

# Chloe Elizabeth Fisher

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## INTERESTS

I am working on developing atmospheric retrieval methods involving machine learning techniques for extrasolar planets. I use both high- and low-resolution data, and also study the theory of transmission spectra. I aim to use machine learning to analyse multiple datasets simultaneously and consider three-dimensional effects.

Key words: *Exoplanet atmospheres, machine learning, Bayesian inference*

## EMPLOYMENT

University of Oxford, UK 06/2022 - 06/2024  
SNF Mobility Fellow

University of Bern, Switzerland 09/2021 - 06/2022  
Scientific Researcher

## EDUCATION

University of Bern, Switzerland 08/2017 - 09/2021  
PhD in Astrophysics, summa cum laude

University of Cambridge, UK 10/2012 - 06/2016  
MSci., Natural Sciences, first class honours  
BA., Mathematics, upper second class honours

## PUBLICATIONS

11. **Fisher, C.**, & Heng, K., *in review*  
*How Do We Optimally Sample Model Grids of Exoplanet Spectra?*
10. Prinoth, B., Hoeijmakers, H.J., Kitzmann, D., Sandvik, E., Seidel, J.V., Lendl, M., Borsato, N.W., Thorsbro, B., Anderson, D.R., Barrado, D., Kravchenko, K., Allart, R., Bourrier, V., Cegla, H.M., Ehrenreich, D., **Fisher, C.**, Lovis, C., Guzmán Mesa, A., Grimm, S., Hooten, M., Morris, B.M., Oreshenko, M., Pino, L., & Heng, K. 2021, *Nature Astronomy*  
*Titanium oxide and chemical inhomogeneity in the atmosphere of the exoplanet WASP-189 b*
9. Grimm, S.L., Malik, M., Kitzmann, D., Guzmán Mesa, A., Hoeijmakers, H.J., **Fisher, C.**, Mendona, J.M., Yurchenko, S.N., Tennyson, J., Alesina, F., Buchschacher, N., Burnier, J., Segransan, D., Kurucz, R.L., & Heng, K. 2021, *ApJS*, 253, 30  
*HELIOS-K 2.0 Opacity Calculator and Open-source Opacity Database for Exoplanetary Atmospheres*
8. Guzmán Mesa, A., Kitzmann, D., **Fisher, C.**, Burgasser, A.J., Hoeijmakers, H.J., Márquez-Neila, P., Grimm, S.L., Mandell, A.M., Sznitman, R., & Heng, K. 2020, *AJ*, 160, 15  
*Information Content of JWST NIRSpec Transmission Spectra of Warm Neptunes*
7. **Fisher, C.**, Hoeijmakers, H.J., Kitzmann, D., Márquez-Neila, P., Grimm, S.L., Sznitman, R., & Heng, K. 2020, *AJ*, 159, 192  
*Interpreting High-resolution Spectroscopy of Exoplanets using Cross-correlations and Supervised Machine Learning*
6. Oreshenko, M., Kitzmann, D., Márquez-Neila, P., Malik, M., Bowler, B.P., Burgasser, A.J., Sznitman, R., **Fisher, C.**, & Heng, K. 2020, *AJ*, 159, 6  
*Supervised Machine Learning for Intercomparison of Model Grids of Brown Dwarfs: Application to GJ 570D and the Epsilon Indi B Binary System*
5. **Fisher, C.**, & Heng, K. 2019, *ApJ*, 881, 25  
*How Much Information Does the Sodium Doublet Encode? Retrieval Analysis of Non-LTE Sodium Lines at Low and High Spectral Resolutions*
4. Hoeijmakers, H.J., Ehrenreich, D., Kitzman, D., Allart, R., Grimm, S.L., Seidel, J.V., Wyttenbach, A., Pino, L., Nielsen, L.D., **Fisher, C.**, Rimmer, P.B., Bourrier, V., Cegla, H.M., Lavie, B., Lovis, C., Patzer, A.B.C., Stock, J.W., Pepe, F.A., & Heng, K. 2019, *A&A*, 627, A165  
*A spectral survey of an ultra-hot Jupiter: Detection of metals in the transmission spectrum of KELT-9b*
3. Seidel, J.V., Ehrenreich, D., Wyttenbach, A., Allart, R., Lendl, M., Pino, L., Bourrier, V., Cegla, H.M., Lovis, C., Barrado, D., Bayliss, D., Astudillo-Defru, N., Deline, A., **Fisher, C.**, Heng, K., Joseph, R., Lavie, B., Melo, C., Pepe, F., Ségransan, D., & Udry, S. 2019, *A&A*, 623, A166

