Simon GAZAGNES

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RESEARCH INTEREST

Development of computational tools for vast/fast data – Mathematical morphology – Image processing – Cosmic reionization – Galaxy evolution

EDUCATION

2017-2021	**Ph.D.** – University of Groningen (Netherlands) – Awarded with the *cum laude* distinction.
2016-2017	**Master's degree in Astrophysics, Space science, and Planetary science** University of Toulouse III (France)
2011-2016	**Double Master's degree in Electrical Engineering and Image and Signal Processing** National Institute of Applied Sciences of Lyon & University of Lyon I (France)

RESEARCH EXPERIENCE

Today
October 2021

Harlan J. Smith Fellowship, UNIVERSITY OF TEXAS AT AUSTIN, United States
> In progress

Extragalactic research group

September 2021
September 2017

Ph.D., UNIVERSITY OF GRONINGEN, The Netherlands
Title : Vast and Fast data in the era of large astrophysics and particle physics experiments.
> Novel algorithms to process vast and fast data sets.
> Properties of the reionization sources using 21-cm tomography.
> Charged-particles track reconstruction for high-intensity accelerator experiments.

Supervisors : Prof. Nasser Kalantar-Nayestanaki, Prof. Léon V.E. Koopmans, Dr. Johan Messchendorp, Dr. Michael H.F. Wilkinson,

July 2017
March 2017

Research internship, GENEVA OBSERVATORY, Switzerland
> Analysis of UV spectroscopic observations of Lyman continuum emitters.

Supervisors : Prof. John Chisholm, Prof. Daniel Schaerer, Prof. Anne Verhamme

August 2016
February 2016

Research internship, LABORATORY I3S, France
> Inverse problems and optimization of non-convex and non-smooth criteria.

Supervisors : Dr. Laure Blanc-Férand, Dr. Emmanuel Soubies

PUBLICATIONS

First author

> **Gazagnes S.**, Mauerhofer, V., Berg, D. A., Blaizot, J., Verhamme, A., Garel, T.; Erb, D. K., and the CLASSY Collaboration – 2023 – Interpreting the Si II and C II line spectra from the COS Legacy Spectroscopic Survey using a virtual galaxy from a high-resolution radiation-hydrodynamic simulation – *The Astrophysical Journal*.

> **Gazagnes S.**, Kalantar-Nayestanaki, N., Messchendorp, J. G., Regina, J., Stockmanns, T., Wilkinson, M. H. F. on behalf of the Panda Collaboration– 2023 – Reconstructing charged-particle trajectories in the PANDA Straw Tube Tracker using the LOcal Track Finder (LOTF) algorithm – *The European Physical Journal A*.

> **Gazagnes S.** and Wilkinson M. H. F. – 2022 – Parallel Attribute Computation for Distributed Component Forests – *IEEE International Conference on Image Processing (ICIP)*.

> **Gazagnes S.**, Koopmans L. V. E, and Wilkinson M. H. F. – 2021 – Inferring the astrophysics of reionization using the morphological spectra of the ionized regions – *MNRAS*, 502.

- **Gazagnes S.** and Wilkinson M. H. F. – 2021 – Distributed Connected Component Analysis and Filtering – *IEEE Transactions on Image Processing*, 30.
- **Gazagnes S.**, Chisholm J., Schaerer D., Verhamme A., and Izotov Y. – 2020 – The origin of the escape of Lyman α and ionizing photons in Lyman continuum emitters – *A&A*, 639, A85.
- **Gazagnes S.** and Wilkinson M. H. F. – 2019 – Distributed component forests in 2D : hierarchical image representations for tera-scale images – *Int. Jour. of Pattern Recognition and Artificial Intelligence*, 33(11).
- **Gazagnes S.**, Chisholm J., Schaerer D., and 3 others – 2018 – Neutral gas properties of Lyman continuum emitting galaxies : Column densities and covering fractions from UV absorption lines – *A&A*, 616, A29.
- **Gazagnes S.**, Soubies E., & Blanc-Féraud L. – 2017 – High density molecule localization for super-resolution microscopy using CEL0 based sparse approximation. *Conference proceedings of the 14th IEEE Int. Symposium on Biomedical Imaging.*

