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Research Interests

- ◊ My research focuses on addressing fundamental questions about the formation of diffuse radio sources within and between galaxy clusters. These studies aim to deepen our understanding of the physical processes driving particle acceleration and magnetic field amplification during the assembly of large-scale cosmic structures. To explore these phenomena, I use some of the most sensitive ground- and space-based telescopes to observe radio and X-ray emission from galaxy clusters and their surrounding inter-cluster environments.

Employment History

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| Oct 2024 – present | ◊ Research Associate , Thuringian State Observatory (Germany). |
| Aug 2022 – Sept 2024 | ◊ Postdoctoral researcher (DFG funded) , Hamburg Observatory, University of Hamburg (Germany). |
| Aug 2019 – Jul 2022 | ◊ Postdoctoral researcher (ERC funded) , Hamburg Observatory, University of Hamburg (Germany). |
| Apr 2014 – Oct 2018 | ◊ Doctoral researcher (ERC funded) , Leiden Observatory, Leiden University (Netherlands). |
| Sep 2012 – Feb 2014 | ◊ Research Assistant , Institute of Astronomy and Astrophysics, Academia Sinica (Taiwan). |
| Feb 2011 – Aug 2012 | ◊ Researcher , Department of Physics, International University - HoChiMinh City (Vietnam). |
| Aug 2004 – Dec 2007 | ◊ Teaching Assistant , Department of Chemistry, University of Science - HoChiMinh City (Vietnam). |
| Apr 2004 – May 2004 | ◊ Research Assistant , Institute of Applied Materials Science - HoChiMinh City (Vietnam). |

Education

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| Apr 2014 – Jun 2019 | ◊ Ph.D. in Astronomy and Astrophysics, Leiden University (Netherlands)
Thesis: <i>Cosmic particle acceleration by shocks and turbulence in merging galaxy clusters.</i>
Supervisors: Prof. Huub Röttgering, Dr. Timothy Shimwell, Assoc. Prof. Reinout van Weeren |
| Feb 2008 – Oct 2010 | ◊ M.Sc. in Physics, Stockholm University (Sweden)
Thesis: <i>Geometrically controlled evolution of four-qubit states.</i>
Supervisor: Assoc. Prof. Hoshang Heydari |
| Sep 1999 – Aug 2003 | ◊ B.Sc. in Chemistry, University of Science - HoChiMinh City (Vietnam)
Thesis: <i>Theoretical study of Aldol-Tishchenko dimerization reaction.</i>
Supervisor: Assoc. Prof. Bui Tho Thanh |

Teaching Experience

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| Jan 2016 – Aug 2017 | ◊ Leiden University (Netherlands)
Courses: <i>Physics experiments, Optics.</i> (in English) |
| Feb 2011 – Aug 2012 | ◊ International University - HoChiMinh City (Vietnam)
Courses: <i>Physics 2B Lab (Electricity, Magnetism, Waves, and Modern Physics); Physics 3 Lab (Electricity and Magnetism).</i> (in English) |

Teaching Experience (continued)

- Aug 2004 – Dec 2007 ◇ **University of Science - HoChiMinh City (Vietnam)**
Courses: *General Chemistry Lab A, Physical Chemistry Lab I, Physical Chemistry Lab II, Applications of Informatics in Chemistry.* (in Vietnamese)

Supervisory Experience

- Oct 2025 – ◇ **Friedrich Schiller University Jena (Germany).**
Topic: *Correlation of radio and X-ray diffuse emission from mega-halos (Bachelor's thesis).* (in English)
- Apr 2023 – Jun 2024 ◇ **Hamburg University (Germany).**
Topic: *Multi-wavelength study of the merging galaxy cluster ZwCl 2341.1+0000 LEAPS (Master's thesis).* (in English)
- Sept 2023 – Dec 2023 ◇ **International University - HoChiMinh City (Vietnam)**
Topic: *Research projects in radio astronomy.* (in English)
- Jun 2021 – Aug 2021 ◇ **Leiden University (Netherlands).**
Topic: *LEAPS (Leiden/ESA Astrophysics Program for Summer Students) research projects.* (in English)
- Mar 2021 – Jul 2021 ◇ **International University - HoChiMinh City (Vietnam)**
Topic: *Research projects in radio astronomy.* (in English)
- Jun 2016 – Aug 2017 ◇ **Leiden University (Netherlands)**
Topic: *LEAPS research project.* (in English)

Skills

- Languages ◇ Fluently reading, writing and speaking competencies for English and Vietnamese (native). German: basic.
- Operating Systems: ◇ Linux, Windows, Mac, and standard packages therein.
- High Performance Computing: ◇ TORQUE and SLURM queuing systems, large volume data processing (up to tens of Terabytes).
- Programming Languages: ◇ Python, Matlab, Mathematica, C++, IDL, Bash.
- Astronomical Software: ◇ LOFAR software, WSClean, CASA, CIAO, eSASS.

