George Yumnam, PhD

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EMPLOYMENT

★ Postdoctoral Associate . **Oak Ridge National Laboratory, Oak Ridge** . (Dec 2022 – present)
Work Description: *Neutron and X-ray scattering studies, Mössbauer and Ultrasound spectroscopy*

EDUCATION

★ Ph.D. (Physics) ..... **University of Missouri, Columbia** ..... (Aug 2017 – Dec 2022)
Thesis: *Magnetic Charge Correlation and Quantum Disorder in Honeycomb Spin Ice Systems*
Advisor: Prof. Deepak K. Singh and Dr. Valeria Lauter

★ M.Sc. (Materials Science) **Indian Institute of Science, Bangalore** (Aug 2016 – June 2017)
Thesis: *Unravelling the Role of Ionicity in Thermal Transport of van der Waals Materials*

★ B.Sc. (Materials Science) **Indian Institute of Science, Bangalore** (Aug 2012 – June 2016)
Thesis: *Identifying efficient thermoelectric materials via first principle high throughput screening*

RESEARCH INTERESTS

Quantum materials and correlated-electron systems; energy-efficient functional materials. Spin-lattice-electronic coupling studied via scattering, computation, and machine learning. Developing next-generation instruments and sample environments to advance quantum and functional materials research.

PROFESSIONAL EXPERIENCE

★ Postdoctoral Associate .... **Oak Ridge National Laboratory** *(ORNL)* .... (Dec 2022 – present)
· *Hybrid excitations of spin-lattice coupling in quantum materials via neutron & x-ray scattering, Mössbauer Spectroscopy and Resonant Ultrasound Spectroscopy + Modelling*

★ Graduate Research Assistant .. **University of Missouri, Columbia** .. (Aug 2017 – Nov 2022)
· *Artificial Spin Ice and Magnetic disorder system - Synthesis, Electrical and Magnetic Property Measurement, Neutron and X-ray Scattering characterization, Atomic force microscopy + Modelling*

★ Masters Research Fellow . **Indian Institute of Science, Bangalore** . (Aug 2016 – July 2017)
· *First-principles DFT calculations of thermal transport in 2D materials + Machine learning*

★ Summer Research Intern ..... **CFCT, ARCI, Chennai** ..... (May - July 2015)
· *Synthesis and characterization of polymer electrolyte membranes for fuel cell application*

★ Undergraduate Researcher **Indian Institute of Science, Bangalore** (Aug 2014 – June 2016)
· *DFT calculations of electronic structure and transport properties of thermoelectric materials*

HONORS AND AWARDS

- ⋆ **APS GERA 2025 Travel Fund Recipient** (2025)
- ⋆ **Gordon Research Seminar & Conference on Neutron Scattering**, Outstanding Poster Award (2023)
- ⋆ **Graduate Professional Council, Mizzou** Travel Award (2022)
- ⋆ **James L. and Dora D. Fergason Fund for Excellence in Physics Scholarship** (2020)
- ⋆ **Newell S. Gingrich Physics Scholarship** (2019)
- ⋆ **O. M. Stewart Scholarship** (2018)
- ⋆ **Graduate Professional Council, Mizzou**, 35^{th} RCAF – Best Researcher in Physical Science (2018)
- ⋆ **Kyoto University**, Invitation for Research Collaboration and Exchange (2017)
- ⋆ **18^{th} International Workshop on Computational Physics**, Selected for sponsored invitation (2017)
- ⋆ **INSPIRE Fellowship, Department of Science and Technology, India** (2012–2017)
- ⋆ **National Talent Search Examination** Recipient (1000 selected of ∼1 million paticipants) (2009)

RESEARCH GRANTS

Contributions to Funded Research ..... (Aug, 2024 – present)

| ***1) Neutron Scattering Studies of Hybrid Excitations*** (DOE, BES) PI: Dr. Raphaël P. Hermann

| My contributions: I led the experiments, data analysis and wrote the section on "Understanding multicaloric and thermomagnetic transport properties due to spin-lattice coupling"

Past Research Funding .....(May – July, 2021)

| ***1) Exploration of Higher Temperature Superconductivity in Hydrogenated Metal Film*** (U. Missouri)

| My contributions: I conceptualized, designed and planned the project. I conducted initial synthesis, electrical & magnetic characterization and wrote the research statement of the funding proposal.

