

# Anna Volpara

*Curriculum Vitae*



## Personal data

First Name Anna  
Last Name Volpara  
Date of birth December 18, 1997  
City of birth  
Country of birth  
Affiliation  
e-mail address  
Skype account

## Research interests

- Applied mathematics
- Inverse Problems
- Solar Imaging

## Education

- 01/11/2021– Present **PhD candidate in Mathematics and Applications**, *University of Genoa*, Genoa
- 23/09/2019 – 21/10/2021 **Master's Degree cum laude in Mathematics**, *University of Genoa*, Genoa,  
Thesis title: "*Ricostruzione di immagini a Raggi X nell'ambito delle missioni NASA RHESSI e ESA STIX: algoritmi a confronto*".  
Supervisors: Prof. Anna Maria Massone, Prof. Michele Piana.
- 19/09/2016 – 17/07/2019 **Bachelor Degree cum laude in Mathematics**, *University of Genoa*, Genoa,  
Thesis title: "*La misura di Haar*".  
Supervisor: Prof. Filippo de Mari.
- 11/2011 – 07/2016 **High school leaving qualification in scientific studies**, *Liceo Scientifico Statale Luigi Lanfranchi*, Genoa

### Attended specialization courses

- 17/06/2024 – **PhD course: “Data and physics driven (kernel) machine learning: applications to solar physics and space weather”**, *University of Genoa*, Genova, Dr. Sabrina Guastavino and Dr. Emma Perracchione
- 11/05/2023 – **PhD course: “Methods for data analysis”**, *University of Genoa*, Genova, Dr. Sabrina Guastavino and Dr. Sara Garbarino
- 18/07/2022 – **PhD course: “Some nonlinear PDEs and their applications in image processing”**, *University of Genoa*, Genova,, Prof. Silvia Tozza
- 11/2021 – **Certificazione dell’acquisizione dei 24 cfu per l’insegnamento nella scuola secondaria (D.M. 616/2017)**, *University of Genoa*, Genova, conseguita il 16/02/2022:
- Pedagogia, pedagogia speciale e didattica dell’inclusione (6 cfu di cui M-PED/01 3 cfu, M-PED/03 3 cfu) per Ambito Disciplinare A
  - Antropologia (6 cfu di cui M-FIL/03 3 cfu, M-DEA/01 3 cfu) per Ambito Disciplinare C
  - Didattica della matematica per l’inclusione (MAT/04 7 cfu) convalida per Ambito Disciplinare D (24 CFU D.M. 616/2017)
  - Didattica della matematica (MAT/04 7 cfu) convalida per Ambito Disciplinare D (24 CFU D.M. 616/2017)

### Research Projects Participation

- 2024 Team Member of **ARCAFF (Active Region Classification and Flare Forecasting)**, European Union’s HORIZON-CL4-2022-SPACE-01 call (Project ID 101082164), Advisor: Dr. Shane Maloney
- 2024 **“Metodi numerici physics-driven per lo space weather”**, INdAM-GNCS, Coordinator: Dr. Sabrina Guastavino
- 2022 **“Metodi numerici per l’imaging: dal 2D al 3D”**, INdAM-GNCS, Coordinator: Prof. Silvia Tozza

### Memberships

- 2022 – Gruppo Nazionale per il Calcolo Scientifico - Istituto Nazionale di Alta Matematica Present (INdAM-GNCS)
- 2022 – Space Weather Italian Community (SWICo) Present

### Talks and Presentations

#### International conferences

- 11/07/2024 **Talk: “Regularized imaging from Fourier limited data in high-energy solar astronomy”**, *GIMC SIMAI Young 2024, Napoli (Italy)*, <https://sites.google.com/view/gsyw24/home-page?authuser=0>
- 04/06/2024 **Talk: “A new approach for STIX regularized imaging-spectroscopy”**, *STIX team meeting 2024, Paris (France)*, <https://sites.google.com/view/stix-meeting-2024/home?authuser=0>
- 07/11/2023 **Talk: “Update on electron maps for STIX”**, *STIX team meeting, Wrocław (Poland)*, [http://www.cbk.pan.wroc.pl/conferences/wroclaw\\_2023/](http://www.cbk.pan.wroc.pl/conferences/wroclaw_2023/)

