

Dr Hongye ZHANG, FHEA, MIET, MIEEE**Lecturer (Assistant Professor) in Superconducting and Cryogenic Electric Machines**

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RESEARCH

Hongye's interdisciplinary research combines Electric Machines & Drives, Superconductor Technology, Clean Energy Conversion, Cryogenic Techniques, Hydrogen Energy, and Artificial Intelligence to contribute to **low/zero emission technology**. His interests centre on **Net Zero Transport** and **Hydrogen Energy** with a focus on power-dense and extra-efficient next-generation propulsion electric machines. His current research focuses on the design, analysis, build, and testing of cryogenic/superconducting motors for zero emission electric aircraft exploiting hydrogen propulsion. His long-term vision is to build a world-leading research group at the interface of **academia** and **industry** that will further advance the **decarbonisation of future transport**.

EDUCATION

The University of Edinburgh (UoE), QS/Times global ranking top 30, Edinburgh, UK. **09/2018-04/2021**
PhD in Applied Superconductivity (PhD studies completed within 2.5 years)

Xi'an Jiaotong University (XJTU), National ranking top 9, Xi'an, China. **09/2015-06/2018**
MSc in Electrical Engineering (XJTU ranks top 2 for *Electrical Engineering* in China)
GPA: 3.48 Class Ranking: 1/60

École Centrale de Lyon (ECL), National ranking top 8 in Écoles d'ingénieurs, Lyon, France. **09/2013-06/2015**
Bac+5 degree in General Engineering (MEng), Exchange Student

XJTU, Xi'an, China. **09/2011-06/2015**
BSc in Electrical Engineering & Automation (Full marks in Advanced Mathematics, Physics, & C++ Programming)
GPA: 3.81 Class Ranking: 1/28 School Ranking: 6/334

EMPLOYMENT & RESEARCH EXPERIENCE

Lecturer (Assistant Professor) in Superconducting and Cryogenic Electric Machines, **UoE**, UK. **04/2024-present**

Visiting Research Fellow in Cryogenic Drives, **The University of Manchester (UoM)**, UK. **04/2024-present**

Research Project, "Hybrid Hydrogen & Electric Architecture (H2GEAR)", UoM, UK. 05/2021-present, sponsored by GKN Aerospace & the Aerospace Technology Institute (ATI)/INNOVATE UK, £1.84 million.

Role: PDRA (05/2021-03/2024) & Visiting Research Fellow (04/2024-present)

A £54M collaborative project to develop a ground-breaking hydrogen propulsion system powering Zero Emission Aircraft. Hongye takes charge of four project modules (DC test + AC test + Numerical modelling tool development + TRL4 motor design) involving project management, collaboration with industrial & academic partners, and working with/supporting other team members.

Research Project, "Electromagnetic characteristics of high temperature superconductor coated conductors applied to electric machines", UoE, UK. 09/2018-04/2021. Role: PhD candidate

Supported by a UoE and CSC joint scholarship, Hongye completed his PhD studies within 2.5 years with 9 lead-author journal publications. His research involved theoretical calculation and numerical modeling of AC losses in different HTS topologies, as well as design of HTS electric machines and electrodynamic suspension systems.

Research Project, "Development and application of fault diagnosis devices based on the measurement of radiated switching transients of GIS", XJTU, China. 06/2017-06/2018, funded by the State Grid of China, £181,250.

Role: Primary Researcher, assuming 60% of the workload, from bidding to execution.

Hongye wrote the research proposal, as per his supervisor's suggestion. He engaged with the project management by scheduling the project progress and took charge of the delivery of a fault diagnosis device for GIS.

Research Project, "GIS status assessment based on measurements of radiated switching transients and research on EMC technology of online monitoring equipment", XJTU, China. 08/2016-12/2017, funded by the State Grid of China, £121,250.

Role: Primary Researcher, assuming 90% of the workload, from bidding, execution, to closeout.

Hongye spearheaded the characterisation of switching transients of GIS and developed a simulator for typical radiated switching transients. Additionally, he led the phased report of the project and the final conclusion work.

