

# Nico Krieger

· POSTDOCTORAL RESEARCHER · ASTRONOMER ·

Max Planck Institute for Astronomy · office 323 · Königstuhl 17 · 69120 Heidelberg · Germany

☎ +49 6221 528-477 | ✉ mail@nicokrieger.de | 🏠 nicokrieger.de | 📺 GiantMolecularCloud | 🔍 ADS record

## General

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**current position** Postdoctoral Researcher, Max Planck Institute for Astronomy, Heidelberg, Germany

## Education

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### Bachelor of Science in Physics

HEIDELBERG UNIVERSITY

Thesis title: “Optimizing Multi-Scale Cleaning in Interferometric Imaging”

Advisor: Dr. Fabian Walter

10/2010 – 03/2014

Heidelberg, Germany

### Master of Science in Physics and Astronomy

HEIDELBERG UNIVERSITY

Thesis title: “Survey of Water and Ammonia in the Galactic Center (SWAG)”

Advisor: Dr. Fabian Walter

04/2014 – 06/2016

Heidelberg, Germany

### PhD in Astronomy

MAX PLANCK INSTITUTE FOR ASTRONOMY

Thesis title: “Zooming into the Blast Furnace - A close Look into the Molecular Gas of the NGC253 Starburst with ALMA”

Thesis advisors: Dr. Fabian Walter, Prof. Dr. Hans-Walter Rix, Prof. Dr. Ralf Klessen

07/2016 – 05/2020

Heidelberg, Germany

## Skills

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**Instruments** ALMA, ATCA (including on-site observing), NEOMA, IRAM 30 m, VLA, KING

**Programming** Python (including standard and specialized astronomy packages; development of own packages),

Bash, LaTeX, C++, AppleScript

**Software** CASA (including development of own tasks), miriad, Gildas, XCLASS, CLASS

**Languages** German (mother tongue), English (fluent), French (basic)

## Observing experience

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2016 **Australia Telescope Compact Array**

The Survey of Water and Ammonia in the Galactic Center

total observation time: 750 h in 2014 to 2016, ~150 h of on-site observation

2019 **IRAM Northern Extended Millimeter Array (NOEMA)**

PI of the project “50 pc imaging of the molecular outflow in M82”

total observation time: 93 h

2020 **IRAM 30 m telescope**

Corresponding single dish observation for the project “50 pc imaging of the molecular outflow in M82”

total observation time: 42 h

ongoing **70 cm KING telescope**

Königstuhl Instrument for Night-Sky Gazing (KING) at the Max Planck Institute for Astronomy

observation with students as part of the undergraduate “advanced practicals” and just-for-fun observing

several dozens of hours

## Honors, Awards & Achievements

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2019-2020 **Referee for AAS Journals**

2016-2020 **Fellow of the International Max Planck Research School (IMPRS)**

Heidelberg, Germany

## Teaching & Students

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### Tutor “Basiskurs Schlüsselkompetenzen”

DEPARTMENT OF PHYSICS AND ASTRONOMY, HEIDELBERG UNIVERSITY  
Introductory course for first semester students on academic studies.

09/2012 – 01/2013  
Heidelberg, Germany

### Tutor “Basiskurs Schlüsselkompetenzen”

DEPARTMENT OF PHYSICS AND ASTRONOMY, HEIDELBERG UNIVERSITY  
Introductory course for first semester students on academic studies.

09/2013 – 01/2014  
Heidelberg, Germany

### Tutor “Basiskurs Schlüsselkompetenzen”

DEPARTMENT OF PHYSICS AND ASTRONOMY, HEIDELBERG UNIVERSITY  
Introductory course for first semester students on academic studies.

09/2014 – 01/2015  
Heidelberg, Germany

### Tutor “Physikalisches Anfängerpraktikum”

DEPARTMENT OF PHYSICS AND ASTRONOMY, HEIDELBERG UNIVERSITY  
Tutoring of the beginners practicals for Bachelor students.

09/2015 – 10/2015  
Heidelberg, Germany

### Tutor “Fortgeschrittenenpraktikum”

DEPARTMENT OF PHYSICS AND ASTRONOMY, HEIDELBERG UNIVERSITY  
Tutoring the experiment “CCD photometry” of the advanced practicals for Bachelor students.

10/2016 – 05/2017  
Heidelberg, Germany

### Supervisor of BSc student Cornelia Jäschke

DEPARTMENT OF PHYSICS AND ASTRONOMY, HEIDELBERG UNIVERSITY  
Thesis title: “Temperatures and Kinematics in the Galactic Center derived from Ammonia Hyperfine Structure Fitting”

10/2017 – 06/2018  
Heidelberg, Germany

## Publications

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For an up-to-date list of publications, please also refer to the [astrophysics data system](#).

