# Amina E. Hussein, MS, PhD

University of Alberta, Department of Electrical & Computer Engineering
11-368 Donadeo Innovation Centre for Engineering, 9211-116 Street, Edmonton AB T6G 2H5
✉ aehussein@ualberta.ca


## RESEARCH INTERESTS

- Laser-driven particle accelerators, including laser-wakefield acceleration (LWFA) and direct laser acceleration (DLA),
- Fusion science and inertial confinement fusion,
- X-ray spectroscopy for plasma diagnostics,
- Adaptive control of high-repetition-rate laser experiments,
- Multiphysics modeling of laser-matter interactions.
- Laser-induced breakdown spectroscopy,
- Data-driven and machine learning modeling of plasmas,
- Translation of laser and plasma technologies into interdisciplinary applications, including sustainable agriculture and advanced manufacturing.

## EDUCATION

**Ph.D. Applied Physics** University of Michigan, Ann Arbor, MI, USA 2015 - 2019
Advisor: Prof. Karl Krushelnick & Prof. Louise Willingale
Dissertation title: *Laser-driven electron accelerators as a broadband radiation source*
**M.S. Nuclear Engineering** Purdue University, West Lafayette, IN, USA 2013 - 2015
Advisor: Prof. Ahmed Hassanein
**B.Sc. Honours Physics**, McGill University, Montréal, QC, Canada 2008 - 2013
Minor: Interdiscplinary Life Sciences
Honours thesis advisor: Prof. Mark Sutton

## POSITIONS

**Canada Research Chair Tier 2** in Laser-Plasma Interactions 05/2023 - Present
University of Alberta, Edmonton, AB, Canada
**Assistant Professor**, Department of Electrical & Computer Engineering 07/2020 - Present
University of Alberta, Edmonton, AB, Canada
**Granted Tenure and promotion to Associate Professor effective 07/2025*
**Maternity leaves: 03/2022-03/2023, 10/2024 - Present*
**Adjunct Professor**, Department of Physics 07/2024 - Present
University of Alberta, Edmonton, AB, Canada
**Adjunct Professor**, Graduate Studies and Research 10/2022 - Present

Faculty of Engineering and Applied Science, University of Regina, Regina, SK, Canada
**UC President's Postdoctoral Fellow**, Department of Physics & Astronomy 07/2019 - 06/2020
University of California, Irvine, CA, USA
**Research Aide**, Argonne Leadership Computing Facility 06/2015 - 08/2015
Argonne National Laboratory, Lemont, IL, USA
**Visiting Scholar**, Department of Nuclear Engineering 05/2012 - 08/2012
Purdue University, West Lafayette, IN, USA
**Research Assistant**, Department of Neurology & Neurosurgery 05/2011 - 08/2011
McGill University, Montréal, QC, Canada

## FUNDING

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**Total external funding awarded as PI:** Over $3 Million CAD since July 2020
**Facility access awarded as PI:** Over $500,000 CAD since July 2020

### AWARDED

27. **Results Driven Agriculture Research** 04/2025-03/2027
**Developing innovative laser-induced breakdown spectroscopy technology with machine learning capability for rapid analysis of cereal grain and byproduct composition**
**PI**: A.E. Hussein
**Co-PIs**: N. Patterson (NRCC), M. Sabsabi (NRCC), M. Jelinski (Veterinary Agri-Health Services Ltd.), A. Feurtado (NRCC), B. Yu (NRCC)
**Amount**: $265,514 CAD

26. **Beef Cattle Research Council** 04/2025-03/2027
**Developing innovative laser-induced breakdown spectroscopy technology with machine learning capability for rapid analysis of cereal grain and byproduct composition**
**PI**: N. Patterson (NRC)
**Co-PIs**: A.E. Hussein, M. Sabsabi (NRC), M. Jelinski (Veterinary Agri-Health Services Ltd.), A. Feurtado (NRC), B. Yu (NRC)
**Amount**: $265,514 CAD

25. **Mitacs Lab2Market Business Strategy Internship** 01/2025-04/2025
**A high-sensitivity, field-portable laser-based probe for soil monitoring**
**PI**: A.E. Hussein
**Intern**: S. Mohajan
**Amount**: $15,000 CAD

24. **Canada Foundation for Innovation - Major Science Initiatives Beamtime Proposals, ALLS** 07/2024-06/2025
**Real-time, Bayesian Optimization of Betatron Radiation from a Laser-Plasma Accelerator**
**PI**: N.F. Beier (UofA)
**Co-PI**: A.E. Hussein
**Amount**: Facility Access valued at ≃$30,000 CAD

23. **US Department of Energy, Fusion Energy Sciences, LaserNetUS** 07/2024-06/2025
**Investigation of failure dynamics in additively manufactured alloys using 3D betatron x-ray tomography**
**PIs:** A.E. Hussein, J. Moore (Marquette)
**Amount**: $10,000 USD + Facility access at the Advanced Laser Light Source at INRS valued at ≃$4,950 CAD

22. **NOVA – FRQNT-NSERC PROGRAM for Junior Researchers 04/2024-03/2026**
**Investigation of pulsed discharged in- and in-contact with water by x-ray spectroscopy and ultrafast imaging PI:** A. Hamdan (UdeM)
**Co-PIs:** A. E. Hussein, L. Stafford (UdeM), E. Carbone (UdeM)
**Amount:** $225,000 CAD