Research Internship, Ampère Laboratory, Lyon, France. 05/2015-07/2015

Research on the interactions between early streamer emission lightning rods and ground wires of power networks.

Execution Internship, Schneider Electric, Grenoble, France. 08/2014

Fabrication and assembly of high-voltage transformers.

Execution Internship, Renault SOVAB, Batilly, France. 07/2014

Fabrication and assembly of Renault trucks.

PATENTS

- "A defect diagnosis method for GIS based on the support vector machine analysis of switching transient electric fields", CN109376626A, **22/02/2019**, China. **Inventors:** Lin Cheng, Yan Zhao Xie, Jiangping Lu, **Hongye Zhang**, *et al.*
- "A fault diagnosis method for high voltage switches based on characteristic energy extraction of radiated electric fields", CN107576907A, **12/01/2018**, China. **Inventors:** Jinpeng Hao, Fei Guo, ..., **Hongye Zhang**, *et al.*
- "A fault diagnosis method for switches in the GIS measured based on switching manipulation radiated electric

field", CN107192943A, 22/09/2017, China. **Inventors:** Jinpeng Hao, Xutao Wu, ..., **Hongye Zhang**, and Yanzhao Xie.

PRIMARY HONORS & AWARDS

IEEE Council on Superconductivity Graduate Study Fellowship in Applied Superconductivity 04/2021

The highest prize worldwide for a full-time PhD candidate in the area of Applied Superconductivity, awarded to no more than six people each year. Hongye is the only awardee in the UK in 2021. News: [Hongye Zhang - 2021 recipient of IEEE CSC Graduate Study Fellowship in Applied Superconductivity | IEEE Council on Superconductivity](#).

2023 Outstanding Early Career Board Member 02/2024

For outstanding editorial board service for Elsevier *Superconductivity*.

IOP Trusted Reviewer 07/2022

In recognition of the very best peer reviewers (top 15%) in the physical sciences.

Joint scholarship from the UoE and China Scholarship Council 09/2018-08/2021

Final selection: 1 of the 3 winners (55 candidates) in the School of Engineering of UoE.

Outstanding graduates from XJTU 06/2018

Final selection: 1 of the 2 winners (60 candidates) at the Institute of High Voltage, XJTU.

"Franco-China 4+4" Scholarship from China Scholarship Council 07/2013-06/2015

Final selection: 1 of the 11 winners (approx. 2000 applicants) from XJTU.

China National Scholarship 10/2012

The highest national award for a full-time undergraduate student in China.

Final selection: 1 of the 7 winners (334 candidates) at the School of Electrical Engineering, XJTU.

GRANT APPLICATIONS

EPSRC network grant: responsive mode 05/2024

Involved as a CI, aiming to build a new interdisciplinary research network centered on Applied Superconductivity across the UK, led by Prof Markus Mueller (PI) at UoE. The application will be submitted in May 2024.

Royal Academy of Engineering (RAEng) Research Fellowship 2022/23 09/2022

Shortlisted and selected for interview in May 2023. Although temporarily unsuccessful, based on the positive feedback from RAEng, Hongye plans to submit a new application in the future.

School Research Pump Priming, Theme Development and Dissemination fund 07/2023

£5000 offered by UoM to conduct independent research work on conduction cooling for electric machine windings.

Department Fellowship Bursary 06/2023

£3000 offered by UoM for research dissemination in two international conferences: EUCAS 2023 and MT-28.

ACADEMIC ROLES & AFFILIATIONS

Session Chair (invited) for the chapter "Superconducting Electric Machines for Transport & Renewable Energy Conversion", **SMT 2024**, Bangkok, Thailand 15/08-19/08, 2024

Board Member (elected) of The European Society for Applied Superconductivity (ESAS) 09/2023-present

The youngest ESAS board member among 31 board members. The first ESAS board member from UoM and UoE. This board membership serves as a high recognition of Hongye's research excellence, international visibility, and global leadership in promoting the development of Applied Superconductivity.

