

# Steven Gillman



Postdoctoral Researcher  
Cosmic Dawn Center | DTU-Space

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## Overview

I am a Postdoctoral Researcher at the Cosmic Dawn Center, National Space Institute (DTU-Space), Denmark. My research focuses on studying galaxy evolution through the analysis of state of the art observations of high-redshift galaxies. I am a leading member of the MIRI High-Z Group working on the *JWST* MIRI HUDF Imaging Survey.

## Employment

- 2020– **Postdoctoral Researcher** | Technical University of Denmark (DTU), Lyngby, Denmark  
Research interests: High-redshift, star-forming galaxies, morphology, photometry, kinematics, metallicity, integral field spectroscopy, galaxy evolution and formation.

## Education

- 2016–2020 **PhD in Astronomy**  
Dept. of Physics, Durham University  
Thesis: [Resolved Studies of the Dynamics, Star Formation and Chemical Properties of High-Redshift Galaxies](#)  
Supervisor: Prof. Ray Sharples and Prof. Mark Swinbank
- 2012–2016 **MPhys (Hons) Physics and Astronomy**, First Class  
Dept. of Physics, University of Birmingham  
Masters Thesis: Morphology Density Relation in Low Redshift Galaxy Clusters  
Supervisor: Dr. Graham Smith and Dr. Felicia Ziparo
- 2015 **Research Internship**  
Dept. of Physics, University of Birmingham  
Project: Galaxy Cluster Scaling Relations  
Supervisor: Dr. Graham Smith and Dr. Sarah Mulroy

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## Publications [1st, Co-Author] = 14 [4,10], h-index = 8

*Author Structure: Lead Author, Co-Authors, Associated Authors alphabetical*

2023

### **KURVS: The outer rotation curve shapes and dark matter fractions of star-forming galaxies at cosmic noon** *MNRAS Submitted*

A.Puglisi, U. Dudzevičiūtė, Mark Swinbank, **Steven Gillman**, A. L. Tiley, Luca Cortese, Christopher Harrison, Edoardo Ibar, Juan Molina, Kyle Oman, Matthew Schaller and Francesco Shankar

2022

### **The gas and stellar content of a metal-poor galaxy at z=8.496 revealed by JWST and ALMA** *ApJ Submitted*

Heintz, K. E. , Giménez-Arteaga, C. , Fujimoto, S. , Brammer, G. , Espada, D., **Gillman, S.** , González-López, J. , Greve, T. R. , Harikane, Y. , Hatsukade, B., Knudsen, K. K. , Koekemoer, A. M. , Kohno, K. , Kokorev, V. , Lee, M. M. , Magdis, G. E. , Nelson, E. J. , Rizzo, F. , Sanders, R. L. , Schaerer, D. , Shapley, A. E. , Strait, V. B. , Sun, F. , Toft, S. , Valentino, F. , Vijayan, A. P. , Watson, D. , Bauer, F. E. , Christiansen, C. R. , Wilson, S. N.

### **COSMOS-Web: An Overview of the JWST Cosmic Origins Survey**

*ApJ Submitted*

Casey, Caitlin M., Kartaltepe, Jeyhan S., Drakos, Nicole E., Franco, Maximilien, Ilbert, Olivier, Rose, Caitlin , Cox, Isabella G., Nightingale, James W., Robertson, Brant E., Silverman, John D., Koekemoer, Anton M., Massey, Richard, McCracken, Henry Joy, Rhodes, Jason, Akins, Hollis B., Amvrosiadis, Aristeidis, Arango-Toro, Rafael C., Bagley, Micaela B., Capak, Peter L., Champagne, Jaclyn B. , Chartab, Nima, Chavez Ortiz, Oscar A., Cooke, Kevin C., Cooper, Olivia R., Darvish, Behnam, Ding, Xuheng, Faisst, Andreas L., Finkelstein, Steven L., Fujimoto, Seiji, Gentile, Fabrizio , **Gillman, Steven**, Gould, Katriona M. L., Gozaliasl, Ghassem, Harish, Santosh, Hayward, Christopher C., He, Qiuhan, Hemmati, Shoubaneh , Hirschmann, Michaela, Jin, Shuowen, Khostovan, Ali Ahmad, Kokorev, Vasily, Lambrides, Erini, Laigle, Clotilde, Leung, Gene C. K., Liu, Daizhong, Liaudat, Tobias, Long, Arianna S., Magdis, Georgios, Mahler, Guillaume, Mainieri, Vincenzo, Manning, Sinclair M., Maraston, Claudia, Martin, Crystal L., McCleary, Jacqueline E., McKinney, Jed, McPartland, Conor J. R., Mobasher, Bahram, Pattnaik, Rohan, Renzini, Alvio, Rich, R. Michael, Sanders, David B., Sattari, Zahra, Scognamiglio, Diana, Scoville, Nick, Sheth, Kartik, Shuntov, Marko, Sparre, Martin, Suzuki, Tomoko L., Talia, Margherita, Toft, Sune, Trakhtenbrot, Benny, Urry, C. Megan, Valentino, Francesco, Vanderhoof, Brittany N., Vardoulaki, Eleni, Weaver, John R., Whitaker, Katherine E., Wilkins, Stephen M., Yang, Lilan, Zavala, Jorge A.