Professional Activities

- 2020–present ◇ Reviewer for the time allocation of the GMRT.
- 2021–present ◇ Reviewer for the Publications of the Astronomical Society of Australia (PASA), New Astronomy, Monthly Notices of the Royal Astronomical Society (MNRAS), and Astrophysical Journal (ApJ), Nature Communications.
- 2011–present ◇ Member of Vietnamese Theoretical Physics Society.
- 2024–present ◇ Member of Vietnamese Astronomical Society.
- 2014–2018 ◇ Galaxy cluster weekly meeting organizer (Leiden).

Observing Experience

- Nov 2013 – Dec 2013 ◇ **Telescope operator**, Yuan-Tseh Lee Array for Microwave Background Anisotropy (AMiBA) at Mauna Loa Observatory (USA).
- Feb 2013 – Mar 2013 ◇ (same as above)

Granted Observing Time

- ◊ **Radio:** LOFAR (190 hours awarded, including 181 hours PI projects); GMRT (123 hours awarded, including 29 hours PI projects); MeerKAT (8 hours, PI); VLA (1384 hours awarded, co-PI); IRAM/NIKA-2 (SZ) (43.2 hours awarded, co-PI).
- ◊ **X-rays:** Chandra (85 hours awarded for PI and co-PI projects). XMM-Newton: 307 hours awarded (co-PI).

References

Prof. Matthias Hoeft

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Dr. Timothy Shimwell

The Netherlands Institute for Radio Astronomy
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Personal Information

- ◊ Nationality: Vietnamese. Date of birth: June 03, 1981. Marital Status: Married with one child (6 years old).

Research Publications

- ◊ Total of 41 peer-reviewed papers and 3 conference proceedings: including 9 first-author papers, 5 third- and fourth-author papers, and 27 co-author papers. Total number of citations: 3653; h-index: 27 (as of December 26, 2025).

Journal Articles (First Author)

- 1 Hoang, D. N., Brüggen, M., Bonafede, A., Koch, P. M., Brunetti, G., Bulbul, E., ... van Weeren, R. J. (2025). Discovery of large-scale radio emission enveloping the mini-halo in the most X-ray luminous galaxy cluster RX J1347.5-1145.. *A&A*, 695, A240. doi:10.1051/0004-6361/202452052
- 2 Hoang, D. N., Brüggen, M., Zhang, X., Bonafede, A., Liu, A., Liu, T., ... Van Weeren, R. J. (2023). A search for intercluster filaments with LOFAR and eROSITA. *MNRAS*, 523(4), 6320–6335. doi:10.1093/mnras/stad1702
- 3 Hoang, D. N., Brüggen, M., Botteon, A., Shimwell, T. W., Zhang, X., Bonafede, A., ... van Weeren, R. J. (2022). Diffuse radio emission from non-Planck galaxy clusters in the LoTSS-DR2 fields. *A&A*, 665, A60. doi:10.1051/0004-6361/202243105
- 4 Hoang, D. N., Shimwell, T. W., Osinga, E., Bonafede, A., Brüggen, M., Botteon, A., ... van Weeren, R. J. (2021). LOFAR detection of a low-power radio halo in the galaxy cluster Abell 990. *MNRAS*, 501(1), 576–586. doi:10.1093/mnras/staa3581
- 5 Hoang, D. N., Zhang, X., Stuardi, C., Shimwell, T. W., Bonafede, A., Brüggen, M., ... van Weeren, R. J. (2021). A 3.5 Mpc long radio relic in the galaxy cluster ClG 0217+70. *A&A*, 656(41428), A154. doi:10.1051/0004-6361/202141428
- 6 Hoang, D. N., Shimwell, T. W., van Weeren, R. J., Brunetti, G., Röttgering, H. J. A., Andrade-Santos, F., ... Stroe, A. (2019). Radio observations of the merging galaxy cluster Abell 520. *A&A*, 622, A20. doi:10.1051/0004-6361/201833900
- 7 Hoang, D. N., Shimwell, T. W., Van Weeren, R. J., Röttgering, H. J., Botteon, A., Brunetti, G., ... Stroe, A. (2019). Characterizing the radio emission from the binary galaxy cluster merger Abell 2146. *A&A*, 622, 1–9. doi:10.1051/0004-6361/201834025