Fellow of the Higher Education Academy (FHEA) 02/2024-present

Committee Member (invited) of the Academic Sub-Committee of World Transport Convention 01/2024-present

Early Career Editorial Board Member & Associate Editor of *Elsevier Superconductivity* 06/2022-present

Programme Committee Member (invited) of **SMT 2023**, Shanghai, China 09/06-12/06, 2023

Technical Editor (invited) for the special issue of *IEEE TAS, MT-28*, Aix-en-Provence, France 09/2023-present

Lead Guest Editor for a Special Issue of *Crystals* 03/2022-present

Member, IET (10/2023-present), IEEE (awarded, PES & CSC, 2022-present)

Peer Reviewer 2018-present

SUST (IOP), *IEEE TAS*, *High Voltage* (IET), *Superconductivity* (Elsevier), *Scientific Reports* (Nature Portfolio)...

CONFERENCES

EFATS 2023, Bristol, UK, 04/10-05/10, 2023. **Delegate**, to provide **technical support to GKN Aerospace**.

MT-28, Aix-en-Provence, France, 10/09-15/09, 2023. **Poster**.

EUCAS 2023, Bologna, Italy, 03/09-07/09, 2023. **Talk**.

EFATS 2022, Glasgow, UK, 30/08-31/08, 2022. **Delegate**, to provide **technical support to GKN Aerospace**.

EFATS 2021, Virtual Conference, 09/06-10/06, 2021. **Delegate**.

ASC 2020, Virtual Conference, 24/10-07/11, 2020. **Talk**.

ASIAEM 2019, Xi'an, China, 15/09-20/09, 2019. **Assistant organiser**.

IMCEC 2018, Xi'an, China, 25/05-27/05, 2018. **Talk**.

ASIAEM 2017, Bangalore, India, 23/07-27/07, 2017. **Talk, top 10 candidate for the Best Student Paper Award.**

INVITED PARTICIPATION

Keynote Speaker, "Superconducting Wind Energy: HTS C-GEN", ICSM 2024, Muğla, Turkey, 27/04-04/05, 2024.

Guest Lecture, "Application and Impact of the dynamic resistance of HTS materials in electric power and transport", invited by Tongji University, China, 07/01/2024.

Book Proofreading, "Introduction to Superconducting Science and Technology (超导科学与技术入门)", authored by Ying Xin, Chao Li, and Tianhui Yang at Tianjin University, China Science Publishing & Media, Beijing, 09/2023.

Guest Lecture, "Dynamic Resistance and Dynamic Loss in ReBCO Superconductors", invited by Southwest Jiaotong University, China, 07/10/2022. (Online)

Invited Poster, "High temperature superconducting Halbach array topology for air-cored electrical machines", EUCAS 2019, Glasgow, UK, 01/09-05/09, 2019.

COLLABORATION NETWORK

Hongye has been developing industrial links based on his collaborative work with GKN Aerospace (UK), Rolls-Royce (UK), State Grid (China), Siemens (Germany), Airbus (France & Germany), and GE (USA), in addition to partnerships with research groups from the Karlsruhe Institute of Technology (Germany), Victoria University of Wellington (New Zealand), Politecnico di Milano (Italy), the University of Cambridge (UK), University of Bath (UK), University of Strathclyde (UK), Tianjin University (China), Shanghai Jiaotong University (China), Université de Lorraine (France), etc. Most of these collaborations resulted in co-publications of papers and patents.

ACADEMIC EXPERTISE

Electro-mechanical-thermal analysis and design of electric machines; Modelling of high temperature superconductors; Calculation, simulation, and measurement of the AC loss of superconductors; Measurement of electromagnetic fields; Cryogenic experiments; Finite element analysis; Electromagnetism; Calculus; Fault diagnosis for high voltage apparatus.

TEACHING & SUPERVISION

Teaching & Laboratory demonstrator, UoE & UoM 01/2019-present

Organisation and delivery (including marking) of 5 different courses in EEE for BEng, MEng, and MSc students.

Supervision, XJTU, UoM & UoE 09/2017-present

Hongye is co-supervising 2 PDRAs, 1 PhD, and 1 MSc student at UoE. He helped supervise 2 PhD students at UoM. He assisted in supervising 1 PhD student (co-published 4 journal papers) and 2 MSc students at UoE. At XJTU, he assisted his MSc supervisor to provide day-to-day supervision to two MSc students (including one international student), both of whom were successfully awarded Master's degrees.

