

Anna Bergamaschi

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Resume

2021-now Group leader “Photon Science Detector Science and Characterization” at the Paul Scherrer Institut (CH). Scientific focus:

- Pushing the limits of single photon counting detectors towards higher intensities, improved spatial resolution and lower energies.
- Improving the spatial resolution of hybrid detectors using interpolation.
- Enabling detection of low energy X-rays using hybrid detectors by improvements of the readout electronics and of the sensors (thin entrance window, LGADs).

2008-2020 Scientist in the Photon Science Detector Group at the Paul Scherrer Institut (CH). Responsible for the MYTHEN single photon counting microstrip detector and for the MÖNCH 25 μm pitch charge integrating pixel detector.

2005-2008 Postdoc in the Swiss Light Source Detector Group at the Paul Scherrer Institut (CH) for the development of the MYTHEN detector.

2005 Postdoc at the University of Trieste (Italy) for the FP6 I-imas (Intelligent Imaging Sensors for Industry, Health & Security) project.

2002-2004 Ph.D. in Physics at the University of Trieste (Italy)
Dissertation title: A high performance detection system for breast tomography with synchrotron radiation. Supervisor: Prof. E. Castelli .

2001 Diploma magna cum laude in Nuclear and Particle Physics at the University of Trieste (Italy)
Thesis title: A detection system for synchrotron radiation digital mammography. Supervisor: Prof. E. Castelli.

1999 Summer student at Fermilab (USA) collaborating at the CDF experiment for the testing of fiber optics electronic modules.

1994-1995 Exchange Student in Iceland with an AFS one year program.
description

Varia

Memberships and tasks

Reviewer for several scientific journals and for proposals from international founding agencies.

2023 Member of the Scientific Advisory Committee of the High Precision X-ray Measurements (HPXM) conference.

2021, 2023 Member of the International Advisory Committee of the International Conference on Position Sensitive Detectors (PSD).

2019-now Co-editor of Journal of Synchrotron Radiation (IUCr journals).

2018-now Member of the RD50 collaboration.

2001-2005 Associated to the Trieste Section of INFN (Italian institute for nuclear physics).

Teaching and student supervision

2023 Supervisor for a master thesis in Physics at the University of Bari (Italy).

Title: Characterization of iLGADs for soft X-ray detection; Student: Antonio Liguori; Co-supervisor: Dr. F. Loparco (U. Bari)

2017 Supervisor for a master thesis in Physics at the University of Bari (Italy).

Title: Assessment of the ultimate spatial resolution of the MÖNCH 0.3 detector using interpolation algorithms; Student: Davide Serini; Co-supervisor: Dr. F. Loparco (U. Bari)

2016 Lecture on “Detectors for synchrotron and XFEL experiments” at the first Barcelona TechnoWeek School on Semiconductor Detectors.

2015, 2013 Presentations about synchrotron radiation detectors at the HERCULES School “Neutrons and Synchrotron Radiation for Science” at PSI.

2013 Mentor for a master thesis in Physics at the École Polytechnique Fédérale de Lausanne (CH).

Title: Material classification with spectral CT data using a pixel detector; Student: Céline Stoecklin; Supervisors: Prof. R. Gruetter (EPFL), Prof. M. Stampanoni (PSI)

2023, 2017, 2012, 2010, 2009 Supervisor of summer students in the SLS Detector Group.

2010 Supervisor for a bachelor thesis in Physics at the University of Trieste (Italy).

Title: Characterization of silicon microstrip sensors of various thickness for X-ray applications; Student: Lorenzo Spadaccini

2001-2005 Didactic support for the courses of classical mechanics, thermodynamics, algebra and mathematical analysis to the first year students in Physics at the University of Trieste (Italy)

2004 Mentor for a diploma thesis in Physics at the University of Trieste (Italy)
Title: Development of a data acquisition system for synchrotron radiation tomography; Student: Francesco Bruni; Supervisor: Prof. R. Longo

Fellowships

2005 Fellowship of the consortium for the Development of Physics for the collaboration in the MATISSE (MAMmographic and Tomographic Imaging with Silicon detectors and Synchrotron radiation at Elettra) project at the University of Trieste (Italy)

2002-2004 Fellowship for PhD students funded by the Italian Ministry of Education, University and Scientific Research, at the University of Trieste (Italy)

2002-2004 Fellowship sponsored by the European Social Fund for the development of a detector for breast tomography with synchrotron radiation at the University of Trieste (Italy)

2001 Collaboration with the Physics department of University of Trieste (Italy) for the testing of the read out electronics of the FRONTRAD (FRONTier RADiology) experiment, for the development of a detector for digital mammography with synchrotron radiation.

Funding

Sale of detectors to external institutions (income for PSI ca. 100 kCHF from MÖNCH; 1 MCHF from MYTHEN)

License fees paid from Dectris AG to PSI for the commercialization of MYTHEN.