Co-authored

- Saldana-Lopez A., Schaerer D., and 25 others, including **Gazagnes S.** – 2022 – The Low-Redshift Lyman Continuum Survey : unveiling the ISM properties of low-z Lyman continuum emitters – *A&A*.
- Chisholm J., Prochaska X., Schaerer D., **Gazagnes S.**, Henry A. – 2020 – Optically thin spatially resolved Mg II emission maps the escape of ionizing photons – *MNRAS*, 498.
- Ghara R., Giri S.K., Mellema G., and 19 others, including **Gazagnes S.** – 2020 – Constraining the intergalactic medium at z$\approx$ 9.1 using LOFAR Epoch of Reionization observations – *MNRAS*, 493(4).
- Mertens F. G., Mevius M., Koopmans L. V. E., and 23 others, including **Gazagnes S.** – 2020 – Improved upper limits on the 21 cm signal power spectrum of neutral hydrogen at z $\approx$ 9.1 from LOFAR – *MNRAS*, 493(2).
- Chisholm J., **Gazagnes S.**, Schaerer D., and 6 others – 2018 – Accurately predicting the escape fraction of ionizing photons using rest-frame ultraviolet absorption lines – *A&A*, 616, A30.

AWARDS – GRANTS

- Harlan J. Smith Fellowship
- Best poster – DSSC workshop, 25 April 2019

OBSERVING PROPOSALS

- HST Cycle 29 – **PI** – Mapping the escape of ionizing photons across the full ionizing continuum using high-resolution Lyman alpha and C IV observations. 34 orbits – 247,344$ funding
- HST Cycle 29 – Co-I – Tracking down the origin of UV photons in local high-z analogues with FUV emission line imaging. 32 orbits.

TEACHING & MENTORING EXPERIENCE

Teaching assistant

- **Introduction to Computer Science** – 2018, 2019 – including tutorials on inter-cultural communication.
- **Computer Vision** – 2017, 2018, 2019 – multiscale analysis, deformable models, mathematical morphology.
- **Numerical Methods** – 2018 – numerical integration, differential equations, minimization problems
- **Interstellar Medium** – 2022 – Guest lecture on ISM properties inference

Supervision of research projects

- **Aniket Rane** – Iterative construction of Distributed Component Forests – April to August 2020.
- **Yannis Paetzelt** – Building the Neighbourhood Relations for Straw Tube Trackers – April to August 2020.
- **Kaelee Parker** – Neutral gas properties in CLASSY – March 2022, ongoing.
- **Zorayda Martinez** – Lyman-alpha properties in CLASSY – May to August 2022.

TALKS

23 oral presentations over 6 years, 5 most recent :

- **Conference talk** – *Interpreting UV spectra with RHD simulations* – UV galaxies, Reykjavik (Iceland) – July

2023.

> **Invited talk** – *Interpreting UV spectra with RHD simulations* – Fake Light workshop, Flatiron Institute, New York (USA) – June 2023.
> **Invited talk** – *Interpreting UV spectra with RHD simulations* – The James Webb Space Telescope turns one : the birth and growth of galaxies, Sesto (Italy) – March 2023.
> **Recorded talk** – *Parallel Attribute Computation for Distributed Component Forests* – IEEE International Conference on Image Processing (ICIP), Bordeaux (France) – October 2022.
> **Seminar** – *Interpreting UV spectra with RHD simulations* – Galaxy seminar, CRAL, Lyon (France) – July 2022.

PROGRAMMING SKILLS

C/C++ (including MPI/OpenMP parallelization techniques) – Python – Fortran – IDL – Matlab – ROOT.