- 8 Hoang, D. N., Shimwell, T. W., van Weeren, R. J., Intema, H. T., Röttgering, H. J. A., Andrade-Santos, F., ... White, G. J. (2018). Radio observations of the double-relic galaxy cluster Abell 1240. *MNRAS*, *478*(2), 2218–2233.
doi:10.1093/mnras/sty1123
- 9 Hoang, D. N., Shimwell, T. W., Stroe, A., Akamatsu, H., Brunetti, G., Donnert, J. M. F., ... White, G. J. (2017). Deep LOFAR observations of the merging galaxy cluster CIZA J2242.8+5301. *MNRAS*, *471*(1), 1107–1125.
doi:10.1093/mnras/stx1645

Journal Articles (Second-, Third- and Fourth-Author)

- 1 Igo, Z., Merloni, A., Hoang, D., Buchner, J., Liu, T., Salvato, M., ... Wolf, J. (2024). The LOFAR - eFEDS survey: The incidence of radio and X-ray AGN and the disk-jet connection. *AA*, *686*, A43.
doi:10.1051/0004-6361/202349069
- 2 Pasini, T., Brüggen, M., Hoang, D. N., Ghirardini, V., Bulbul, E., Klein, M., ... Ramos-Ceja, M. (2022). The eROSITA Final Equatorial-Depth Survey (eFEDS). *A&A*, *661*, A13. doi:10.1051/0004-6361/202141211
- 3 Jones, A., de Gasperin, F., Cuciti, V., Hoang, D. N., Botteon, A., Brüggen, M., ... van Weeren, R. J. (2021). Radio relics in PSZ2 G096.88+24.18: a connection with pre-existing plasma. *MNRAS*, *505*(4), 4762–4774.
doi:10.1093/mnras/stab1443
- 4 Ghirardini, V., Bulbul, E., Hoang, D. N., Klein, M., Okabe, N., Biffi, V., ... Williams, W. L. (2021). Discovery of a supercluster in the eROSITA Final Equatorial Depth Survey: X-ray properties, radio halo, and double relics. *A&A*, *647*, A4. doi:10.1051/0004-6361/202039554
- 5 Donnert, J. M. F., Stroe, A., Brunetti, G., Hoang, D., & Roettgering, H. (2016). Magnetic field evolution in giant radio relics using the example of CIZA J2242.8+5301. *MNRAS*, *462*(July), 2014–2032.
doi:10.1093/mnras/stw1792

Journal Articles (Co-Author)

- 1 Veronica, A., Reiprich, T. H., Pacaud, F., Brüggen, M., Koribalski, B., Pasini, T., ... Zhang, X. (2025). The life of central radio galaxies in clusters: AGN-ICM studies of eRASS1 clusters in the ASKAP fields. *PASA*.
doi:10.48550/arXiv.2511.22319
- 2 Lusetti, G., Brüggen, M., Edler, H. W., de Gasperin, F., Hoeft, M., Di Gennaro, G., ... Brunetti, G. (2025). A view of the CIZA J2242.8+5301 galaxy cluster at very low radio frequencies., *699*, A200.
doi:10.1051/0004-6361/202554521
- 3 Pasini, T., Mahatma, V. H., Brienza, M., Kolokythas, K., Eckert, D., de Gasperin, F., ... Santra, R. (2025). Non-thermal emission in galaxy groups at extremely low frequency: The case of A1213., *693*, A94.
doi:10.1051/0004-6361/202452006
- 4 Shimwell, T. W., Hardcastle, M. J., Tasse, C., Drabent, A., Botteon, A., Williams, W. L., ... Sweijen, F. (2025). The LOFAR Two-metre Sky Survey. *AA (Accepted)*.
- 5 Lusetti, G., Bonafede, A., Lovisari, L., Gitti, M., Ettori, S., Cassano, R., ... Shimwell, T. W. (2024). LOFAR detection of extended emission around a mini halo in the galaxy cluster Abell 1413., *683*, A132.
doi:10.1051/0004-6361/202347635
- 6 Sarkar, A., Andrade-Santos, F., van Weeren, R. J., Kraft, R. P., Hoang, D. N., Shimwell, T. W., ... Grant, C. E. (2024). On the Particle Acceleration Mechanisms in a Double Radio Relic Galaxy Cluster, Abell 1240., *962*(2), 161.
doi:10.3847/1538-4357/ad1aac
- 7 Jones, A., de Gasperin, F., Cuciti, V., Botteon, A., Zhang, X., Gastaldello, F., ... van Weeren, R. J. (2023). The Planck clusters in the LOFAR sky. VI. LoTSS-DR2: Properties of radio relics., *680*, A31.
doi:10.1051/0004-6361/202245102
- 8 Stuardi, C., Bonafede, A., Rajpurohit, K., Brüggen, M., de Gasperin, F., Hoang, D., ... Vazza, F. (2022). Using the polarization properties of double radio relics to probe the turbulent compression scenario. *A&A*, *666*, A8.
doi:10.1051/0004-6361/202244179