INVENTION DISCLOSURE

[1] "Pure nuclear resonant Bragg reflections from quadrupolar order in non-symmorphic crystals", Invention Disclosure filed with ORNL (2025), ID#: 81968795
Co-inventors: Dr. Deepak Prajapat, ***Dr. George Yumnam****, Dr. Illya Sergeev, Dr. Raphaël P. Hermann*

PUBLICATIONS († – equal contribution)

# 12 first author (including 2 equal contribution), 11 coauthored articles, ES - Editor's Suggestion

[23] **George Yumnam**, Parul R. Raghuvanshi, et al. (2025). In: *Cell Reports Physical Science* **6** (102852)
[22] Anjali Verma, Arthur P. Ramirez, et al. (2025). In: *Prog. Solid State Chem.* **79**, p. 100537
[21] Edison P. Carlisle, **George Yumnam**, et al. (2025). In: *Phys. Rev. B* **112** (1), p. 014450 *(ES)*
[20] Raphaël P. Hermann, **George Yumnam**, et al. (2025). In: *Phys. Status Solidi A.*, p. 2500213
[19] Andrew F. May, **George Yumnam**, et al. (2025). In: *Phys. Rev. Mater.* **9** (3), p. 034002
[18] Juliane Weber, Brittany Moseley, et al. (2024). In: *J. Phys. Chem. C* **129**.1, pp. 194–204
[17] **George Yumnam**, Duncan H Moseley, et al. (2024). In: *Phys. Rev. B* **109**.21, p. 214434
[16] T Seddik, B Rezini, et al. (2023). In: *Phys. B: Condens. Matter* **668**, p. 415209
[15] **George Yumnam**, Moudip Nandi, et al. (2023). In: *Mater. Today Adv.* **18**, p. 100386
[14] Jiasen Guo, Vitalii Dugaev, et al. (2022). In: *Nat. Sci.* **2**.4, e20210083
[13] **George Yumnam**, Jiasen Guo, Yiyao Chen, Ashutosh Dahal, et al. (2022). In: *Mater. Today Phys.* **22**, p. 100574
[12] **George Yumnam**, Jiasen Guo, and Deepak K Singh (2021). In: *Phys. Rev. B* **104**.13, p. 134429

[11] Yiyao Chen, **George Yumnam**†, et al. (2021). In: *Iscience* **24**.3, p. 102206
[10] **George Yumnam**, Yiyao Chen, Jiasen Guo, et al. (2021). In: *Adv. Sci.* **8**.6, p. 2004103 *(Featured in Frontispiece)*
[9] Jiasen Guo, **George Yumnam**, et al. (2021). In: *Adv. Electron. Mater.* **7**.9, p. 2100079
[8] **George Yumnam**, Jiasen Guo, Yiyao Chen, Valeria Lauter, et al. (2020). In: *Phys. Rev. Research* **2**.4, p. 043018
[7] Yiyao Chen, **George Yumnam**, et al. (2020). In: *Phys. Rev. Research* **2**.2, p. 023168
[6] KC Bhamu, Enamul Haque, et al. (2021). In: *RSC Adv.* **11**.10, pp. 5521–5528
[5] **George Yumnam**, Yiyao Chen, Yang Zhao, et al. (2019). In: *phys. status solidi RRL* **13**.10, p. 1900304
[4] Rinkle Juneja, **George Yumnam**†, et al. (2019). In: *Chem. Mater.* **31**.14, pp. 5145–5151
[3] Madhubanti Mukherjee, **George Yumnam**, and Abhishek K Singh (2018). In: *J. Phys. Chem. C* **122**.51, pp. 29150–29157
[2] **George Yumnam**, Tribhuwan Pandey, and Abhishek Kumar Singh (2018). In: *J. Phys. Chem. C* **122**.5, pp. 2521–2527
[1] **George Yumnam**, Tribhuwan Pandey, and Abhishek K Singh (2015). In: *J. Chem. Phys.* **143**.23