- 22/06/2023 **Talk: "The Spectrometer/Telescope for Imaging X-rays on-board Solar Orbiter: from photon to electron visibilities"**, *The Solar Physics High Energy Research (SPHERE) Workshop, University of Maryland (USA)*, <https://sphere.boulder.swri.edu/>
- 23/05/2023 **Talk: "Spatially resolved imaging spectroscopy with Solar Orbiter STIX"**, *Flare forecasting workshop, Genova (Italy)*, [https://life.unige.it/sites/default/files/2023-05/locandina\\_MIDA\\_SSW\\_2023\\_v7.pdf](https://life.unige.it/sites/default/files/2023-05/locandina_MIDA_SSW_2023_v7.pdf)
- 26/04/2023 **Poster: "Spatially resolved imaging spectroscopy with the Spectrometer/Telescope for Imaging X-rays on-board Solar Orbiter"**, *EGU2023, Wien (Austria)*, <https://www.egu23.eu/>
- 11/04/2023 **Talk: "Inhomogeneity and variability of the spectral index in flaring sources observed by STIX"**, *STIX team meeting, Prague (Czech Republic)*, [https://www.asu.cas.cz/~kasparov/stix\\_prague2023/](https://www.asu.cas.cz/~kasparov/stix_prague2023/)
- 28/03/2023 **Talk: "Electron maps: from photon to electron visibilities"**, *Co-location meeting ESA's STIX instrument, Windisch (Switzerland)*
- 02/02/2023 **Talk: "Data formation process and image reconstruction methods for the Spectrometer/Telescope for Imaging X-rays on-board Solar Orbiter"**, *Workshop "Science with current and future solar physics missions", ASI - Roma (Italy)*, <https://www.asi.it/event/workshop-science-with-current-and-future-solar-physics-missions/>
- 15/07/2022 **Talk: "Parametric imaging for STIX: global search methods"**, *The Solar Physics High Energy Research (SPHERE) Workshop, Windisch (Switzerland)*, <https://sphere.boulder.swri.edu/archive/sphere2022/>
- 14/07/2022 **Tutorial: "STIX imaging tutorial: brief methods overview"**, *The Solar Physics High Energy Research (SPHERE) Workshop, Windisch (Switzerland)*, <https://sphere.boulder.swri.edu/archive/sphere2022/>
- [Invited presentation](#)
- 18/09/2023 **Talk: "STIX challenges"**, *DRWAA workshop, S. Vito di Cadore (Italy)*, <https://sites.google.com/view/drwaa23/participants>
- 12/06/2023 **Seminar: "STIX: from photon to electron visibilities"**, *SWICo seminar, online*

## Visiting

- 29/04/2024 – 02/05/2024 Visiting at **Dublin Institute for Advanced Studies (DIAS)**, Dublin, (Ireland)
- 01/11/2023 – 13/11/2023 Visiting at **Leibniz Institute for Astrophysics Potsdam (AIP)**, Potsdam, (Germany)
- 17/06/2023 – 19/06/2023 Visiting at **Western Kentucky University (WKU)**, Bowling Green, (USA)
- 11/2021 – 07/2024 Visiting at **University of Applied Sciences and Arts Northwestern Switzerland (FHNW)**, Windisch, (Switzerland), several short visiting periods since 2021

## Publications

[Peer reviewed journals](#)