21. **Canadian Institutes of Health Research (CIHR) Team Grant: Lung Health 04/2024-xxxx**
**Interventions to address exposure and health outcomes linked with air pollution and climate change - an interdisciplinary team approach**
**PI:** A. Hicks (UAlberta)
**Co-Is:** M. Hicks (UAlberta), J. Harynuk, R. Zhao ((UAlberta), L. Behjat (UCalgary), M. Demissie (UCalgary), L. Kelly (UmManitoba), M. Ospina (Queens), S.M. Tse (UdeM)
**Collaborators:** P. de la Mata Espinosa (UAlberta), R. Valji (UAlberta)
**Knowledge User:** A.E. Hussein
**Amount:** $1,700,000 CAD

20. **Mitcas Accelerate** 11/2023-01/2026
**Development of a portable laser-based system for soil analysis**
**PI:** A. E. Hussein
**Industry Partner:** Croptimistic Technology Inc.
**Amount**: $60,000 CAD

19. **US Department of Energy, Fusion Energy Sciences, LaserNetUS** 07/2023-06/2024
**The Impact of Sheath Dynamics on Radiation Generation in Laser Solid Interactions**
**PIs:** F. Dollar (UCI), Amina E. Hussein
**Amount**: $10,000 USD + + facility access valued at ≃$50,000 CAD

18. **Canada Research Chair, Tier 2** 05/2023 - 05/2029
**Laser-Plasma Based Diagnostics**
**PI:** A. E. Hussein
**Amount:** $600,000 CAD

17. **NSERC Research Tools and Instruments**
04/2023-03/2024
**High-repetition rate particle acceleration end-station for ultrafast science**
**PI:** A. E. Hussein
**Amount:** $141,739 CAD

16. **NSERC CREATE program** 09/2023-08/2029
**Training in Ultrafast Science and Technology (TrUST)**

**PI:** F. Légaré (INRS)
**Co-Applicants:** A. E. Hussein, D. Strickland (Waterloo), Byung-Kook Ham (USask), David Cooke (McGill), Emile Haddad; Frank Hegmann (UAlberta), Kimberley Hall; Ksenia Dolgaleva; Lora Ramunno; Matt Reid (UNBC), Tsuneyuki Ozaki (INRS)
**Amount:** $1,650,000 CAD

15. **Canadian Space Agency, CubeSats Initiative in Canada for STEM 2022** 04/2023 - 03/2026
**Ex-Alta 3: Measuring Ice and Snow Coverage**
**PI:** C. Lange (UAlberta)
**Co-PIs:** A. E. Hussein, K. Knudsen, M. Lipsett, I. Mann, A. Iyer
**Amount:** $348,700 CAD

14. **NSERC Alliance - Alberta Innovates Advance, Discovery Supplement** 03/2023 - 02/2025
**New frontiers in intense laser-matter interactions**
**PI:** A. E. Hussein
**Amount**: $32,000 CAD

13. **University of Alberta, Tecnológico de Monterrey Seed Funding** 07/2022-06/2023
**Small-Scale, High-Impact Digital Solutions and Approaches towards SMEs 4.0**
**PI:** R. Ahmad (UAlberta), A. Román (TEC)
**Collaborators:** A. E. Hussein (UAlberta), X. Zhang (UAlberta), R. Monroy (UAlberta), D. Romero (TEC), E. Cuan (REC), P. Urbina (TEC), C. Vazquez (TEC)
**Amount**: $45,000 CAD

12. **US Department of Energy, Fusion Energy Sciences, LaserNetUS** 04/2022-06/2023
**Investigation of pulsed discharges in water by betatron x-ray imaging**
**PI:** Amina E. Hussein
**Co-PIs:** A. Hamdan (UMontréal), Jason Myatt (UAlberta), V. Senthilkumaran (UAlberta)
**Amount**: $15,772 USD ($20,504 CAD) + Facility access at the Advanced Laser Light Source at INRS valued at ≃$50,000 CAD

11. **US Department of Energy, Fusion Energy Sciences, LaserNetUS** 04/2022-06/2023
**Exploring the role of energetic electrons in volumetric heating of solid-density plasma using high-resolution time-resolved X-ray spectroscopy**
**PI:** Nick Beier (UAlberta)
**Co-PI:** A. E. Hussein (UAlberta)
**Amount**: $41,616 USD ($54,100 CAD) + Facility access at the Jupiter Laster Facility at Lawrence Livermore National Laboratory valued at ≃$150,000 USD

10. **NSERC Alliance - Alberta Innovates Advance Program** 04/2022-03/2025
**Smart in-situ X-ray-based probing system for novel additively manufactured products and materials**
**PI:** Amina E. Hussein
**Co-investigators:** Rafiq Ahmad (UAlberta)
**Amount**: $300,000 CAD