### **The resolved chemical abundance properties within the interstellar medium of star-forming galaxies at z≈1.5** *MNRAS 512 3480G*

**S. Gillman**, A.Puglisi, U. Dudzevičiūtė, A. M. Swinbank, A. L. Tiley, C. M. Harrison, J. Molina, R. M. Sharples, R. G. Bower, M. Cirasuolo , Edo Ibar and D. Obreschkow

2021	<p><b>Multi-resolution angular momentum measurements of <math>z \approx 1.5 - 2</math> star-forming galaxies</b> <a href="#">MNRAS 509 2318E</a>  J. M. E. Salcedo, Karl Glazebrook, Deanne B. Fisher, Sarah M. Sweet, Danail Obreschkow, A. M. Swinbank, <b>Steven Gillman</b> and Alfred L. Tiley</p> <p><b>The KMOS Galaxy Evolution Survey (KGES): the angular momentum of star-forming galaxies over the last <math>\approx 10</math> Gyr</b> <a href="#">MNRAS 506 323T</a>  A. L. Tiley, <b>S. Gillman</b>, L. Cortese, A. M. Swinbank, U. Dudzevičiūtė, C. M. Harrison, I. Smail, D. Obreschkow, S. M. Croom, R. M. Sharples, A. Puglisi</p> <p><b>The Evolution of Gas-Phase Metallicity and Resolved Abundances in Star-Forming Galaxies from <math>z \approx 0.6 - 1.8</math></b> <a href="#">MNRAS 500 4229G</a>  <b>S. Gillman</b>, A. L. Tiley, A. M. Swinbank, U. Dudzevičiūtė, R. M. Sharples, Ian Smail, C. M. Harrison, Andrew J. Bunker, Martin Bureau, M. Cirasuolo, Georgios E. Magdis, Trevor Mendel and John P. Stott</p>
2020	<p><b>A kpc-scale resolved study of unobscured and obscured star-formation activity in normal galaxies at <math>z = 1.5</math> and <math>2.2</math> from ALMA and HiZELS</b>  <a href="#">MNRAS 499 5241C</a>  Cheng Cheng, Edo Ibar, Ian Smail, Juan Molina, David Sobral, Andrés Escala, Philip Best, Rachel Cochrane, <b>Steven Gillman</b>, Mark Swinbank, R. J. Ivison, Jia-Sheng Huang, Thomas M. Hughes, Eric Villard and Michele Cirasuolo</p> <p><b>From Peculiar Morphologies to Hubble-type Spirals: The relation between galaxy dynamics and morphology in star-forming galaxies at <math>z \sim 1.5</math></b> <a href="#">MNRAS 492 1492G</a>  <b>S. Gillman</b>, A. L. Tiley, A. M. Swinbank, C. M. Harrison, Ian Smail, U. Dudzevičiūtė, R. M. Sharples, L. Cortese, D. Obreschkow, R. G. Bower, T. Theuns, M. Cirasuolo, D. Fisher, K. Glazebrook, Edo Ibar, J. Trevor Mendel and Sarah M. Sweet</p>
2019	<p><b>The Dynamics and Distribution of Angular Momentum in HiZELS Star-Forming Galaxies at <math>z = 0.8 - 3.3</math></b> <a href="#">MNRAS 486 175G</a>  <b>S. Gillman</b>, A. M. Swinbank, A. L. Tiley, C. M. Harrison, Ian Smail, U. Dudzevičiūtė, R. M. Sharples, P. N. Best, R. G. Bower, R. Cochrane, D. Fisher, J. E. Geach, K. Glazebrook, Edo Ibar, J. Molina, D. Obreschkow, M. Schaller, D. Sobral, S. Sweet, J. W. Trayford, T. Theuns</p> <p><b>The Shapes of the Rotation Curves of Star-forming Galaxies Over the Last <math>\sim 10</math> Gyr</b> <a href="#">MNRAS 485 934T</a>  Alfred L. Tiley, A. M. Swinbank, C. M. Harrison, Ian Smail, O. J. Turner, M. Schaller, J. P. Stott, D. Sobral, T. Theuns, R. M. Sharples, <b>S. Gillman</b>, R. G. Bower, A. J. Bunker, P. Best, J. Richard, Roland Bacon, M. Bureau, M. Cirasuolo, G. Magdis</p>

