Dr. Eduard **Keilmann**

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Education

04/**2021** - 06/**2025** **PhD (Astrophysics) – I. Physikalisches Institut, University of Cologne**

Title: *The Genesis of Stars: From Giant Molecular Clouds to Star-Forming Cores*
Research on the interstellar medium (ISM) and star-formation processes in the Milky Way and external galaxies, performing astrophysical data analysis, dust-dynamics and photodissociation-region (PDR) modeling, along with developing specialized analytical techniques, etc. (in Python and GILDAS/Fortran).
Investigate atomic and molecular cloud formation and stellar feedback's impact on the ISM using [CII] data from NASA SOFIA's FEEDBACK program.
Led student tutorial sessions, designing problem sets, and grading assignments and exams.
Advisors: Prof. Dr. Jürgen Stutzki, Dr. Nicola Schneider

Grade: 1.0 (magna cum laude)

2016 - 2019 **Physics (Master of Science) – Johannes Gutenberg-Universität Mainz**

Title: *Standard Model Effective Field Theory Effects in Dijet Events at Tevatron*
(Grade: 1.3)
Focus: Elementary Particle Physics, Quantum Field Theory
Minor: Meteorology (Atmospheric Hydrodynamics)
Parts of the results of my master thesis are published at the renowned peer-review journal JHEP: https://doi.org/10.1007/JHEP09(2019)086

2011 - 2016 **Physics (Bachelor of Science) – Johannes Gutenberg-Universität Mainz**

Title: *Massenbestimmung steriler Neutrinos anhand von Supernovae*
Minors: Mathematics und Informatics (Java)

2010 - 2011 **Fachgebundene Hochschulreife (High School Diploma) – Berufsbildende Schule 1 Mainz**

Employment

04/**2021** - **present** **Research Astrophysicist (Wissenschaftlicher Mitarbeiter) – I. Physikalisches Institut, University of Cologne**

Research on the interstellar medium (ISM) and star-formation processes in the Milky Way and external galaxies, performing astrophysical data analysis, dust-dynamics and photodissociation-region (PDR) modeling, and developing specialized analytical techniques, etc. (in Python and GILDAS/ Fortran).
Investigate atomic and molecular cloud formation and stellar feedback's impact on the ISM using [CII] data from NASA SOFIA's FEEDBACK program.
Led student tutorial sessions, designing problem sets, and grading assignments and exams.

10/**2019** - 03/**2021** **Aktuar (Mathematiker) – HDI, Cologne**

Developed and implemented the internal "Leben" mathematical model (in R) for Solvency II – compliant risk modeling of life insurance portfolios.

06/**2019** - 09/**2019** **Software Developer – Hottgenroth, Cologne**

Developed software for building simulations focused on the physical parameters critical to energy-efficient buildings, particularly climate data (.NET/C#).

06/**2017** - 12/**2018** **Software Development/-architecture (Werkstudent) – BioNTech, Mainz**

Engineered software solutions and defined software architecture, overseeing project planning, documentation, and evaluating applications (with contact to U.S. teams).
Gained foundational project coordination experience by managing a focused software development initiative (.NET/C#).

09/**2014** - 12/**2015** **Research Assistant – Institut für Physik, Mainz**

Built acousto-optic modulator (AOM) driver systems for laser-based quantum physics experiments.

06/**2014** - 09/**2014** **Research Assistant – Institut für Kernphysik, Mainz**

IT-Administration for the Institute of Nuclear Physics.

08/**2009** - 12/**2009** **License Management – T-Systems, Darmstadt**

Managed software licensing for mainframe computer systems.

09/**2006** - 06/**2009** **Apprenticeship IT-Specialist (Berufsausbildung zum Fachinformatiker) – Deutsche Telekom, Mainz**

Designed and developed software applications in C++.

Publications

NASA ADS Link

Science/Research Presentations

09/**2023** **German Astronomical Society – Berlin (contributed talk)**

FEEDBACK observations of RCW79

04/**2024** **Heritage of SOFIA – Scientific Highlights and Future Perspectives, NASA/SOFIA Conference – Stuttgart (poster presentation)**

First Detection of the [CII] 158 μm Line in the Intermediate Velocity Cloud Draco

07/**2024** **Research Group Prof. Walch-Gassner (seminar talk) – University of Cologne (invited talk)**

M33 Molecular Cloud Matching

09/**2024** **German Astronomical Society – Cologne (contributed talk)**

M33 Molecular Cloud Matching

01/**2025** **Science with the Atacama Pathfinder Experiment (APEX), Max-Planck Conference – Ringberg (poster presentation)**

Unveiling Star Formation in the Milky Way: *SOFIA's legacy in Cygnus X*

05/**2025** **Star Formation, Stellar Feedback, and the Ecology of Galaxies Conference – Visegrad, Hungary (poster presentation)**
Reassessing the [CII]-Deficit in RCW79

Observing Proposals

Successful as PI

2022 **APEX (18.6h)**
[CI] Observations in the M33 Southern Arm
Project Code: #109.23FN

2024 **APEX (17.7h)**
An evolutionary tale of three interstellar bubbles
Project Code: #M9502A_113

Successful as Co-PI

2024 **IRAM, 30m (25.4h)**
The Diamond Ring in Cygnus X: Composition and Evolution of an unusual ring in [CII]
Project Code: #P458622
PI: Simon Dannhauer

2025 **IRAM, 30m (5.4h)**
Molecular gas dynamic and conditions in a proplyd-like object in Cygnus X
Project Code: #P487526
PI: Dr. Nicola Schneider

2025 **IRAM, NOEMA (12h)**
Outflows and shocks in a proplyd in Cygnus
Project Code: #P484678
PI: Simon Dannhauer

Associated Research Collaborations

SFB956 Conditions and Impact of Star Formation
SFB1601 Habitats of massive stars across cosmic time
FEEDBACK NASA FEEDBACK SOFIA Legacy

Other

Strong abstract and analytical thinking with a problem-solving orientation, expertise in data science, machine learning, and strategic planning.
Proficient in Python, C++, Mathematica, R (statistics), GILDAS, and ROOT (CERN).