MANUSCRIPT IN PREPARATION/REVIEW († – equal contributions)

[2] Pousali Ghosh, **George Yumnam**†, Jiasen Guo†, *et al.* (in review) "Magnetic charge liquid state in honeycomb spin ice"
[1] Ashiq Shawon, **George Yumnam**, Hsin Wang, *et. al.* (submitted) "Leveraging Polymorphism in YbCuBi to Map Transport and Elastic Properties"

PRESENTATIONS IN CONFERENCES / SEMINARS / SYMPOSIUMS

Invited (3 invited talks)

[3] ***BES MSE Quantum Materials and Soft Matter Seminar Series***, MSTD/ORNL ..... (Jan, 2025)
[2] ***Roadmap to Altermagnetism***, New Jersey Institute of Technology ..... (Jan, 2025)
[1] ***Gordon Research Conference & Seminar*** on **Neutron Scattering**, Ventura ..... (June, 2023)

Contributed (8 talks, 7 posters)

[14] ***TMS Annual Meeting***, Las Vegas ..... (2025)
[13] ***APS Global Physics Meeting***, Anaheim ..... (2025)
[12] ***9^{th} North American Mössbauer International Symposium***, ORNL ..... (2024)
[11] ***American Conference on Neutron Scattering***, Knoxville ..... (2024)
[10] ***APS March Meeting***, Minneapolis ..... (2024)
[9] ***SNS & HFIR User Group Meeting and Seminar***, Oak Ridge ..... (2023)
[8] ***APS March Meeting***, Las Vegas ..... (2023)
[7] ***American Conference on Neutron Scattering***, Boulder ..... (2022)
[6] ***APS March Meeting***, Chicago ..... (2022)
[5] ***APS March Meeting***, Denver (*virtual due to COVID-19*) ..... (2020)
[4] ***35^{th} Annual Research & Creative Activities Forum***, Graduate Professional Council, Mizzou .(2018)
[3] ***18^{th} International Workshop on Computational Physics and Materials Science: Total Energy and Force Methods***, International Centre for Theoretical Physics, Trieste ..... (Jan, 2017)
[2] ***Asian Consortium on Computational Materials Science***, SRM University, Chennai ..... (2016)
[1] ***28^{th} Annual Symposium, Department of Materials Engineering***, IISc ..... (2016)

PROFESSIONAL SERVICE

- **Peer Reviewer for Journals** (2023–present)
  Topics in *Magnetism, Neutron Scattering, DFT, Energy Materials, Thermal transport*
  · *Phys. Rev. B*, *J. Mater. Sci.*, *Adv. Funct. Mater.*, *Commun. Phys*, *Adv. Mater. Interfaces*, *J. Appl. Crystallogr.*, *Thin Solid Films*, *Solar*
- **Oak Ridge Postdoctoral Research Associate (ORPA)**: Chair of Research Activities (2023–2024)
  · Co-organized the National Postdoc Appreciation Week in ORNL
  · Organized the 12^{th} Oak Ridge Postdoctoral Research symposium, July–2024
  · Chaired and Organized *ten* ORPA Research Seminars and Colloquium
- **Neutron Scattering Seminar Series**: Organizer (2023–2024)
  · Chaired and Organized Monthly Seminars on Neutron Scattering: Science and Instrumentation
- **TMS Annual Meeting, Neutron Scattering Seminar:** Session Chair (March 26, 2025)
  · Chaired the session: Neutron and X-Ray Scattering in Materials Science and Engineering — Lattice and Spin Dynamics in Materials at the 2025 TMS Meeting at Las Vegas