SELECTED PEER-REVIEWED PUBLICATIONS (since 2019, *corresponding author, h-index 15, citations 503)

[1] **Hongye Zhang**, Min Yao, Kevin Kails, Philip Machura, Markus Mueller, Zhenan Jiang, Ying Xin, and Quan Li*, "Modelling of electromagnetic loss in HTS coated conductors over a wide frequency band," *Supercond. Sci. Technol.*, vol. 33, no. 2, 205004, 2020. <https://iopscience.iop.org/article/10.1088/1361-6668/ab6022/meta>.

[2] **Hongye Zhang***, Philip Machura, Kevin Kails, Hongyi Chen, and Markus Mueller*, "Dynamic loss and magnetization loss of HTS coated conductors, stacks, and coils for high-speed synchronous machines," *Supercond. Sci. Technol.*, vol. 33, no. 8, 084008, 2020. (Focus on the Jan Evetts SUST Paper Award 2020) <https://iopscience.iop.org/article/10.1088/1361-6668/ab9ace/meta>.

[3] **Hongye Zhang*** and Markus Mueller, "Electromagnetic properties of curved HTS trapped field stacks under high-frequency cross fields for high-speed rotating machines," *Supercond. Sci. Technol.*, vol. 34, no. 4, 045018, 2021. <https://iopscience.iop.org/article/10.1088/1361-6668/abe4b6/meta>.

[4] **Hongye Zhang**, Min Yao, Zhenan Jiang, Ying Xin, and Quan Li*, "Dependence of Dynamic Loss on Critical Current and n -Value of HTS Coated Conductors," *IEEE Trans. Appl. Supercond.*, vol. 29, no. 8, pp. 1-7, 2019. (Recommended by Associate Editor) <https://ieeexplore.ieee.org/abstract/document/8880530>.

[5] **Hongye Zhang***, Hongyi Chen, Zhenan Jiang, Tianhui Yang, Ying Xin, Markus Mueller, and Quan Li, "A full-range formulation for dynamic loss of HTS coated conductors," *Supercond. Sci. Technol. (Letter)*, vol. 33, no. 5, 05LT01, 2020. (Focus on the Jan Evetts SUST Paper Award 2020. Specially reported in *Francesco Grilli 2021 Supercond. Sci. Technol.* 34 020501.) <https://iopscience.iop.org/article/10.1088/1361-6668/ab7b0d/meta>.

[6] **Hongye Zhang***, Chuantong Hao, Ying Xin, and Markus Mueller*, "Demarcation Currents and Corner Field for Dynamic Resistance of HTS-Coated Conductors," *IEEE Trans. Appl. Supercond.*, vol. 30, no. 8, pp. 1-5, 2020. (Recommended by Associate Editor) <https://ieeexplore.ieee.org/abstract/document/9117071>.

[7] **Hongye Zhang**, Quan Li, Okechukwu Ubani, and Markus Mueller*, "High temperature superconducting Halbach array topology for air-cored electrical machines," *J. Phys.: Conf. Ser.*, vol. 1559, 012140, 2020. <https://iopscience.iop.org/article/10.1088/1742-6596/1559/1/012140/meta>.

[8] **Hongye Zhang***, Kevin Kails, Philip Machura, and Markus Mueller*, "Conceptual Design of Electrodynamic Wheels Based on HTS Halbach Array Magnets," *IEEE Trans. Appl. Supercond.*, vol. 31, no. 5, pp. 1-6, 2021. <https://ieeexplore.ieee.org/abstract/document/9360525>.

[9] **Hongye Zhang***, Tianhui Yang, Wenxin Li, Ying Xin*, Chao Li, Matteo F. Iacchetti, Alexander C. Smith, and Markus Mueller, "Origin of the anomalous electromechanical interaction between a moving magnetic dipole and

a closed superconducting loop," *Supercond. Sci. Technol.*, vol. 35, no. 4, 045009, 2022.

<https://iopscience.iop.org/article/10.1088/1361-6668/ac53dc/meta>.

