P. C., Hatchfield, H. P., and Smith, R. J., “Simulations of the Milky Way’s Central Molecular Zone - II. Star formation”, *MNRAS* 497, 5024–5040 (2020).
- [27] Reissl, S. et al. (incl. **Sormani**, M. C.) “Synthetic observations of spiral arm tracers of a simulated Milky Way analog”, *A&A* 642, A201 (2020).
- [26] Soler, J. D. et al. (incl. **Sormani**, M. C.) “The history of dynamics and stellar feedback revealed by the H I filamentary structure in the disk of the Milky Way”, *A&A* 642, A163 (2020).
- [25] Anderson, L. D., **Sormani**, M. C., Ginsburg, A., Glover, S. C. O., Heywood, I., Rammala, I., Schuller, F., Csengeri, T., Urquhart, J. S., and Bronfman, L., “Unusual Galactic H II Regions at the Intersection of the Central Molecular Zone and the Far Dust Lane”, *ApJ* 901, 51 (2020).
- [24] **Sormani**, M. C. and Li, Z., “Do nuclear rings in barred galaxies form at the shear minimum of the rotation curve?”, *MNRAS* 494, 6030–6035 (2020).
- [23] Tress, R. G., Smith, R. J., **Sormani**, M. C., Glover, S. C. O., Klessen, R. S., Mac Low, M.-M., and Clark, P. C., “Simulations of the star-forming molecular gas in an interacting M51-like galaxy”, *MNRAS* 492, 2973–2995 (2020).
- [22] Smith, R. J., Treß, R. G., **Sormani**, M. C., Glover, S. C. O., Klessen, R. S., Clark, P. C., Izquierdo, A. F., Duarte-Cabral, A., and Zucker, C., “The Cloud Factory I: Generating resolved filamentary molecular clouds from galactic-scale forces”, *MNRAS* 492, 1594–1613 (2020).
- [21] **Sormani**, M. C., Treß, R. G., Glover, S. C. O., Klessen, R. S., Barnes, A. T., Battersby, C. D., Clark, P. C., Hatchfield, H. P., and Smith, R. J., “The geometry of the gas surrounding the Central Molecular Zone: on the origin of localized molecular clouds with extreme velocity dispersions”, *MNRAS* 488, 4663–4673 (2019).
- [20] Fragkoudi, F., Katz, D., Trick, W., White, S. D. M., Di Matteo, P., **Sormani**, M. C., Khoperskov, S., Haywood, M., Hallé, A., and Gómez, A., “On the ridges, undulations, and streams in Gaia DR2: linking the topography of phase space to the orbital structure of an N-body bar”, *MNRAS* 488, 3324–3339 (2019).
- [19] Sobacchi, E. and **Sormani**, M. C., “The effect of rotation on the thermal instability of stratified galactic atmospheres - I. Local analysis”, *MNRAS* 486, 205–214 (2019).
- [18] **Sormani**, M. C. and Sobacchi, E., “The effect of rotation on the thermal instability of stratified galactic atmospheres - II. The formation of high-velocity clouds”, *MNRAS* 486, 215–226 (2019).
- [17] **Sormani**, M. C. and Barnes, A. T., “Mass inflow rate into the Central Molecular Zone: observational determination and evidence of episodic accretion”, *MNRAS* 484, 1213–1219 (2019).
- [16] Inno, L. et al. (incl. **Sormani**, M. C.) “First metallicity determination from near-infrared spectra for five obscured Cepheids discovered in the inner disc”, *MNRAS* 482, 83–97 (2019).
- [15] **Sormani**, M. C., Sobacchi, E., Pezzulli, G., Binney, J., and Klessen, R. S., “Models of rotating coronae”, *MNRAS* 481, 3370–3381 (2018).
- [14] **Sormani**, M. C., Sobacchi, E., Fragkoudi, F., Ridley, M., Treß, R. G., Glover, S. C. O., and Klessen, R. S., “A dynamical mechanism for the origin of nuclear rings”, *MNRAS* 481, 2–19 (2018).
- [13] **Sormani**, M. C., Treß, R. G., Ridley, M., Glover, S. C. O., Klessen, R. S., Binney, J., Magorrian, J., and Smith, R., “A theoretical explanation for the Central Molecular Zone asymmetry”, *MNRAS* 475, 2383–2402 (2018).