9. **Alberta Jobs, Economy and Innovation Small Equipment Grant** 02/2022

**Smart femtosecond microbeamline for ultrafast applications**
**PI:** Amina E. Hussein
**Amount**: $274,649 CAD

8. **Western Grains Research Foundation, Saskatchewan Wheat Development Commission** 04/2022-03/2025
Laser Induced Breakdown Spectroscopy for efficient germplasm selection of wheat grain attributes
**PI:** Amina E. Hussein
**Collaborators:** Jatinder Sangha (Agriculture & Agri-Food Canada), Bin Xiao Fu (Canadian Grain Commission), Srinivas Sura (Agriculture & Agri-Food Canada), Frank Hegmann (UAlberta), A. Bais (URegina)
**Amount**: $204,360 CAD

7. **Canada Foundation for Innovation, John Evans Leaders Fund** 06/2021
**Smart femtosecond microbeamline for ultrafast applications**
**PI:** Amina E. Hussein
**Amount**: $274,649 CAD

6. **NSERC, Discovery Grant** 04/2021-04/2028
**New frontiers in intense laser-matter interactions**
**PI:** Amina E. Hussein
**Amount**: $144,000 + $12,500 CAD Discovery Launch award

5. **Digital Research Alliance of Canada (formerly Compute Canada), Resources for Research Groups Competition**
**New frontiers in intense laser-matter interactions**
**PI:** Amina E. Hussein
**Amount**: $8,069 CAD equivalent cost of resources 04/2023-03/2024
**Amount**: $14,266 CAD equivalent cost of resources 04/2022-03/2023
**Amount**: $14,639 CAD equivalent cost of resources 04/2021-03/2022

4. **US Department of Energy, Fusion Energy Sciences, LaserNetUS** 03/2021-12/2022
**High-resolution betatron X-ray imaging of porosity evolution in additively manufactured alloys**
**PI:** Amina E. Hussein
**Collaborators:** J. Moore (Marquette University), L. Zhou (Marquette University)
**Amount**: $86,268 USD ($105,662.77 CAD) + facility access valued at ≃$50,000 CAD

3. **Alberta Innovates Smart Agriculture and Food Digitization and Automation Challenge** 03/2021-8/2024
**Laser Induced Breakdown Spectroscopy for in-situ soil analysis**
**PI:** Amina E. Hussein
**Collaborators:** Frank Hegmann (UAlberta), Miles Dyck (UAlberta), Abdul Bais (URegina)
**Amount**: $498,000 CAD + $430,000 CAD in-kind

2. **Shastri Indo-Canadian Institute, Golden Jubilee Conference and Lecture Series Grant** 02/2021-03/2021
**Science and Technology for the New Age - Acquisition, Analysis and Adaptation**
**Director:** Amartya Sengupta (IIT Delhi)

**Collaborators:** Amina E. Hussein (UAlberta), Aparajita Bandyopadhyay (IIT Delhi)
**Amount**: 1,10,000 Rs

1. **US Department of Energy, Fusion Energy Sciences, LaserNetUS** 07/2020-12/2021
**The role of hot electrons in the generation of anomalous X-ray spectra from ultra-intense laser-plasma interactions**
**PI:** Amina E. Hussein
**Collaborators:** K. Flippo (LANL), F. Dollar (UCI), L. Gao (PPPL), K. Hill (PPPL), S. Hansen (SNL), R. Shepherd (LLNL)
**Amount**: $75,117 USD ($97,634.15 CAD) + facility access valued at ≃$150,000 USD

## HONORS AND AWARDS

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### SCHOLARSHIPS AND PRIZES

Finalist, Women in Innovation Award, ASTech 2024
Alberta Capital Airshed Clean Air Award 2024
Canada Research Chair, Tier II *($600,000 CAD)* 2023 - 2028
University of California President's Postdoctoral Fellowship, *($71,125 USD, faculty hiring incentive)* 2019
University of Michigan Rackham Graduate Student Research Grant, *($3,000 USD)* 2019
Michigan Institute for Plasma Science and Engineering Fellowship, *($4,000 USD)* 2018
University of Michigan Marian Sarah Parker Graduate Prize, *($1,000 USD)* 2018
U-M Library Student Mini-Grant, *($1,000 USD)* 2017
SPIE Laser Technology, Engineering and Applications Scholarship, *($5,000 USD)* 2015
NSERC of Canada Postgraduate Doctoral Scholarship, *($63,000 CAD)* 2015 - 2018
UCSD California Research Assistantship Fellowship, *($50,546 USD, declined)* 2015 - 2017
SPIE Optics and Photonics Education Scholarship *($2 000 USD)* 2013
IEEE Nuclear and Plasma Sciences Phelps Grant *($750 USD)* 2013
McGill University Mobility Award, *($3 000 CAD)* 2012

### PRESENTATION AWARDS

Best Poster Award, MIPSE Graduate Student Symposium 2018
Outstanding Poster Award, International Committee on Ultrahigh Intensity Lasers Conference 2018
First Place Poster Award, OMEGA Laser Users' Workshop, Rochester, NY 2018
Best Poster Award, OMEGA Laser Users' Workshop, Rochester, NY 2016
Best Poster Award, Conference for Undergraduate Women in Physics, Caltech, Pasadena, CA 2013
Third Prize Talk, Applied Physics, Canadian Undergraduate Physics Conference, Vancouver, BC 2012
Second Prize Poster, McGill Department of Physics Poster Presentations, Montréal, QC 2012

