

## EDUCATION

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<b>University of Copenhagen (UCPH)</b> Ph.D. in Astrophysics, Supervisor: Darach Watson	Copenhagen, Denmark 2021–2023(expected)
<b>University of Copenhagen (UCPH)</b> M.Sc. in Astrophysics, Advisors: Darach Watson and Gabriel Brammer	Copenhagen, Denmark 2018–2021
<b>University of Texas at Austin (UT)</b> B.S.(Highest Honors) in Astronomy, Advisors: Caitlin Casey and Volker Bromm	Austin, Texas, USA 2016–2018
<b>Indian Institute of Technology (IIT)</b> B.Tech.(Honours) in Mechanical Engineering	Kharagpur, India 2011–2015

## RESEARCH EXPERIENCE

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### **Spatial Offsets among Stellar and ISM Phases in ALPINE Galaxies**

Advisors: Michele Ginolfi, Gergö Popping, European Southern Observatory (ESO), Garching, Germany Feb 2022–Present

- Calculating centroids and spatial offsets for [C II] emission tracing metal-enriched gas, ultra-violet and optical emission tracing young and old stellar populations, and far-infrared continuum emission tracing dust for a statistical sample of main-sequence galaxies at  $z \sim 4-6$  from the ALMA (Atacama Large Millimeter Array) Large Program to Investigate C+ at early times (ALPINE) survey
- Relating observed spatial offsets to galaxy physical properties to understand the impact of galactic feedback mechanisms and dust geometry on observed galaxy morphology.
- Presented at: European Astronomical Society annual meeting (EAS) 2022 in Valencia, Spain and DAWN Summit 2022

### **Compact LAEs at High- $z$**

Advisor: Gabriel Brammer, Cosmic DAWN Center, UCPH 2019–Present

- Studying a sample of 17 compact Lyman- $\alpha$  Emitters (LAEs) at  $z \sim 3.5-6.5$  found in data from the Advanced Camera for Surveys (ACS) G800L grism on Hubble Space Telescope (HST)
- Fitting Lyman- $\alpha$  line and continuum morphology with GALFIT, and spectral energy distributions (SEDs) with EAZY using archival multi-wavelength photometric fluxes
- Comparing with the parent HST sample of 1060 Lyman-break galaxies (LBGs) in the Great Observatories Origins Deep Survey (GOODS), Extended Groth Strip (EGS), and Ultra Deep Survey (UDS) fields, and with other LAEs in literature observed using the Multi Unit Spectroscopic Explorer (MUSE) instrument on the Very Large Telescope (VLT).
- Presented at: DAWN Summit 2020, 2021

### **Novel Metallicity Constraint in the Re-ionization Epoch**

Advisors: Darach Watson, Seiji Fujimoto, Cosmic DAWN Center, UCPH 2021–2022

- Estimating fluxes and calculating flux ratios for the gravitationally lensed  $z \sim 7.1$  galaxy Abell 1689-zD1 (A1689-zD1) using [C II], [O III] ( $52\mu\text{m}$  and  $88\mu\text{m}$ ), and [N II] lines and underlying continua from ALMA
- Estimating gas phase metallicity, dust to metal ratio, and age of the system
- Presented at: EAS 2022 in Valencia, Spain

### **KMOS Lyman- $\alpha$ Damping-wing Observation of A1689-zD1**

Advisor: Darach Watson, Cosmic DAWN Center, UCPH 2018–2021

- Preparing phase 2 observations, including telescope orientation and arm configuration with the KMOS ARM Allocator (KARMA) tool, and observing runs with the P2UI tool
- Reducing 21 hours of K-band Multi Object Spectrograph (KMOS) data using the EsoReflex pipeline to measure the Lyman- $\alpha$  damping wing of A1689-zD1 for the first direct and conclusive measurement of the neutral intergalactic medium (IGM) before reionization

## Neutron-capture in Milky Way Dwarfs

Advisor: Darach Watson, Cosmic DAWN Center, UCPH

2018–2019

- Analyzing slow (s process) and rapid (r process) neutron-capture element abundances in local ultra-faint dwarf galaxies to investigate the plausibility of an r-process channel in the Universe, separate from nucleosynthesis during Neutron Star Mergers.

## Alternatives to WIMPs in the first dark matter halos

Advisor: Volker Bromm, UT Austin

2017–2018

- Simulating dark matter halos in the early Universe with particles other than SUSY-WIMPs (Super Symmetric Weakly Interacting Massive Particles) to test the efficiency of collapse to form population III stars.