- in prep. **The Survey of Water and Ammonia in the Galactic Center**  
J. OTT, D. S. MEIER, N. KRIEGER AND THE SWAG TEAM
- 2020 **Star Clusters in the Central Starburst of NGC 4945**  
K. EMIG, A. BOLATTO, A. LEROY, E. MILLS, M. JIMENEZ DONAIRE, A. TIELENS, A. GINSBURG, M. GORSKI, N. KRIEGER, R. LEVY, D. MEIER, J. OTT, E. ROSOLOWSKY, T. THOMPSON, S. VEILLEUX  
accepted for publication in ApJ  
Links: [ADS](#), [arXiv](#)
- 2020 **The turbulent gas structure in the centers of NGC 253 and the Milky Way**  
N. KRIEGER, A. BOLATTO, E. KOCH, A. LEROY, E. ROSOLOWSKY, F. WALTER, A. WEIß, D. EDEN, R. LEVY, D. MEIER, E. MILLS, T. MOORE, J. OTT, Y. SU, S. VEILLEUX  
ApJ, Volume 899, Issue 2, id.158  
Links: [ADS](#), [arXiv](#)
- 2020 **The molecular ISM in the Super Star Clusters of the starburst NGC253**  
N. KRIEGER, A. BOLATTO, A. LEROY, R. LEVY, E. MILLS, D. MEIER, S. VEILLEUX, F. WALTER, A. WEIß  
ApJ, Volume 897, Issue 2, id.176  
Links: [ADS](#), [arXiv](#)
- 2019 **The Molecular Outflow in NGC 253 at a Resolution of Two Parsecs**  
N. KRIEGER, A. BOLATTO, F. WALTER, A. LEROY, L. ZSCHAECHNER, D. MEIER, J. OTT, A. WEIß, E. MILLS, S. VEILLEUX, M. GORSKI  
ApJ, Volume 881, Issue 1, article id. 43, 20 pp  
Links: [ADS](#), [arXiv](#)
- 2019 **The dynamical evolution of molecular clouds near the Galactic Centre - II. Spatial structure and kinematics of simulated clouds**  
J. M. D. KRUIJSSEN, J. E. DALE, S. N. LONGMORE, D. L. WALKER, J. D. HENSHAW, A. GINSBURG, S. M. R. JEFFRESON, A. T. BARNES, C. D. BATTERSBY, K. IMMER, J. M. JACKSON, E. KETO, N. KRIEGER, E. A. C. MILLS, A. SANCHEZ-MONGE, A. SCHMIEDEKE, S. T. SURI, Q. ZHANG  
MNRAS, Volume 484, Issue 4, p.5734-5754  
Links: [ADS](#), [arXiv](#)

- 2019 **Survey of Water and Ammonia in the Galactic center (SWAG): Morphologies of Molecular Tracers**  
 J. OTT, D. MEIER, **N. KRIEGER**, A. GINSBURG, T. CANDELARIA  
 American Astronomical Society, AAS Meeting #233  
 Links: [ADS](#), [arXiv](#)
- 2018 **Forming Super Star Clusters Power the Central Starburst in NGC 253**  
 A. LEROY, A. BOLATTO, E. OSTRIKER, F. WALTER, M. GORSKI, A. GINSBURG, **N. KRIEGER**, D. MEIER, E. MILLS, J. OTT, E. ROSOLOWSKY, T. THOMPSON, S. VELLEUX, L. ZSCHAECHNER  
 Astrophysical Journal  
 Links: [ADS](#), [arXiv](#)
- 2018 **Spatially resolved  $^{12}\text{CO} (2-1) / ^{12}\text{CO} (1-0)$  in the starburst galaxy NGC 253: Assessing optical depth to constrain the molecular mass outflow rate**  
 L. ZSCHAECHNER, A. BOLATTO, F. WALTER, A. LEROY, C. HERRERA, **N. KRIEGER**, D. KRUIJSSEN D. MEIER, E. MILLS, J. OTT, S. VELLEUX, A. WEIB  
 Astrophysical Journal  
 Links: [ADS](#), [arXiv](#)
- 2018 **SWAG: Distribution and Kinematics of an Obscured AGB Population toward the Galactic Center**  
 J. OTT, D. MEIER, A. GINSBURG, F. YUSEF-ZADEH, **N. KRIEGER**, C. JÄSCHKE  
 Proceedings IAU Symposium No. 343: Why Galaxies Care About AGB Stars: A Continuing Challenge through Cosmic Time  
 Links: [arXiv](#)
- 2017 **SWAG Water Masers in the Galactic Center**  
 J. OTT, **N. KRIEGER**, M. RICKERT, D. S. MEIER, A. GINSBURG, F. YUSEF-ZADEH AND THE SWAG TEAM  
 Proceedings IAU Symposium No. 336: Astrophysical Masers: Unlocking the Mysteries of the Universe  
 Links: [ADS](#), [arXiv](#)
- 2017 **The Survey of Water and Ammonia in the Galactic Center: Molecular Cloud Evolution in the Central Molecular Zone**  
**N. KRIEGER**, J. OTT, H. BEUTHER, F. WALTER, J. M. D. KRUIJSSEN, D. S. MEIER, E. A. C. MILLS ET AL.  
 ApJ, 850, 77  
 Links: [ADS](#), [arXiv](#), [high resolution download](#)
- 2017 **High Resolution Surveys of the Water and Methanol Star Formation Masers in the Central Molecular Zone**  
 M. RICKERT, F. YUSEF-ZADEH, J. OTT, D. MEIER, **N. KRIEGER** AND THE SWAG TEAM  
 American Astronomical Society, AAS Meeting #229  
 Link: [ADS](#)
- 2017 **Temperature Evolution of Molecular Clouds in the Central Molecular Zone**  
**N. KRIEGER**, J. OTT, F. WALTER, J. M. D. KRUIJSSEN, H. BEUTHER AND THE SWAG TEAM  
 Proceedings IAU Symposium No. 322: The Multi-Messenger Astrophysics of the Galactic Centre  
 Links: [ADS](#), [arXiv](#)
- 2017 **SWAG: Survey of Water and Ammonia in the Galactic Center**  
 J. OTT, D. S. MEIER, **N. KRIEGER**, M. RICKERT AND THE SWAG TEAM  
 Proceedings IAU Symposium No. 322: The Multi-Messenger Astrophysics of the Galactic Centre  
 Links: [ADS](#), [arXiv](#)