- 9 Pasini, T., Edler, H. W., Brüggen, M., de Gasperin, F., Botteon, A., Rajpurohit, K., ... Riseley, C. J. (2022). Particle re-acceleration and diffuse radio sources in the galaxy cluster Abell 1550. *A&A*, *663*, A105.
DOI: [10.1051/0004-6361/202243833](https://doi.org/10.1051/0004-6361/202243833)
- 10 Bulbul, E., Liu, A., Pasini, T., Comparat, J., Hoang, D. N., Klein, M., ... Shen, Y. (2022). The eROSITA Final Equatorial-Depth Survey (eFEDS): Galaxy clusters and groups in disguise. *A&A*, *661*, A10.
DOI: [10.1051/0004-6361/202142460](https://doi.org/10.1051/0004-6361/202142460)
- 11 Liu, A., Bulbul, E., Ghirardini, V., Liu, T., Klein, M., Clerc, N., ... Thibaud, Q. (2022). The eROSITA Final Equatorial-Depth Survey (eFEDS): Catalog of galaxy clusters and groups. *A&A*, *661*, A2.
DOI: [10.1051/0004-6361/202141120](https://doi.org/10.1051/0004-6361/202141120)
- 12 Sanders, J. S., Biffi, V., Brüggen, M., Bulbul, E., Dennerl, K., Dolag, K., ... ZuHone, J. A. (2022). Studying the merging cluster Abell 3266 with eROSITA. *A&A*, *661*, A36. DOI: [10.1051/0004-6361/202141501](https://doi.org/10.1051/0004-6361/202141501)
- 13 Botteon, A., Shimwell, T. W., Cassano, R., Cuciti, V., Zhang, X., Bruno, L., ... de Gasperin, F. (2022). The Planck clusters in the LOFAR sky: I. LoTSS-DR2: New detections and sample overview. *A&A*, *660*(43020), A78.
DOI: [10.1051/0004-6361/202143020](https://doi.org/10.1051/0004-6361/202143020)
- 14 Vacca, V., Shimwell, T., Perley, R. A., Govoni, F., Murgia, M., Feretti, L., ... Wittor, D. (2022). Spectral study of the diffuse synchrotron source in the galaxy cluster Abell 523. *A&A*, *511*(3), 3389–3407. DOI: [10.1093/mnras/stac287](https://doi.org/10.1093/mnras/stac287)
- 15 Di Gennaro, G., van Weeren, R. J., Rudnick, L., Hoeft, M., Brüggen, M., Ryu, D., ... Hoang, D. N. (2021). Downstream Depolarization in the Sausage Relic: A 1–4 GHz Very Large Array Study. *ApJ*, *911*(1), 3.
DOI: [10.3847/1538-4357/abe620](https://doi.org/10.3847/1538-4357/abe620)
- 16 Brüggen, M., Reiprich, T. H., Bulbul, E., Koribalski, B. S., Andernach, H., Rudnick, L., ... Marvil, J. (2021). Radio observations of the merging galaxy cluster system Abell 3391–Abell 3395. *A&A*, *647*, A3.
DOI: [10.1051/0004-6361/202039533](https://doi.org/10.1051/0004-6361/202039533)
- 17 Reiprich, T. H., Veronica, A., Pacaud, F., Ramos-Caja, M. E., Ota, N., Sanders, J., ... Vardoulaki, E. (2021). The Abell 3391/95 galaxy cluster system. *A&A*, *647*, A2. DOI: [10.1051/0004-6361/202039590](https://doi.org/10.1051/0004-6361/202039590)
- 18 Wolf, J., Nandra, K., Salvato, M., Liu, T., Buchner, J., Brusa, M., ... Williams, W. L. (2021). First constraints on the AGN X-ray luminosity function at $z \sim 6$ from an eROSITA-detected quasar. *A&A*, *647*, A5.
DOI: [10.1051/0004-6361/202039724](https://doi.org/10.1051/0004-6361/202039724)
- 19 Zhang, X., Simionescu, A., Kaastra, J. S., Akamatsu, H., Hoang, D. N., Stuardi, C., ... Brown, S. (2020). ClG 0217+70: A massive merging galaxy cluster with a large radio halo and relics. *A&A*, *642*, L3.
DOI: [10.1051/0004-6361/202039028](https://doi.org/10.1051/0004-6361/202039028)
- 20 Botteon, A., Shimwell, T. W., Bonafede, A., Dallacasa, D., Gastaldello, F., Eckert, D., ... Wilber, A. (2019). The spectacular cluster chain Abell 781 as observed with LOFAR, GMRT, and XMM-Newton. *A&A*, *622*, A19.
DOI: [10.1051/0004-6361/201833861](https://doi.org/10.1051/0004-6361/201833861)
- 21 Shimwell, T. W., Tasse, C., Hardcastle, M. J., Mechev, A. P., Williams, W. L., Best, P. N., ... Wilber, A. (2019). The LOFAR Two-metre Sky Survey. *A&A*, *622*, A1. DOI: [10.1051/0004-6361/201833559](https://doi.org/10.1051/0004-6361/201833559)
- 22 Mandal, S., Intema, H. T., Shimwell, T. W., Van Weeren, R. J., Botteon, A., Röttgering, H. J., ... Rafferty, D. (2019). Ultra-steep spectrum emission in the merging galaxy cluster Abell 1914. *A&A*, *622*, 1–11.
DOI: [10.1051/0004-6361/201833992](https://doi.org/10.1051/0004-6361/201833992)
- 23 Gennaro, G. D., van Weeren, R. J., Hoeft, M., Kang, H., Ryu, D., Rudnick, L., ... Stroe, A. (2018). Deep Very Large Array Observations of the Merging Cluster CIZA J2242.8+5301: Continuum and Spectral Imaging. *ApJ*, *865*(1), 24.
DOI: [10.3847/1538-4357/aad738](https://doi.org/10.3847/1538-4357/aad738)
- 24 Botteon, A., Shimwell, T. W., Bonafede, A., Dallacasa, D., Brunetti, G., Mandal, S., ... Venturi, T. (2018). LOFAR discovery of a double radio halo system in Abell 1758 and radio/X-ray study of the cluster pair. *MNRAS*, *478*(1), 885–898. DOI: [10.1093/mnras/sty1102](https://doi.org/10.1093/mnras/sty1102)