206021.183320 Swiss National Fund R'Equip proposal "Improved capabilities at the Powder Diffraction station for contrast-enhanced experiments. New X-ray detector" awarded with 94 kCHF. Co-proposer together with N. Casati and A. Cervellino.

Patents

EP20152785.0-1208 Single photon counting detectors in strip or pixel design having digital inter-pixel communication and logic
Applicant: Paul Scherrer Institut
Inventors: A. Bergamaschi, B. Schmitt, R. Dinapoli

WO2016074864(A1) System for obtaining quantitative x-ray images, using Hilbert transform on imaged fringes
Applicant : Paul Scherrer Institut
Inventors: B. Schmitt, M. Stampanoni, Z. Wang, M. Kaggias, A. Bergamaschi, R. Dinapoli, S. Cartier, A. Mozzanica

EP2470927(A1) X-ray detector with integrating readout chip for single photon resolution
Applicant: Paul Scherrer Institut
Inventors: B. Schmitt, A. Bergamaschi, R. Dinapoli, A. Mozzanica

US2014166861(A1) Single photon counting detector system having improved counter architecture

Applicant: Paul Scherrer Institut

Inventors: B. Schmitt, A. Bergamaschi, R. Dinapoli, A. Mozzanica

description

Scientific outcome

Web of Science ResearcherID	1528198
ORCID ID	0000-0001-7817-6493
Number of Publications	105
Sum of the Times Cited	2686
h-index	24



Updated on October 30, 2023

Selected publications

- 2023 T. A. Butcher, N. W. Phillips, C.-C. Chiu, C.-C. Wei, S.-Z. Ho, Y.-C. Chen, E. Fröjdh, F. Baruffaldi, M. Carulla, J. Zhang, A. Bergamaschi, C. A. F. Vaz, A. Kleibert, S. Finizio, J.-C. Yang, S.-W. Huang, J. Raabe
Ptychographic nanoscale imaging of the magnetoelectric coupling in freestanding BiFeO₃
arXiv (2023) [**cond-mat.mtrl-sci**], 2308.13465.
<https://doi.org/10.48550/arXiv.2308.13465>
- 2022 J. Zhang, R. Barten, F. Baruffaldi, A. Bergamaschi, G. Borghi, M. Boscardin, M. Brückner, M. Carulla, M. Centis Vignali, R. Dinapoli, S. Ebner, F. Ficorella, E. Fröjdh, D. Greiffenberg, J. Heymes, S. Hasanaj, V. Hinger, T. King, P. Kozłowski, C. Lopez Cuenca, D. Mezza, K. Moustakas, A. Mozzanica, G. Paternoster, S. Ronchin, C. Ruder, B. Schmitt, D. Thattil
Development of the LGAD sensor with a thin entrance window for soft X-ray detection
Journal of Instrumentation (2022) **17**, C11011.
<https://doi.org/10.1088/1748-0221/17/11/C11011>
- 2022 A. Bergamaschi, M. Andrä, R. Barten, F. Baruffaldi, M. Brückner, M. Carulla, S. Chiriotti, R. Dinapoli, E. Fröjdh, D. Greiffenberg, S. Hasanaj, J. Heymes, V. Hinger, P. Kozłowski, C. Lopez Cuenca, D. Mezza, A. Mozzanica, K. Moustakas, C. Ruder, B. Schmitt, D. Thattil, J. Zhang
First demonstration of on-chip interpolation using a single photon counting microstrip detector
Journal of Instrumentation (2022) **17**, C11012.
<https://doi.org/10.1088/1748-0221/17/11/C11012>
- 2020 A. Bergamaschi, A. Mozzanica, B. Schmitt
XFEL detectors
Nature Review Physics (2020) **2**, 335–336.