*Hot Exoplanet Atmospheres Resolved with Transit Spectroscopy (HEARTS) - II. A broadened sodium feature on the ultra-hot giant WASP-76b*

2. **Fisher, C.**, & Heng, K. 2018, MNRAS, 481, 4698  
*Retrieval analysis of 38 WFC3 transmission spectra and resolution of the normalization degeneracy*
1. Márquez-Neila, P., **Fisher, C.**, Sznitman, R., & Heng, K. 2018, Nature Astronomy, 2, 719  
*Supervised machine learning for analysing spectra of exoplanetary atmospheres*

**REFEREEING** Referee for ApJ, ApJ Letters, and PSJ 02/2020-Present

**FELLOWSHIPS & AWARDS**

SNSF Postdoc.Mobility Fellowship	2022-2024
IAU Division F Honorable PhD Prize	2022
University of Bern Physics and Astronomy Faculty PhD Award	2021
SSAA MERAC Funding and Travel Award (4500 CHF)	2021
University of Bern International 2021 PhD Fellowship	2017-2020
Bundy Scholarship, University of Cambridge	2016
Magdalene College Natural Sciences Award, University of Cambridge	2016

**PROFESSIONAL TALKS**

• The Next Generation of European Extrasolar Scientists Conference (Virtual)	04/2022
• SSAA GA (Virtual)	10/2021
• ESO Atmo Conference (Virtual)	08/2021
• KPIC Mini workshop (Virtual)	06/2021
• Young Physicists Forum, Switzerland (Virtual)	04/2021
• California Institute of Technology, California, USA (Virtual)	09/2020
• University of Chicago Journal Club, Chicago, USA (Virtual)	08/2020
• ESP Summer School, Bern, Switzerland (Virtual)	06/2020
• CSH Symposium, Bern, Switzerland	02/2020
• AMLD, Lausanne, Switzerland	01/2020
• DPS, EPSC, Geneva, Switzerland	09/2019
• Junior Researchers Assembly, Vitznau, Switzerland	09/2019
• ESP Summer School, Lenzerheide, Switzerland	06/2019
• CSH Symposium, Bern, Switzerland	01/2019
• Machine Learning Series, Oxford, UK	11/2018
• SPI-MAX, Oxford, UK	11/2018
• Bern Exoplanet Retreat, Monte Verita, Switzerland	09/2018
• Spectroscopy of Exoplanets, Windsor, UK	07/2018
• DTU Workshop, Copenhagen, Denmark	05/2018

**ORGANISATION**

LOC & SOC for PlanetS Junior Researchers' Assembly	04/2022
SOC for ESO Atmo 2021 Conference	08/2021

<b>TEACHING &amp; MENTORING</b>	Mentor for visiting refugee high-school student University of Bern, Switzerland	09/2018 - present
	TA for Bachelor's Physics Exercises and Lab Courses University of Bern, Switzerland	2020-2021
	TA for Master's Course " <i>Advanced Statistical Methods for Physicists</i> " University of Bern, Switzerland	02-06/2019
	Physics A-level teaching assistant The Cherwell School, UK	05-07/2017
	Student mentor for Cambridge STEP school University of Cambridge, UK	04-06/2013; 08/2014
<b>OUTREACH</b>	Invited talk at the Young Physicists Forum, Switzerland (Virtual) Bern, Switzerland	04/2021
	Astronomy introduction sessions with a primary school child Oxford, UK	04/2021
	Talk at A-Level certificates evening The Cherwell School, UK	12/2019
	Video for International Relations University of Bern, Switzerland	11/2019
	Talk at Pint of Science Bern, Switzerland	05/2019
<b>OTHER SKILLS</b>	Programming: PYTHON, MATLAB	
	Languages: English (native), German (B1 level), French (AS level), Spanish (AS level)	