### ADDITIONAL HONORS

Institute of Physics Trusted Reviewer Status 2020
Scientific Reports Top 100 Physics Articles in 2019 2020
Invited remarks, University of Michigan Nobel Laureate Lecture featuring Prof. Gérard Mourou 2019
Travel Award, The First Annual Users Meeting of LMJ-Petal 2018
Invited to partake in the 2018 Communicating Science Conference, Michigan 2018
Selected to attend the NNSA/CEA Postdoctoral Exchange Workshop in Paris, FR 2018

Travel Award, Conference for Undergraduate Women in Physics, Caltech 2013
Award to represent McGill University at the Canadian Undergraduate Physics Conference 2012
Departmental nomination to the McGill Faculty of Science Undergraduate Research Conference 2012

## PUBLICATIONS

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- Convention for author order: 1st: Greatest contributions, 2nd/3rd: Significant contributions, Final: Principal investigator.
- *Underline denotes supervised students, double underline denotes supervised postdoctoral fellows.*

### REFERRED JOURNAL PUBLICATIONS

J29. V. Senthilkumaran, N.F. Beier, S. Fourmaux, P. Shabaninezhad, J. Stinehart, L. Zhou, J. Moore, **A.E. Hussein**, *Laser-driven betatron x-rays for high-throughput imaging of additively manufactured materials*, Review of Scientific Instruments, **95**, 123510 (2024)

J28. S. Mohajan, F. Mehravaran, S. Ansari, L. Droog, N.F. Beier, F. Keserwan, Y. Huang, A. Bais, R. Fedosejevs, M. Gamal El-Din, **A.E. Hussein**, *Impact of sample preparation on bitumen content measurement using laser-induced breakdown spectroscopy*, Spectrochimica Acta Part B: Atomic Spectroscopy, 107083 (2024)

J27. P. Kordell, C. Zulick, **A.E. Hussein**, T. Batson, *Quasi-Monoenergetic Ion Acceleration and Neutron Generation from Laser-Driven Transverse Collisionless Shocks*, Physics of Plasmas, **31**, 103110 (2024)

J26. N.F. Beier, V. Senthilkumaran, E. Kriz, S. Fourmaux, F. Legare, T. Ma, **A.E. Hussein**, *Deep Learning Based X-ray Spectrometer for High Repetition Rate Characterization of Betatron Radiation*, Physics of Plasmas, **31**, 103106 (2024)

**Editor's Pick article*

J25. S. Mohajan, N.F. Beier, **A.E. Hussein**, *Investigating crater formation in nanosecond laser ablation of aluminum foils*, Journal of Applied Physics, **136**, 023102 (2024)

**Editor's Pick article*

J24. Y. Ma, J.A. Cardarelli, P.T. Campbell, S. Fourmaux, R. Fitzgarrald, M.D. Balcazar, A.F. Antoine, N.F. Beier, Q. Qian, **A.E. Hussein**, B. Kettle, S.R. Klein, K. Krushelnick, Y.F. Li, S.P.D. Mangles, G. Sarri, D. Seipt, V. Senthilkumaran, M.J.V. Streeter, L. Willingale, and A.G.R. Thomas, *Single-Shot Diagnosis of Electron Energy Evolution via Streaked Betatron X Rays in a Curved Laser Wakefield Accelerator*, Physical Review Letters **132**, 225001 (2024)

J23. Y. Huang, S. Mohajan, N.F. Beier, Y. Wan, S Lamothe, A. Bais, M. Dyck, F. Hegmann, **A.E. Hussein**, *Adaptive learning for soil classification in laser-induced breakdown spectroscopy streaming*, IEEE Transactions on Artificial Intelligence (2024)

J22. S. Mohajan, Y. Huang, N.F. Beier, M. Dyck, F. Hegmann, A. Bais, **A.E. Hussein**, *The effect of laser wavelength on soil carbon measurement using laser-induced breakdown spectroscopy* Optics Express, **31**, 20 (2023)

J21. Y. Huang, A. Bais, **A.E. Hussein**, *Domain adaptation using class-balanced self-paced learning for soil classification with LIBS*, IEEE Transactions on Plasma Science, **51**, 9 (2023) (citations: 1)

J20. Y. Huang, A. Bais, **A.E. Hussein**, *Pseudo-Shot Learning for Soil Classification with Laser-Induced Breakdown Spectroscopy*, IEEE Transactions on Artificial Intelligence (2023)

J19. Y. Huang, S. Harilal, A. Bais, **A.E. Hussein**, *Progress Toward Machine Learning Methodologies for Laser-Induced Breakdown Spectroscopy With an Emphasis on Soil Analysis*, IEEE Transactions on Plasma Science, **51**, 7 (2023) (citations: 17)

**Invited review in the 50th Anniversary issue of IEEE TPS*

J18. **A.E. Hussein**, J.D. Ludwig, Y. Ma. P.-E. Masson-Laborde, P.J. Skrodzki, J. Hinojosa, E. Peterson, I. Jovanovic, A. Maksimchuk, J. Nees, A.G.R. Thomas, W. Rozmus, K. Krushelnick, *Direct spectral measurements of mid-infrared radiation from a laser wakefield accelerator*, Physical Review A, **106** 063505 (2022)