**Angular momentum of  $z \sim 1.5$  galaxies and their local analogues with adaptive optics [MNRAS 485 5700S](#)**

Sarah Sweet, Deanne Fisher, Karl Glazebrook, Danail Obreschkow, **Steven Gillman**, Alfred Tiley, Claudia Lagos, Liang Wang, A. Mark Swinbank; Richard Bower, Ray Sharples

2018      **The core of the massive cluster merger MACS J0417.5-1154 as seen by VLT/MUSE [MNRAS 483 3082J](#)**

Mathilde Jauzac, Guillaume Mahler, Alastair C. Edge, Keren Sharon, **Steven Gillman**, Harald Ebeling, David Harvey, Johan Richard, Michele Fumagalli, A. Mark Swinbank, Steven L. Hamer, Jena-Paul Kneib, Richard Massey , Philippe Salome

2017      **Galaxy cluster luminosities and colours, and their dependence on cluster mass and merger state [MNRAS 472 3246](#)**

Sarah L. Mulroy, Sean L. McGee, **Steven Gillman**, Graham P. Smith, Chris P. Haines, Jessica Démoclès, Nobuhiro Okabe, Eiichi Egami

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**Research Talks** [Invited\*, Contributed] = 12 [1,11]

January 2023    **Sub-mm Galaxies with Webb\***

[IPARCOS Seminar Series](#), Online, [YouTube](#)

July 2022      **The Early Universe**

JWST First Images Reception, Copenhagen, Denmark,

September 2021    **MIRI High-Redshift GTO Program Update**

DAWN Summit, Copenhagen, Denmark, [Programme](#)

September 2021    **Resolving the ISM at  $z \approx 1.5$**

DAWN Summit, Copenhagen, Denmark, [Programme](#)

June 2021       **The Fundamental Properties of  $z=1-2$  Star-Forming Galaxies**

DAWN Cake Talk: [DAWN-IRES](#) Mentor Introduction, Online

March 2019       **The Angular Momentum Distribution in High Redshift SF Galaxies**

Life and Death of Star-Forming Galaxies, Perth, Australia, [Programme](#), [Slides](#)

January 2019       **The Angular Momentum Distribution in High Redshift Galaxies**

DEX XV, Royal Observatory of Edinburgh, UK

December 2018      **The Redistribution of Angular Momentum in High Redshift Star-Forming Galaxies - A KMOS and SINFONI study**

KMOS @ 5, ESO, Garching, Germany, [Programme](#), [Slides](#)

November 2018    **The Dynamics and Distribution of Angular Momentum in High Redshift Star-Forming Galaxies**  
                       Friday Lunchtime Astronomy Talk, Durham, UK

March 2018    **Integral Field Galaxy Evolution**  
                       Friday Lunchtime Astronomy Talk, Durham, UK

June 2017    **IFView of Galaxy Evolution**  
                       Friday Lunchtime Astronomy Talk, Durham, UK

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### **Approved Observing Proposals (PI)**

2022    **110.248Z 20h, VLT/KMOS**  
                       Resolved Interstellar Medium Properties in  $z \approx 1.5$  Star-Forming Galaxies.

2020    **106.211L, 39h, VLT/HAWK-I**  
                       Resolving Clumps in High Redshift KMOS GTO Galaxies using HawkI Narrow Band Imaging.