<https://doi.org/10.1038/s42254-020-0200-x>

- 2019 M. Andrä, J. Zhang, A. Bergamaschi, R. Barten, C. Borca, G. Borghi, M. Boscardin, P. Busca, M. Brückner, N. Cartiglia, S. Chirioti, G.-F. Dalla Betta, R. Dinapoli, P. Fajardo, M. Ferrero, F. Ficorella, E. Fröjd, D. Greiffenberg, Th. Huthwelker, C. Lopez-Cuenca, M. Meyer, D. Mezza, A. Mozzanica, L. Pancheri, G. Paternoster, S. Redford, M. Ruat, Ch. Ruder, B. Schmitt, X. Shi, V. Sola, D. Thattil, G. Tinti, S. Vetter
Development of Low Energy X-ray Detectors using LGAD Sensors
Journal of Synchrotron Radiation (2019) **26**, 1226-1237.
<https://doi.org/10.1107/S1600577519005393>
- 2019 K. Wakonig, A. Diaz, A. Bonnin, M. Stampanoni, A. Bergamaschi, J. Ihli, M. Guizar-Sicairos, A. Menzel
X-ray Fourier ptychography
Science Advances (2019) **5(2)**, eaav0282.
<https://doi.org/10.1126/sciadv.aav0282>
- 2018 C. Dullin, J. Albers, G. Tromba, M. Andrä, M. Ramilli, A. Bergamaschi
MÖNCH detector enables fast and low-dose free-propagation phase-contrast computed tomography of in situ mouse lungs
Journal of Synchrotron Radiation (2018) **25**, 565–569.
<http://dx.doi.org/10.1107/S160057751701668X>
- 2017 M. Ramilli, A. Bergamaschi, M. Andrä, M. Brückner, S. Cartier, R. Dinapoli, E. Fröjd, D. Greiffenberg, T. Hutwelker, C. Lopez-Cuenca, D. Mezza, A. Mozzanica, M. Ruat, S. Redford, B. Schmitt, X. Shi, G. Tinti, J. Zhang
Measurements with MÖNCH, a 25 μm pixel pitch hybrid pixel detector
Journal of Instrumentation (2017) **12**, C01071.
<http://dx.doi.org/10.1088/1748-0221/12/01/C01071>
- 2016 S. Cartier, M. Kagias, A. Bergamaschi, Zh. Wang, R. Dinapoli, A. Mozzanica, M. Ramilli, B. Schmitt, M. Brückner, E. Fröjd, D. Greiffenberg, D. Mayilyan, D. Mezza, S. Redford, Ch. Ruder, L. Schaedler, X. Shi, D. Thattil, G. Tinti, J. Zhang, M. Stampanoni
Micron resolution imaging using MÖNCH: towards G₂-less grating interferometry
Journal of Synchrotron Radiation (2016) **23**, 1462–1473.
<http://dx.doi.org/10.1107/S1600577516014788>
- 2016 M. Kagias, S. Cartier, Z. Wang, A. Bergamaschi, R. Dinapoli, A. Mozzanica, B. Schmitt, M. Stampanoni
Single shot X-ray phase contrast imaging using a direct conversion microstrip detector with single photon sensitivity
Applied Physics Letters (2016) **108**, 234102–234105.
<http://dx.doi.org/10.1063/1.4948584>
- 2015 A. Bergamaschi, S. Cartier, R. Dinapoli, D. Greiffenberg, J.H. Jungmann-Smith, D. Mezza, A. Mozzanica, B. Schmitt, X. Shi, G. Tinti

Looking at single photons using hybrid detectors

Journal of Instrumentation (2015) **10**, C01033.

<http://dx.doi.org/10.1088/1748-0221/10/01/C01033>

- 2010 A. Bergamaschi, A. Cervellino, R. Dinapoli, F. Gozzo, B. Henrich, I. Johnson, P. Kraft, A. Mozzanica, B. Schmitt and X. Shi

The MYTHEN detector for X-ray powder diffraction experiments at the Swiss Light Source

Journal of Synchrotron Radiation (2010) **17**, 653-668.

<http://dx.doi.org/10.1107/S0909049510026051>

- 2008 A. Bergamaschi, Ch. Broennimann, R. Dinapoli, E. Eikenberry, F. Gozzo, B. Henrich, M. Kobas, P. Kraft, B. Patterson, B. Schmitt

Performance of a single photon counting microstrip detector for strip pitches down to 10 μm

Nuclear Instruments and Methods in Physics Research A (2008) **591**, 163-166.

<http://dx.doi.org/10.1016/j.nima.2008.03.048>

Papers presented at conferences

- 2023 **Hybrid Detectors for Next Generation X-Ray Sources**

Invited talk presented at the "Gordon Conference on X-ray Science"

- 2022 **Advances in hybrid detector development for synchrotrons and XFELs at PSI**

Invited talk presented at the "14th International Conference on Synchrotron Radiation Instrumentation (SRI 2021)"

- 2021 **Advances in hybrid detector development for synchrotrons and XFELs at PSI**

Invited talk presented at the High precision X-Ray Measurements Workshop (HPXM 2021)

- 2019 **Soft X-ray detector development at PSI**

Invited talk presented at the 40th International Conference on Vacuum Ultraviolet and X-ray Physics (VUVX 19)

- 2018 **Hybrid Detectors for High Resolution Imaging**

Invited talk presented at the "14th International Conference on X-Ray Microscopy (XRM 2018)"

- 2018 **Advances in hybrid detector development at PSI**

Invited talk presented at the "13th International Conference on Synchrotron Radiation Instrumentation (SRI 2018)"

- 2017 **Advances in hybrid pixel detectors for photon science**

Invited talk presented at the "24th International Congress on X-ray Optics and Microanalysis" (ICXOM 24)

2016 **MÖNCH: joys and sorrows of 25 μm pitch pixels**

Invited talk presented at the "International Forum on Detectors for Photon Science (IFDEPS 2016)"

2014 **Looking at single photons using hybrid detectors**

Invited talk presented at the "IWORID16 International Workshop on Radiation Imaging Detectors"