J17. M.J.V. Streeter, Y. Ma, B. Kettle, E. Gerstmayr, F. Albert, N. Bourgeois, S. Cipiccia, J.M. Cole, I.G. Gonzalez, A. Higginbotham, **A.E. Hussein**, K. Falk, K. Krushelnick, N. Lemos, N.C. Lopes, C. Lumsdon, S.P.D. Mangles, Z. Najmudin, P.P. Rajeev, M. Shahzad, M. Smid, R. Spesyvtsev, D.R. Symes, G. Vieux, A.G.R. Thomas, *Characterization of Laser Wakefield Acceleration Efficiency with Octave Spanning Near-IR Spectrum Measurements*, Physical Review Accelerators and Beams, **25** 101302 (2022) (citations: 6)

J16. N.F. Beier, H. Allison, P. Efthimion, K. Flippo, L. Gao, S. Hansen, K. Hill, R. Hollinger, M. Logantha, Y. Musthafa, R. Nedbailo, V. Senthilkumaran, R. Shepherd, V.N. Shlyaptsev, H. Song, S. Wang, F. Dollar, J. Rocca, **A.E. Hussein**, *Homogeneous, micron-scale high-energy-density matter generated by relativistic laser-solid interactions*, Physical Review Letters, **129** 135001 (2022) (citations: 10)

J15. V. Senthilkumaran, K. Behm, D. Bailie, J. Warwick, G.M. Samarin, A. Maksimchuk, J. Nees, A. Thomas, G. Sarri, K. Krushelnick, **A.E. Hussein**, *Intense gamma-ray source based on focused electron beams from a laser wakefield accelerator*, Applied Physics Letters, **120** 264103 (2022) (citations: 3)

J14. A. Maitrallain, E, Brunetti, M. Streeter, B. Kettle, R. Spesyvtsev, G. Vieux, M. Shazhad, B. Ersfeld, S. Yoffe, A. Kornaszewski, O. Finlay, Y. Ma, F. Albert, N. Bourgeois, S. Dann, N. Lemos, S. Cipiccia, J. Cole, I. Gallardo González, A. Higginbotham, **A.E. Hussein**, M. Šmíd, K. Falk, K. Krushelnick, N. Lopes, E. Gerstmayr, C. Lumsdon, O. Lundh, S. Mangles, Z. Najmudin, P. Rajeev, D. Symes, A. Thomas, D. Jaroszynski, Dino *Parametric study of high-energy ring-shaped electron beams from a laser wakefield accelerator*, New Journal of Physics, **24** 013017 (2022) (citations: 4)

J13. Y. Ma, D. Seipt, **A.E. Hussein**, S. Hakimi, N.F. Beier, S.B. Hansen, J. Hinojosa, A. Maksimchuk, J. Nees, K. Krushelnick, A.G.R. Thomas, F. Dollar, *The effects of laser polarization and wavelength on injection dynamics of a laser wakefield accelerator*, Physics of Plasmas, **28** 6 (2021) (citations: 7)

J12. M. Stanfield, N.F. Beier, S. Hakimi, H. Allison, D. Farinella, **A.E. Hussein**, T. Tajima and F. Dollar, *Relativistic few cycle laser pulses produced from self phase modulation in thin dielectric media*, Optics Express, **29** 6 (2021) (citations: 26)

J11. **A.E. Hussein**, A.V. Arefiev, T. Batson, H. Chen, R.S. Craxton, A.S. Davies, D.H. Froula, Z. Gong, D. Haberberger, Y. Ma, P.M. Nilson, W. Theobald, T. Wang, K. Weichman, G.J. Williams, L. Willingale, *Towards the optimization of direct laser acceleration*, New Journal of Physics, **23** 023031 (2021) (citations: 45)

J10. Y. Ma, D. Seipt, **A.E. Hussein**, S. Hakimi, N.F. Beier, S.B. Hansen, J. Hinojosa, A. Maksimchuk, J. Nees, K. Krushelnick, A.G.R. Thomas, F. Dollar, *Polarization-dependent self-injection by above threshold ionization heating in a laser wakefield accelerator*, Physical Review Letters, **124**, 114801 (2020) (citations: 18)

J9. K. Behm, **A.E Hussein**, T.Z Zhao, R.A Baggott, J.M Cole, E. Hill, K. Krushelnick, A. Maksimchuk, J. Nees, S.J Rose, A.G.R Thomas, R. Watt, J.C Wood, V. Yanovsky, S.P.D. Mangles, *Demonstration*

*of Femtosecond Broadband X-rays from Laser Wakefield Acceleration as a Source for Pump-Probe X-ray Absorption Studies*, High Energy Density Physics **35**, 100729 (2020) (citations: 4)

J8. B. Kettle, E. Gerstmayr, M.J.V. Streeter, F. Albert, R.A. Baggott, J.M. Cole, S. Dann, K. Falk, I.G. Gonzalez, **A.E. Hussein**, N. Lemos, N.C. Lopes, O. Lundh, Y. Ma, S.J. Rose, C. Spindloe, M. Smid, D.R. Symes, A.G.R. Thomas, R. Watt, S.P.D. Mangles, *Single shot multi-keV X-ray absorption spectroscopy using an ultrashort laser wakefield accelerator source*, Physical Review Letters **123**, 25 (2019) (citations: 41)