SCIENTIFIC WORKSHOPS

- *Northeast Quantum Forum: Quantum Magnets and Magnetotransports*, New Hampshire .....(2024)
- *Magnetic Structure Refinement Workshop*, Kennesaw .....(2024)
- *Polarized Neutron Diffraction and Spectroscopy: Applications to Quantum Materials*, Knoxville .(2024)
- *Inelastic neutron scattering analysis software: Inspired, Shiver, Sunny*, Knoxville .....(2024)
- *Methods for modelling transport and dynamics in quantum magnets*, Los Alamos .....(2024)
- *APS March Meeting Tutorial: T4. Quantum Computing Platforms*, Minneapolis .....(2024)
- *5^{th} US Total Scattering School*, ORNL .....(2023)
- *21^{st} National School on Neutron and X-Ray Scattering*, ORNL & Argonne (highly selective) .....(2019)
- *Advanced Workshop on High-Performance & High-Throughput Materials Simulations using Quantum ESPRESSO*, ICTP, Trieste (Among 30 fully-funded participants selected internationally) .....(2017)
- *IWPSD International Workshop on Physics of Semiconductor devices*, IISc .....(2015)

PROFESSIONAL SOCIETIES

- American Physical Society (APS – GMAG, DCMP) – Member (2017–present)
- The Minerals, Metals and Materials Society (TMS) – Member (2022–present)
- American Neutron Scattering Society (ACNS) – Member (2018–present)
- SNS & HFIR User Group (SHUG) – Member (2018–present)
- Oak Ridge Postdoctoral Association (ORPA) – Executive Member & Research Chair (2023–2024)
- Graduate Professional Council (GPC), Mizzou – Member (2017–2022)
- Physics & Astronomy Graduate Students Association (PAGSA), Mizzou – Member (2017–2022)
- IISc Student Council – Member (2012–2017)

TEACHING & MENTORING EXPERIENCE

Teaching experience

· **Introduction to Modern Physics and Quantum Mechanics**, Teaching Assistant .....(Fall 2017)
· **Introduction to Thermodynamics and Statistical Mechanics**, Teaching Assistant .....(Spring 2019)
· **College Physics I – Intro Classical Mechanics**, Laboratory Instructor .....(Fall 2018)
· **College Physics II – Intro Electromagnetism**, Laboratory Instructor .....(Spring 2019)

· **College Physics I – Intro Classical Mechanics**, Recitation Instructor ..... (Fall 2021)
· **College Physics II – Intro Electromagnetism**, Recitation Instructor ..... (Spring 2022)
· **Introduction to Electromagnetism and Electrodynamics**, Teaching Assistant ..... (Spring 2022)

Mentoring experience

· Dr. Madhubanti Mukherjee, (2016-2017), *Mentored her initial research project at IISc.* . (Ph.D. student)
· Mr. Sannibha Das, (2015), *Mentored his Summer research project at IISc.* ..... (UG summer intern)
· Mr. Kartikay Gaur, (2016), *Mentored his Summer research project at IISc.* ..... (UG summer intern)
· Dr. Jiasen Guo (2018–2019), *Initial research including neutron expts. at Mizzou.* ..... (Ph.D. student)
· Ms. Pousali Ghosh (2019–2021), *Initial research including neutron expts. at Mizzou.* ... (Ph.D. student)
· Mr. Moudip Nandi (2021–2022), *Initial research including neutron expts. at Mizzou.* .... (Ph.D. student)
· Dr. Ashiq Shawon (2024), *Trained him on neutron scattering and analysis at ORNL* ... (Research Intern)
· Ms. Sierra Diller (2025), *Training her on inelastic neutron scattering at ORNL* ..... (UG summer intern)

REFERENCES

◯ Dr. Raphaël P. Hermann (✉ hermannrp@ornl.gov) ..... Sr. Scientist, ORNL
Postdoc Advisor (2022–)

◯ Dr. Michael E. Manley (✉ manleyme@ornl.gov) ..... Sr. Scientist, ORNL
Postdoc co-Advisor (2022–)

◯ Prof. Deepak K. Singh (✉ singhdk@missouri.edu) ..... Assoc. Prof., Mizzou
Ph.D. Advisor (2017–22)

◯ Dr. Valeria Lauter (✉ lauterv@ornl.gov) ..... Sr. R&D Scientist, ORNL
Ph.D. co-Advisor (2017–22)

◯ Prof. Abhishek K. Singh (✉ abhishek@iisc.ac.in) ..... Professor, IISc
UG Advisor (2014–17)