**106.211L, 19.8h, VLT/KMOS**  
                       Resolved Metallicity Gradients in Star Forming Main-Sequence Galaxies at  $z \approx 1.5$

2019    **0102.B-0690, 3h, VLT/HAWK-I**  
                       Resolving Clumps in High Redshift KMOS GTO Galaxies across Cosmic Time using High Resolution HawkI Narrow Band Imaging

2018    **0101.B-0923, 15h, VLT/KMOS**  
                       Resolved Metallicity Gradients in Star Forming Main-Sequence Galaxies at  $z \approx 1.5$

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### **Approved Observing Proposals (CoI)**

2021    **2021.1.01098.S, Cycle 8, 13.4h, ALMA**  
                       The clump-scale ISM in gravitationally unstable discs at  $z \approx 0.1$

2019    **0103.B-0862(A), 20h, VLT/MUSE**  
                       Resolved Star-Formation Driven Outflows at  $z \approx 1.5$

**2019.1.01238.S, Cycle 7, 19.6h, ALMA**  
                       The kpc-scale view to the molecular gas content in ‘typical’ star-forming galaxies at  $z \approx 1.5$

**2019.1.00102.S, Cycle 7, 7.6h, ALMA**  
                       A survey for the molecular gas content in star-forming galaxies at  $z \approx 1.5$ : exploiting the VLT/KMOS and ALMA synergy

2018    **1102.B-0232, 200h, VLT/KMOS**

The KMOS Ultra-deep Rotational Velocity Survey (KURVS): The outer-edges of individual star-forming galaxies at high-redshift

### **2018.1.00164.S, Cycle 6, 20h, ALMA**

A survey for the molecular gas content in star-forming galaxies at  $z \approx 1.5$ : exploiting the VLT/KMOS and ALMA synergy

### **0102.B-0365(A), 12h, VLT/SINFONI**

Witnessing the formation of the Hubble Sequence with Angular Momentum

2017

### **099.A-0282(A), 12h, VLT/SINFONI**

Mapping the kpc-scale dynamics and triggering of the starburst activity in high-redshift ultraluminous galaxies

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## **Observing Experience**

2018

### **PauCam (WHT 4.2 m), Santa Cruz de La Palma, Spain (4 nights)**

PI: N. Hatch, Understanding how  $z > 1$  galaxy clusters form

2017

### **OSIRIS (Keck 10 m), W. M. Keck Observatory, Maunakea, Hawaii (3 nights)**

PI: K. Glazebrook, Resolving the evolution of galaxy angular momentum and metallicity

2017

### **KMOS (VLT 8 m), Paranal Observatory, Chile (3 nights)**

PI: R. Sharples, KMOS Galaxy Evolution Survey (KGES): Tracing the Dynamics, Star-Formation and Chemical Properties of Star-Forming Galaxies Across Half the Age of the Universe

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## **Technical Skills**

Experience reducing and analysing integral field spectroscopic observations (e.g. VLT-KMOS, VLT-SINFONI, Keck-OSIRIS) and as well as reduction and analysis of observations from *HST* - WFC3, *HST* - ACS and *JWST* - MIRI)

Programming knowledge of Python, Unix, PBS, L<sup>A</sup>T<sub>E</sub>X and basic HTML as well as experience using DS9, ESOREX, GALFIT, SExtractor and other astronomical software

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## **Student Supervision**

### **PhD Supervision:**

2022 –

Iris Jermann: ‘Cosmic Evolution of High-Z Merger Fraction’

### **BSc Supervision:**

2022

Maria Madsen, Andreas Rasmussen: ‘SED fitting with *JWST* and *HST* galaxies’  
Søren Staal: ‘*JWST* Mock Observations of the HUDF in FLARES’

### **Summer Students:**

2021

[DAWN-IRES](#) Project Mentor

Michael Messere: ‘Searching for outflows in  $z \approx 1.5$  main-sequence galaxies’

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## **Responsibilities, Leadership and Teaching activities**

- 2021 – DTU-Space Astronomy & Atmospheric Physics Seminar Coordinator  
2020 – Referee for MNRAS, ApJ and A&A journals.  
2019–2020 Departmental Galaxy Evolution Meeting Organiser  
2018–2019 Weekly Postgraduate Journal Club Organiser  
2017–2020 Undergraduate Year 2 Stars and Galaxies Workshop Demonstrator  
2017–2018 Weekly 1st Year Postgraduate Journal Club Organiser  
2016–2017 Undergraduate Year 1 Problems Administrator

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## **Awards and Scholarships**

- 2016–2020 **STFC Postgraduate Studentship**  
Centre for Extragalactic Astronomy, Durham, UK
- June 2015 **Gateway Internship Bursary**  
Dept. of Physics, University of Birmingham

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## **Professional Memberships**

- 2021 – **Junior Member of International Astronomical Union**  
2019–2021 Fellow of the Royal Astronomical Society, UK  
2016–2021 Member of Institute of Physics, UK  
2013–2016 Student Member of Institute of Physics