- 25 Shimwell, T. W., Röttgering, H. J. A., Best, P. N., Williams, W. L., Dijkema, T. J., de Gasperin, F., ... Zwart, J. T. L. (2017). The LOFAR Two-metre Sky Survey. *A&A*, 598, A104.  doi:10.1051/0004-6361/201629313
- 26 Shimwell, T. W., Luckin, J., Brüggen, M., Brunetti, G., Intema, H. T., Owers, M. S., ... White, G. J. (2016). A plethora of diffuse steep spectrum radio sources in Abell 2034 revealed by LOFAR. *MNRAS*, 459(1), 277–290.  doi:10.1093/mnras/stw661
- 27 Lin, K.-Y., Nishioka, H., Wang, F.-C., Huang, C.-W. L., Liao, Y.-W., Wu, J.-H. P., ... Birkinshaw, M. (2016). AMiBA: cluster Sunyaev-Zel'dovich effect observations with the expended 13-element array. *ApJ*, 830(2), 91.  doi:10.3847/0004-637X/830/2/91

Conference Proceedings

- 1 **Hoang**, N. D., & Heydari, H. (2011, March). Geometrically controlled evolution of four-qubit states. In G. Jaeger, A. Khrennikov, M. Schlosshauer, & G. Weihs (Eds.), *Advances in quantum theory* (Vol. 1327, pp. 329–333).  doi:10.1063/1.3567455
- 2 Sezer, H. C., **Hoang**, N. D., & Heydari, H. (2011, March). Quantum entanglement properties of geometrical and topological quantum gates. In G. Jaeger, A. Khrennikov, M. Schlosshauer, & G. Weihs (Eds.), *Advances in quantum theory* (Vol. 1327, pp. 472–476).  doi:10.1063/1.3567476
- 3 **Hoang**, N. D., & Heydari, H. (2010). Evolution of polynomial invariants of four-qubit systems controlled by local unitary operation. In I. Bengtsson, G. Björk, & M. Bourennane (Eds.), *International conference on quantum information and computation* (P1.34).