# Talks & Posters

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## TALKS

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|------|---|-------------------------------------|
| 2016 | <b>CSIRO ATNF lunch talk and ATNF Daily Astronomy Picture</b><br>The Survey of Water and Ammonia in the Galactic Center - First analysis: Molecular Clouds in the CMZ                                   | <i>Marsfield, Sydney, Australia</i> |
| 2016 | <b>NRAO lunch talk</b><br>Molecular Clouds in the CMZ & The Survey of Water and Ammonia in the Galactic Center  | <i>Socorro, New Mexico, USA</i>     |
| 2016 | <b>MPIA Galaxy Coffee</b><br>Molecular Cloud Evolution in the Galactic Center with SWAG   | <i>Heidelberg, Germany</i>          |
| 2016 | <b>MPIA PSF coffee</b><br>The Survey of Water and Ammonia in the Galactic Center  | <i>Heidelberg, Germany</i>          |
| 2017 | <b>MPIA GC retreat</b><br>Zooming into the starburst environment of NGC 253 and the Milky Way   | <i>Kloster Schöntal, Germany</i>    |
| 2017 | <b>Galactic Star Formation with Surveys</b><br>The Survey of Water and Ammonia in the Galactic Center (SWAG)  | <i>Heidelberg, Germany</i>          |
| 2018 | <b>FINCA visitor colloquium</b><br>Zooming into the starburst environment of NGC253 and the Galactic Center   | <i>Helsinki, Finland</i>            |
| 2019 | <b>Linking the Milky Way and Nearby Galaxies - The ISM and Star Formation from Cold Cores to kpc Scales</b><br>A detailed ALMA look into the NGC253 starburst and its connection to the Galactic Center | <i>Helsinki, Finland</i>            |
| 2019 | <b>Views on the Interstellar Medium in galaxies in the ALMA era</b><br>A detailed ALMA look into the NGC253 starburst   | <i>Bologna, Italy</i>               |
| 2020 | <b>Königstuhl Colloquium</b><br>Zooming into the Blast Furnace - A close Look into the Molecular Gas of the NGC253 Starburst with ALMA  | <i>Heidelberg, Germany</i>          |

## POSTER PRESENTATIONS

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|------|--|---------------------------------|
| 2014 | <b>New Mexico Symposium</b><br>HI in NGC 253: Outflows and Absorption Properties   | <i>Socorro, New Mexico, USA</i> |
| 2015 | <b>Central molecular zone workshop</b><br>Survey of Water and Ammonia in the Galactic Center (SWAG): Survey Status and First Results   | <i>ESO, Garching, Germany</i>   |
| 2015 | <b>A 3D view on Galaxy Evolution</b><br>Are there HI outflows in NGC 253?  | <i>Heidelberg, Germany</i>      |
| 2016 | <b>IAU Symposium No. 322: The Multi-Messenger Astrophysics of the Galactic Centre</b><br>Molecular Clouds in the CMZ                   | <i>Palm Cove, Australia</i>     |
| 2016 | <b>Heidelberg-Harvard Meeting for Star Formation</b><br>Molecular Clouds in the CMZ  | <i>Heidelberg, Germany</i>      |
| 2017 | <b>HGSFP winter school</b><br>Molecular Cloud Evolution in the Central Molecular Zone  | <i>Obergurgl, Austria</i>       |
| 2017 | <b>The Galaxy ecosystem</b><br>A Close Look into the Blast Furnace: the Core of the NGC 253 starburst                                  | <i>ESO, Garching, Germany</i>   |
| 2017 | <b>The role of gas in galaxy dynamics</b><br>High resolution gas kinematics of the nuclear starburst NGC 253                           | <i>Valetta, Malta</i>           |
| 2018 | <b>The laws of Star Formation: From the Cosmic Dawn to the present Universe</b><br>Molecular outflows in the nuclear starburst NGC 253 | <i>Cambridge, UK</i>            |
| 2018 | <b>Van de Hulst Centennial Symposium</b><br>Molecular outflows in the nuclear starburst NGC 253  | <i>Leiden, the Netherlands</i>  |