J7. P.T. Campbell, D. Canning, **A.E. Hussein**, K. Krushelnick, A.G.R. Thomas, L. Willingale, *Proton beam emittance growth due to surface plasma expansion and filamentation in kilojoule-class, multipicosecond laser-solid interactions*, New Journal of Physics **21**, 103021 (2019) (citations: 6)

J6. J. Li, P. Forestier-Colleoni, M. Bailly-Grandvaux, C. McGuffey, A.V. Arefiev, S.S. Bulanov, D.C. Gautier, J. Peebles, C. Krauland, **A.E. Hussein**, T. Batson, J.C. Fernandex, S. Palaniyappan, R.P. Johnson, G. Petrov, F.N. Beg, *Laser-driven acceleration of quasi-monoenergetic, near-collimated titanium ions via a transparency-enhanced acceleration scheme*, New Journal of Physics **21**, 103005 (2019) (citations: 8)

J5. **A.E. Hussein**, N. Senabulya, Y. Ma, M.J.V. Streeter, B. Kettle, S.J.D. Dann, F. Albert, N. Bourgeois, S. Cipiccia, J.M. Cole, O. Finlay, E. Gerstmayr, I. Gallardo González, A. Higginbotham, D.A. Jaroszynski, K. Falk, K. Krushelnick, N. Lemos, N.C. Lopes, C. Lumsdon, O. Lundh, S.P.D. Mangles, Z. Najmudin, P.P. Rajeev, C.M. Schleputz, M. Shahzad, M. Smid, R. Spesyvtsev, D.R. Symes, G. Vieux, L. Willingale, J. C. Wood, A.J. Shahani and A.G.R. Thomas, *Laser-wakefield accelerators for high-resolution X-ray imaging of complex microstructures*, Scientific Reports, **9**, 3249 (2019) (citations: 70)

**Scientific Reports top 100 physics articles in 2019, among top 25 most accessed*

J4. K. Behm, **A. Hussein**, T.Z. Zhao, B. Hou, V. Yanovsky, J. Nees, A. Maksimchuk, W. Schumaker, K. Krushelnick, A.G.R. Thomas, *Measurements of electron beam ring structures from laser wakefield accelerators*, Plasma Physics and Controlled Fusion (2019) (citations: 12)

J3. D.M. Farinella, J. Wheeler, **A.E. Hussein**, J. Nees, M. Stanfield, N. Beier, G. Cojocaru, G. Ungureanu, M. Pittman, J. Demailly, E. Baynard, R. Fabbri, R. Secareanu, M. Masruri, R. Dabu, A. Naziru, A. Maksimchuk, K. Krushelnick, G. Mourou, T. Tajima, F. Dollar, *Focusability of laser pulses at petawatt transport intensities in thin-film compression*, Journal of the Optical Society of America B **36**, 2 (2019) (citations: 41)

J2. **A.E. Hussein**, J. Ludwig, K. Behm, Y. Horovitz, P.-E. Masson-Laborde, C. Chvykov, A. Maksimchuk, T. Matsuoka, C. McGuffey, A.G.R. Thomas, W. Rozmus, V. Yanovsky, K. Krushelnick, *Stimulated Raman Backscatter from a laser wakefield accelerator*, New Journal of Physics **20** (2018) (citations: 5)

J1. **A.E. Hussein**, P. K. Diwakar, S.S. Harilal, A. Hassanein, *The role of laser wavelength on plasma generation and expansion of ablation plumes in air*, Journal of Applied Physics **113**, 143305 (2013) (citations: 170)

## CONFERENCE PROCEEDINGS

C5. A.R. Arce-Borkent, T. Richards, V. Senthilkumaran, N.F. Beier, L. Zhou, J.A. Moore, K.S. Knudsen, **A.E. Hussein**, M.G. Lipsett, *Design and Development of a Novel Tensile Testing Apparatus for Time-Resolved Betatron X-ray Tomographic Imaging*, Proceedings of the Canadian Society for Mechanical Engineering International Congress (2022)

C4. E. Saive, L. Droog, K. Ball, J. Swanson, E. Chao, M.G. Lipsett, **A.E. Hussein**, C.F. Lange, B.F. Cockburn, D.G. Elliott, *Design of an imaging payload for earth observation from a nanosatellite* Small Satellite Conference SSC21-WKIV-05 (2021)

C3. M. Stanfield, H. Allison, N. F. Beier, S. Hakimi, **A.E. Hussein**, F. Dollar, *Generating relativistic intensities via staged pulse compression in dielectric media*, OSA High-brightness Sources and Light-driven Interactions Congress 2020 (EUVXRAY, HILAS, MICS) JM3A.2 (2020)

C2. M. Stanfield, N. Beier, S. Hakimi, **A.E. Hussein**, F. Dollar, *Few cycle EUV continuum generation via thin film compression*, Conference on Lasers and Electro-Optics (2020) (citations: 2)

C1. R. Spesyvtsev, E. Brunetti, G. Vieux, M. Shahzad, A. Maitrallain, S. Yoffe, B. Ersfeld, A. Kornaszewski, M. J. V. Streeter, O. Finlay, Y. Ma; B. Kettle, S. J. D. Dann, F. Albert, N. Bourgeois, S. Cipiccia, J. M. Cole, E. Gerstmayr, I. G. Gonzales, A. Higginbotham, **A. E. Hussein**, K. Falk, K. Krushelnick, N. Lemos, N. C. Lopes, C. Lumsdon, O. Lundh, S. P. D. Mangles, Z. Najmudin, P. P. Rajeev, M. Smid, D. R. Symes, A. G. R. Thomas, D. A. Jaroszynski, *Generation of electron high energy beams with a ring-like structure by a dual stage laser wakefield accelerator*, Proceedings of SPIE **11036**, 110360F-1 (2019) (citations: 2)