[10] **Hongye Zhang***, Tianhui Yang, Francesco Grilli, Wenxin Li, Paul Tuohy, and Ying Xin, "A superconducting wireless energiser based on electromechanical energy conversion," *Superconductivity*, vol. 7, 100057, 2023.

<https://www.sciencedirect.com/science/article/pii/S2772830723000224>.

[11] Zezhao Wen*, **Hongye Zhang**, and Markus Mueller, "Sensitivity analysis and machine learning modelling for the output characteristics of rotary HTS flux pumps," *Supercond. Sci. Technol.*, vol. 34, no. 12, 125019, 2021.

<https://iopscience.iop.org/article/10.1088/1361-6668/ac3463/meta>.

[12] Zezhao Wen, **Hongye Zhang***, Mengyuan Tian, Francesco Grilli, and Markus Mueller*, "A statistical model for the design of rotary HTS flux pumps based on deep-learning neuron network," *Superconductivity*, vol. 3, 100017, 2022.

<https://www.sciencedirect.com/science/article/pii/S2772830722000163>.

[13] **Hongye Zhang**, Alexander C. Smith*, Matteo F. Iacchetti*, Paul M. Tuohy, Charalampos D. Manolopoulos, Alexandru-Vlad Rusu, and Vicente Climente-Alarcon, "Electromagnetic Characterization of Hyperconducting Aluminum Litz Wires at Cryogenic Temperatures," *IEEE Access*, vol. 12, pp. 60234-60245, 2024.

<https://ieeexplore.ieee.org/abstract/document/10505298>.

[14] Qi Wang, **Hongye Zhang***, Luning Hao, Jintao Hu, Haigening Wei, Ismail Patel, Adil Shah, and Tim Coombs, "Magnetisation and Demagnetisation of Trapped Field Stacks in a Superconducting Machine for Electric Aircraft," *Supercond. Sci. Technol.*, vol. 36, no. 11, 115023, 2023. (Invited Article)

<https://iopscience.iop.org/article/10.1088/1361-6668/acfcdf/meta>.

[15] Hongyi Chen and **Hongye Zhang***, "AC loss mitigation for high temperature superconducting coils in wireless power transfer," *Superconductivity*, 100044, 2023. <https://doi.org/10.1016/j.supcon.2023.100044>

[16] **Hongye Zhang**, Boyang Shen*, Xiaoyuan Chen*, and Zhenan Jiang, "Dynamic Resistance and Dynamic Loss in a ReBCO Superconductor," *Supercond. Sci. Technol.*, vol. 35, no. 11, 113001, 2022. (Invited Article)

<https://iopscience.iop.org/article/10.1088/1361-6668/ac95d5>.

[17] Zezhao Wen, **Hongye Zhang***, and Markus Mueller, "HTS Flux Pumps for Contactless Energization," *Crystals*, vol. 12, no. 6, 766, 2022. (Feature Paper, Editor's Choice) <https://www.mdpi.com/2073-4352/12/6/766>.

[18] Yang-xin Qiu, Yan-zhao Xie*, Shao-fei Wang, Pu-qing Zhang, Tong Zhou, Lan-qi Zhang, Yu Yang, Ming-xiang Gao, and **Hong-ye Zhang**, "A modularized high-power ultra-wideband radiation system based on the space-synthesis method," *Rev. Sci. Instrum.*, vol. 93, 044705, 2022.

<https://pubs.aip.org/aip/rsi/article/93/4/044705/2849018/A-modularized-high-power-ultra-wideband-radiation>.

[19] Chao Li, Yuying Xing*, Beitao Zhao, **Hongye Zhang**, Ning Li, Ying Xin, and Bin Li, "Dynamic Resistance of Series-Connected HTS Stacks Considering Electromagnetic and Thermal Coupling," *IEEE Trans. Appl. Supercond.*, vol. 32, no. 4, pp. 1-5, 2022. <https://ieeexplore.ieee.org/abstract/document/9693220>.