## Lessons on Obscured Star-formation from ALMA Archival Data in COSMOS

Advisor: Caitlin Casey, UT Austin

2016–2018

- Comparison of sub-millimeter sources in 450 and 850 $\mu$ m bands from Sub-millimeter Common User Bolometer Array2 (SCUBA2) surveys with ALMA archival data in the Cosmological Evolution Survey (COSMOS) field
- Re-calculation of galaxy luminosity functions and star formation rates for sources that display multiplicity
- Presented at: Texas Astronomy Undergraduate Research Symposium (Sep 2016), Fall Undergraduate Research Symposium (Sep 2016), Undergraduate Research Forum (April 2017)

## PUBLICATIONS

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- [1] **M. Killi**, G. Brammer, and D. Watson, “Bright compact LAEs at  $z \sim 4-6$ ”, *AA*, (in prep.)
- [2] **M. Killi**, M. Ginolfi, G. Popping, D. Watson, and S. Fujimoto, “ALPINE-ALMA [C II] survey: Spatial Offsets in main-sequence galaxies at  $z \sim 4-6$ ”, *ApJ*, (in prep.)
- [3] **M. Killi**, D. Watson, S. Fujimoto, H. Akins, K. Knudsen, J. Richard, Y. Harikane, D. Rigopoulou, F. Rizzo, M. Ginolfi, G. Popping, and V. Kokorev, “A solar metallicity galaxy at  $z > 7$ ; detection of the [N II] 122  $\mu$ m and [O III] 52  $\mu$ m lines”, *MNRAS*, (submitted).
- [4] C. M. Casey, A. Cooray, **M. Killi**, P. Capak, C.-C. Chen, C.-L. Hung, J. Kartaltepe, D. B. Sanders, and N. Z. Scoville, “Near-infrared MOSFIRE Spectra of Dusty Star-forming Galaxies at  $0.2 < z < 4$ ”, *ApJ*, vol. 840, no. 2, 101, p. 101, May 2017. arXiv: [1703.10168](https://arxiv.org/abs/1703.10168) [[astro-ph.GA](#)].

## APPROVED PROPOSALS

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### Dust in galaxies at $z=8-11$

P.I.: Seiji Fujimoto; Project code: 2022.1.01562.S

2022

- 20 hours to observe ALMA Band 7 dust continuum of 23 bright Lyman Break Galaxy (LBG) candidates at  $z \sim 8-11$  with approved JWST Cycle 1 spectroscopy

### The first measurement of metallicity and ISM conditions of a normal galaxy at reionisation

P.I.: Darach Watson; Project code: 2019.1.01778.S

2019

- 10 hours to measure [N II] and [O III] 52 $\mu$ m fluxes for A1689-zD1 in ALMA Bands 7 and 9 for the first metallicity estimate in the reionization epoch

### Testing long GRB SNe as a source of r-process material in the Universe

P.I.: Jonatan Selsing; DDT code: 2102.D-5025

2018

- 6 hours to observe the evolution of GRB171205A/SN2017iuk,  $\sim 1$  year after explosion using HAWK-I and X-SHOOTER instruments.

## OBSERVING EXPERIENCE

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### Nordic Optical Telescope (NOT)

Observational Astronomy summer school, UCPH

Aug 2022

- Selecting appropriate targets, preparing observations, executing imaging and spectroscopy observations for one week at NOT, La Palma, Spain, followed by reduction and analysis of the data; targets studied include single stars, planetary nebula, nearby galaxies, high- $z$  quasars, and supernova transients

## McDonald Observatory

Texas Astronomy Undergraduate Research experience for Under-represented Students (TAURS), UT Austin Aug 2016

- Observing comets, stars (with planets), planetary nebulae, and nearby galaxies with the McDonald 30" and the 2.7m Harlan J. Smith telescopes for one week.

## TEACHING

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- **Teaching Assistant** for Quantum Mechanics 2 (Lab; undergraduate level) at UCPH Apr-Jun 2022  
*Course Instructors: Anders Sørensen, Jason Koskinen (lab coordinator)*
- **Teaching Assistant** for Theoretical Astrophysics (Masters' level) at UCPH Sep-Nov 2020  
*Course Instructor: Martin Pessah*
- **Tutor** at Texas Athletics Student Services, UT Austin Fall 2016  
*Undergraduate Calculus, Physics, and Astronomy*
- **Tutor** at National Service Scheme (NSS), IIT Kharagpur 2011-2012  
*Grade 10 Mathematics*

## SCHOLARSHIPS AND AWARDS

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- **DAWN PhD Fellowship** funding (including travel grants for talks, conferences, and research visits) for duration of M.Sc. and Ph.D. program 2018–Present
- **General International Student and Scholar Services Financial Aid Award** of \$3000 Spring 2017
- **Best Presentation Award in Chemistry and Astronomy** at the Fall Undergraduate Research Symposium Sep 2016
- **John W. Cox Endowment for the Advanced Studies in Astronomy** funding of \$2000 for summer research support 2016
- **Dr. Ambedkar National Merit Scholarship** of Rs.10,000/- for excellence in Secondary School Certificate (SSC) Public Examination of Andhra Pradesh, India 2009, 2011
- **Certificate of Merit** from Narayana Group of Educational Institutions for academic excellence 2008–2009
- **Ranked 10th** in the state of Andhra Pradesh, India in the Jr.APAMT (Andhra Pradesh Association of Mathematics Teachers) exam 2008

## TECHNICAL SKILLS

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- **Programming:** Python, HTML
- **Astronomy Programs:** CASA, CARTA, GALFIT, EAZY, TOPCAT, DS9, QFitsView, IDL (basic)
- **Data reduction/Pipelines:** ALMA, VLT(KMOS incl. P2UI, KARMA, EsoReflex), NOT
- **Other:** L<sup>A</sup>T<sub>E</sub>X, MSOffice, MacOS, GitHub