- 2024 [Volpara A.](#), Massa P., Krucker S., Emslie A.G., Piana M., Massone A.M., *Variation of the electron flux spectrum along a solar flare loop as inferred from STIX hard X-ray observations*, *Astronomy & Astrophysics*, 684,A185
- 2023 Ryan D.F., Musset S., Reid H.A., Krucker S., Battaglia A.F., Bréelle, E., Chapron C., Collier H., Dahlin J., Denker C., Dickson E., Gallagher P.T., Hannag I., Jeffrey N. LS., Kašparová J., Kontar E., Laurent P., Maloney S.A., Massa P., Massone A.M., Mrozek T., Pailot D., Pallu M., Pesce-Rollins M., Piana M., Plotnikov I., Rouillard A., Shih A.Y., Smith D., Steslicki M., Stiefel M.Z., Warmuth A., Verma M., Veronig A., Vilmer N., Vocks C., [Volpara A.](#), *The Large Imaging Spectrometer for Solar Accelerated Nuclei (LISSAN): A Next-Generation Solar  $\gamma$ -ray Spectroscopic Imaging Instrument Concept*, *Aerospace*, 10(12), 985
- 2023 Perracchione E., Camattari F., [Volpara A.](#), Massa P., Massone A.M., Piana M., *Unbiased CLEAN for STIX in Solar Orbiter*, *The Astrophysical Journal Supplement Series*, 268(2), 68
- 2023 Massa P., Hurford J.H., [Volpara A.](#), Kuhar M., Battaglia A.F., Xiao H., Casadei D., Perracchione E., Garbarino S., Guastavino S., Collier H., Dickson E.C.M., Ryan D.F., Maloney S.A., Schuller F., Warmuth A., Massone A.M., Benvenuto F., Piana M., Krucker S., *The STIX Imaging Concept*, *Solar Physics*, 298, 114
- 2023 Stiefel M.Z., Battaglia A.F., Barczynski K., Collier H., [Volpara A.](#), Massa P., Schwanitz C., Tynelius S., Harra L., Krucker S., *Solar Flare Hard X-rays from the Anchor Points of an Eruptive Filament*, *Astronomy and Astrophysics*, 670, A89
- 2022 [Volpara A.](#), Massa P., Perracchione E., Battaglia A.F., Garbarino S., Benvenuto F., Krucker S., Piana M., Massone A.M., *Forward-fitting STIX visibilities*, *Astronomy and Astrophysics*, 668, A145
- 2022 Massa P., Battaglia A.F., [Volpara A.](#), Collier H., Hurford G.J. , Kuhar M., Perracchione E., Garbarino S., Massone A.M., Benvenuto F., Schuller F., Warmuth A., Dickson E.C.M., Xiao H., Maloney S.A., Ryan D.F., Piana M., Krucker S., *First hard X-ray imaging results by Solar Orbiter STIX*, *Solar Physics*, 297, 93

### Preprints

- 2024 [Volpara A.](#), Lupoli A., Filbir F., Perracchione E., Massone A.M., Piana, M., *RIS: Regularized Imaging Spectroscopy for STIX on-board Solar Orbiter*, arXiv preprint arXiv:2407.01175
- 2024 [Volpara A.](#), Piana, M., Massone, A. M., *Multi-scale CLEAN in hard X-ray solar imaging*, arXiv preprint arXiv:2303.16272

### Publications in conference proceedings and volumes

- 2023 Marchetti F., Perracchione E., [Volpara A.](#), Massone A.M., De Marchi S., Piana M., *Mapped Variably Scaled Kernels: Applications to Solar Imaging*, 23rd International Conference on Computational Science and Its Applications, ICCSA 2023, Lecture Notes in Computer Science, vol 14108, Springer

### Other activities

- 2023 - Reviewing articles for the journal: *Solar Physics*  
Present

## Teaching and Tutoring Experiences

AA **Tutor**, *DISTAV-UniGe*, tutor in Elements of Mathematics for first year students in 2023/2024 Earth Sciences

AA **Tutor**, *DISTAV-UniGe*, tutor in Elements of Mathematics for first year students in 2022/2023 Earth Sciences and for first year students in Pharmacy

AA **Teaching Assistant**, *DISTAV-UniGe*, teaching support in Elements of Mathematics 2021/2022 for first year students in Environmental and Natural Sciences

## Computer skills

OS Microsoft Windows

Programming IDL, MATLAB,  $\LaTeX$

Experience Office

## Software

- **VIS\_FWDFIT\_PSO routines**, forward fitting method from visibility acquired by STIX, on board ESA SolarOrbiter, Software available in SolarSoftWare (SSW) in Interactive Data Language (IDL).
- **Imaging spectroscopy pipeline for STIX** (IDL), [https://github.com/theMIDAGroup/Al-FLARES/tree/main/WP3100-D1/STIX\\_VisibilityInversionSoftware](https://github.com/theMIDAGroup/Al-FLARES/tree/main/WP3100-D1/STIX_VisibilityInversionSoftware)

## Languages

Italian Mother tongue

English B2 level (FIRST - Grade C)

French A2 level (DELF)

Genova, 25/07/2024

Firma

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