[20] **Hongye Zhang***, Zezhao Wen, Francesco Grilli*, Konstantinos Gyftakis, and Markus Mueller*, "Alternating current loss of superconductors applied to superconducting electrical machines," *Energies*, vol. 14, no. 8, 2234, 2021. (Invited Article) <https://www.mdpi.com/1996-1073/14/8/2234>.

[21] Tongqiang Yi, Yanzhao Xie*, **Hongye Zhang**, and Xu Kong, "Insulation Fault Diagnosis of Disconnecting Switches Based on Wavelet Packet Transform and PCA-IPSO-SVM of Electric Fields," *IEEE Access*, vol. 8, pp. 176676-176690, 2020. <https://ieeexplore.ieee.org/abstract/document/9206012>.

[22] Philip Machura*, **Hongye Zhang**, Kevin Kails, and Quan Li, "Loss characteristics of superconducting pancake, solenoid and spiral coils for wireless power transfer," *Supercond. Sci. Technol.*, vol. 33, no. 7, 074008, 2020. (Focus on the Jan Evetts SUST Paper Award 2020) <https://iopscience.iop.org/article/10.1088/1361-6668/ab931d/meta>.

[23] Kevin Kails, Min Yao, **Hongye Zhang**, Philip Machura, Markus Mueller, and Quan Li*, "T-formulation based numerical modelling of dynamic loss with a DC background field," *J. Phys.: Conf. Ser.*, vol. 1559, 012145, 2020.

<https://iopscience.iop.org/article/10.1088/1742-6596/1559/1/012145/meta>.

[24] Kevin Kails*, **Hongye Zhang**, Markus Mueller, and Quan Li*, "Loss characteristics of HTS coated conductors in field windings of electric aircraft propulsion motors," *Supercond. Sci. Technol.*, vol. 33, no. 6, 064006, 2020. (Focus on the Jan Evetts SUST Paper Award 2020) <https://iopscience.iop.org/article/10.1088/1361-6668/ab89ed/meta>.

[25] Lin Cheng, **Hongye Zhang**, Tongqiang Yi, Yanzhao Xie, Simeng Feng, and Xiang Liu, "Insulation Defect Detection Method for Disconnecting Switches Based on Time-frequency Analysis of 3D Electric Fields," *High Voltage Engineering*, vol. 46, no. 4, pp. 1417-1423, 2020. [10.13336/j.1003-6520.hve.20190624001](https://doi.org/10.13336/j.1003-6520.hve.20190624001)

[26] **Hongye Zhang**, Yanzhao Xie*, Yi Zhou, and Yangxin Qiu, "Development and Application of Simulator for Transient Radiation Field of GIS Switching Operation," *High Voltage Apparatus*, vol. 56, no. 4, pp. 172-178, 2020. <https://www.cnki.com.cn/Article/CJFDTotat-GYDQ202004028.htm>.

[27] Kevin Kails, **Hongye Zhang**, Philip Machura, Markus Mueller, and Quan Li*, "Dynamic loss of HTS field windings in rotating electric machines," *Supercond. Sci. Technol.*, vol. 33, no. 4, 045014, 2020.

<https://iopscience.iop.org/article/10.1088/1361-6668/ab777a/meta>.

[28] Tongqiang Yi, Yanzhao Xie*, **Hongye Zhang** and Henan Liu, "Electric Field Signal Recognition Method of DS Switching Operations Based on Wavelet Packet Analysis and PSO-HSVM," *J. Phys.: Conf. Ser.*, vol. 1449, 012026, 2020. <https://iopscience.iop.org/article/10.1088/1742-6596/1449/1/012026/meta>.

[29] **Hong-ye Zhang**, Yan-Zhao Xie*, Tong-Qiang Yi, Xu Kong, Lin Cheng, and Hao-Jun Liu, "Fault Detection for High-Voltage Circuit Breakers Based on Time-Frequency Analysis of Switching Transient E-Fields," *IEEE Trans. Instrum. Meas.*, vol. 69, no. 4, pp. 1620-1631, 2020. <https://ieeexplore.ieee.org/abstract/document/8698825>.

More publication information can be found online <https://scholar.google.com/citations?user=bY4AQ14AAAAJ&hl=en>.