## STUDENT & POSTDOC SUPERVISION

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**Total supervised trainees:** 47
2 PDFs, 5 PhDs (1 graduated, 1 co-supervised), 8 MScs (3 graduated, 4 co-supervised), 31 UGs (12 co-supervised), 1 Research Associate

**Postdoctoral fellows:**

1. Dr. Yingchao Huang, PhD in Electronic Systems Engineering, URegina 2023 (2024-Present)
   **2024 IEEE NPSS Young Professionals Grant*
2. Dr. Nicholas Beier, PhD in Physics, UC Irvine 2021 (2021-Present)
   **2024 LaserNetUS Annual Meeting Best Postdoctoral Researcher Poster Awards*
   **2023 - Present: United States Department of Energy Fusion Energy Sciences Fellow, Co-supervised by Dr. Tammy Ma (LLNL) and Dr. Francois Legare (INRS)*
   **2021 IEEE NPSS Young Professionals Grant*

**Research Associates:**

1. Morteza Khalaji, MSc in Photonics and Lasers, Shahid Beheshti University 2008 (2024-Present)

**PhD students:**

1. Carlton Kim (PhD, Photonics and Plasmas 2024 - 2029 *expected*
2. Yusuf Ojonoka (PhD, Photonics and Plasmas 2023 - 2028 *expected*)
3. Shubho Mohajan (PhD, Photonics and Plasmas 2021 - 2026 *expected*)
   **2025 Selected for a Mitacs Lab2Market Business Strategy Internship*
   **2024 Alberta Graduate Excellence Fellowship recipient*
   **2024-26 Alberta Innovates Graduate Student Scholarship*
   **2023 Bangladesh Sweden Trust Fund Higher Education Grant recipient*
   **2022 Alberta Graduate Excellence Fellowship recipient*

*2021 SPIE Optics and Photonics Education Scholarship recipient*
*2021 University of Alberta Alberta Doctoral Recruitment fellowship*

4. Vigneshvar Senthilkumaran (PhD, Photonics and Plasmas 2020 - 2025 *expected*)
   *2023-25 Alberta Innovates Graduate Student Scholarship*
   *2021 Alberta Graduate Excellence Fellowship recipient*
   *2021 Seigman International School on Lasers invitee*
   *2020 University of Alberta Alberta Doctoral Recruitment fellowship*
5. Yingchao Huang (PhD, Electronic Systems Engineering, University of Regina, 2024)
   Co-Supervised with Prof. Abdul Bais (URegina)
   Dissertation title: "Coping with the distribution change in soil classification with LIBS"
   *2023 Dissertation nominated for the Governor General's Academic Gold Medal*
   *2023 Andjelic Land Inc. Graduate Award*

**Master's students:**

1. Liam Droog (MSc, Photonics and Plasmas, 2023 - 2025 *expected*)
2. Sakila Ansari (MSc, Photonics and Plasmas, 2023 - 2025 *expected*)
3. Mariam Moussilli (MEng, Photonics and Plasmas, 2022 - 2024 *expected*)
   *2024 Alberta Graduate Excellence Fellowship recipient*
   *2023 Falling Walls Lab Edmonton, Finalist*
4. Khulood Alqaydi (MSc, Mechanical Engineering, 2025 *expected)*
   Co-supervised with Prof. Ahmed Qureshi
5. Carlton Kim (MSc, Physics, 2021 - 2023)
   Co-Supervised with Prof. Richard Sydora
   Thesis: *Near Critical Density Laser Beat-wave Acceleration for Radiotherapy Applications*
6. Aran McDowell (MSc, Physics, 2020 - 2022)
   Co-Supervised with Prof. Frank Hegmann
   Thesis: *Characterization of Laser-Induced Plasmas with Terahertz Pulses*
7. Madhu Beniwal (MTech, Physics, IIT Delhi, 2021 - 2022)
   Co-Supervised with Prof. Amartya Sengupta
8. Mohammad Kabir (MSc, Photonics and Plasmas supervised in 2021)

**Undergraduate Students:**

1. Ava San Agustin (Research Assistant, B.Sc. Engineering 2028 *expected*)
2. Andrea Roman (Research Assistant, Co-supervised with Dr. Rafiq Ahmad, B.Sc. Mechanical Engineering 2026 *expected*
3. Miles Taylor (B.Sc. Electrical Engineering 2024 *expected*)
4. Aaron Lottin (I-STEAM Environmental Research Internships for Indigenous Students and NSERC USRA 2024, Co-supervised with Dr. Duane Froese, B.Sc. Software Engineering 2028 *expected*)
5. Matthew Maurier (NSERC USRA, B.Sc. Electrical Engineering 2026 *expected*)
6. Abhay Agnihotri (Engineering Co-Op intern 2024, Co-supervised with Dr. Michael Lipsett, B.Sc. Mechanical Engineering 2025 *expected*)