- [12] Sobacchi, E., Granot, J., Bromberg, O., and **Sormani**, M. C., “A common central engine for long gamma-ray bursts and Type Ib/c supernovae”, *MNRAS* 472, 616–627 (2017).
- [11] **Sormani**, M. C., Sobacchi, E., Shore, S. N., Treß, R. G., and Klessen, R. S., “Periodicity makes galactic shocks unstable - I. Linear analysis”, *MNRAS* 471, 2932–2951 (2017).
- [10] Ridley, M. G. L., **Sormani**, M. C., Treß, R. G., Magorrian, J., and Klessen, R. S., “Nuclear spirals in the inner Milky Way”, *MNRAS* 469, 2251–2262 (2017).
- [9] Sobacchi, E., Lyubarsky, Y. E., and **Sormani**, M. C., “Kink instability of force-free jets: a parameter space study”, *MNRAS* 468, 4635–4641 (2017).
- [8] **Sormani**, M. C., Treß, R. G., Klessen, R. S., and Glover, S. C. O., “A simple method to convert sink particles into stars”, *MNRAS* 466, 407–412 (2017).
- [7] Sobacchi, E., **Sormani**, M. C., and Stamera, A., “A model for periodic blazars”, *MNRAS* 465, 161–172 (2017).
- [6] **Sormani**, M. C., Binney, J., and Magorrian, J., “Gas flow in barred potentials - III. Effects of varying the quadrupole”, *MNRAS* 454, 1818–1839 (2015).
- [5] **Sormani**, M. C., Binney, J., and Magorrian, J., “Gas flow in barred potentials - II. Bar-driven spiral arms”, *MNRAS* 451, 3437–3452 (2015).
- [4] De Palma, G. and **Sormani**, M. C., “Counterintuitive effect of gravity on the heat capacity of a solid sphere: Re-examination of a well-known problem”, *American Journal of Physics* 83, 723–729 (2015).
- [3] **Sormani**, M. C., Binney, J., and Magorrian, J., “Gas flow in barred potentials”, *MNRAS* 449, 2421–2435 (2015).
- [2] **Sormani**, M. C. and Magorrian, J., “Recognizing the fingerprints of the Galactic bar: a quantitative approach to comparing model (l, v) distributions to observations”, *MNRAS* 446, 4186–4204 (2015).
- [1] **Sormani**, M. C. and Bertin, G., “Gravothermal catastrophe: The dynamical stability of a fluid model”, *A&A* 552, A37 (2013).

Preprints:

- [2] Mandowara, Y., **Sormani**, M. C., Sobacchi, E., and Klessen, R. S., “Formation of Arm Spurs/Feathers in Local Simulations of the Wiggle Instability”, arXiv:2110.04108 (2021).
- [1] Shahzamanian, B., Schoedel, R., Noguera-Lara, F., Martinez-Arranz, A., **Sormani**, M. C., Gallego-Calvente, A. T., Gallego-Cano, E., and Alburai, A., “A proper motion catalogue for the Milky Way’s nuclear stellar disc”, arXiv:2108.11847 (2021).

Conference Proceedings, White papers, etc:

- [3] **Sormani**, M. C., “The Geometry of the Gas Surrounding the Central Molecular Zone: On the Origin of Localised Molecular Clouds With Extreme Velocity Dispersions”, *New horizons in galactic center astronomy and beyond*, Vol. 528, edited by Tsuboi, M. and Oka, T., *Astronomical Society of the Pacific Conference Series* (2021).
- [2] Butterfield, N., Barnes, A., **Sormani**, M., and Hatchfield, H. P., “Investigating the gas in the Galactic Bar: the missing link between the Galactic Disc and the Central Molecular Zone”, *Bulletin of the American Astronomical Society* 51, 460 (2019).
- [1] Tress, R. G., **Sormani**, M. C., Klessen, R. S., and Glover, S. C. O., “A simple way to convert sink particles into stars”, *Memorie della Societa Astronomica Italiana* 88, 753 (2017).