7. Fahrin Bushra (Engineering Co-Op intern 2024, Co-supervised with Dr. Anne Hicks, B.Sc. Software Engineering 2025 *expected*)
8. Bhavesh Nadumananchi (Dean's Research Award student, 2024, B.Sc. Mechanical Engineering 2024 *expected*)
9. Zilin Qiu (Dean's Research Award student, 2024, B.Sc. Software Engineering 2027 *expected*)
10. Syed Faiyaz (Dean's Research Award student, 2024, B.Sc. Electrical Engineering 2027 *expected*)
11. Yi Meng Wang (Engineering Co-op intern 2023, B.Sc. Software Engineering 2024, Co-supervised with Dr. Rafiq Ahmad)
12. Ester Kriz (NSERC USRA Summer 2023, B.Sc. Physics Honours, McGill University, 2023)
13. Wilson Truong (Engineering Co-op intern 2023, Co-supervised with Dr. Rafiq Ahmad)
14. Rashed Khan (Summer Undergraduate Researcher, B.Sc. Electrical Engineering 2028 *expected*
15. Jason Song, (Summer Undergraduate Researcher, B.Sc. Electrical Engineering 2027 *expected*)
16. Carter Wassil (Dean's Research Award student 2023,B.Sc. Electrical Engineering 2025 *expected*)
17. Uriah Martinkus (Dean's Research Award student 2023,B.Sc. Electrical Engineering 2024 *expected*)
18. Raghav Sharma (Dean's Research Award student 2023,B.Sc. Electrical Engineering 2024 *expected*)
19. Damien Hang (Dean's Research Award student 2022, B.Sc. Electrical Engineering 2024 *expected*)
20. Owen Cooke (Engineering Co-op intern 2022, Co-supervised with Dr. Rafiq Ahmad)
21. Bassam Nima (NSERC USRA, 2022, B.Sc. Engineering Physics 2023 *expected*)
22. Sadee Lamothe (I-STEAM Environmental Research Internships for Indigenous Students and NSERC USRA 2022, B.Sc. Physics 2022)
23. Ying Wan (Dean's Research Award student 2021/22, Co-op intern and NSERC USRA 2022, B.Sc. Co-op, Computer Engineering 2025 *expected*)
24. Benaka Achar (Dean's Research Award student 2022, B.Sc. Electrical and Computer Engineering 2025 *expected*)
25. Nehal Sekhon (Dean's Research Award student 2021/22, B.Sc. Co-op, Computer Engineering, 2025 *expected*)
26. Jamin Achtymichuk (Summer Undergraduate Researcher, Co-Supervised with Prof. Miles Dyck, B.Sc. Physics Honours 2021)
27. Liam Droog (NSERC USRA Summer 2021, B.Sc. Physics 2023 *expected*)
28. Fatima Keserwan (NSERC USRA Summer 2021, Co-Supervised with Prof. Mohamed Gamal El-Din, B.Sc. Civil & Environmental Engineering 2023 *expected*)
29. Max Stratmann Meouchi (Summer 2021, B.Sc. Engineering Physics 2022 *expected*)
30. Alvaro Arce-Borkent (Winter 2021 Co-Op, B.Sc. Mechanical Engineering 2022 *expected*)
31. Mahek Logantha (Summer Undergraduate Researcher, B.Sc. Mechanical Engineering, UCI, 2020)

**High School Students:**

1. Kaylin Crocker (WISEST Summer Research Program, Summer 2024)

**Capstone Projects**

**Winter 2024:** UofA Software Engineering Capstone Design Project:
Client for 1 groups of 3 senior undergraduate students on the development of a dashboard for air-quality monitoring.

**Team awarded a Clean Air Award by the Alberta Capital Airshed for this work.*

**Fall/Winter 2021/2:** UofA Electrical Engineering Capstone Design Project:
Technical advisor for 2 groups of 4 senior undergraduate students (8 students in total) on the development of an auto-focussing system for intense laser pulses.

## SELECTED SERVICE

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### PROFESSIONAL

**Journal reviewer:** Physical Review Letters, Science Advances, IEEE Transactions on Plasma Science, Optics Express, Physics of Plasmas, Plasma Physics and Controlled Fusion, Nuclear Fusion, Journal of the Optical Sciences of America B, European Journal of Medical Physics, Nuclear Instruments and Methods A, Applied Radiation and Isotopes, High Power Laser Science and Engineering

Peer-Review Activities

- Saskatchewan Wheat Development Commission — 2023
- Department of Energy (DOE), Office of Science — 2021, 2023
- US National Science Foundation (NSF) Science and Technology Centers, Site Visit — 2020
- US NSF/DOE Partnership in Basic Plasma Science and Engineering — 2020

Guest Editor:
Journal of Plasma Physics Special Issue on Laser and Plasma Accelerators — 09/2023

Invited Participant: Basic Research Needs for Laser Technology — 08/2023

Editorial Advisory Board: Matter and Radiation at Extremes — 01/2023 - Present

Strategic Planning Committee: Advanced Laser Light Source — 9/2021 - Present

Co-Chair: US Department of Energy, Intense-light USers Engagement (I-USE) — 3/2021 - Present

Co-Director of Outreach/Equity, Diversity and Inclusion, UofA Engineering — 1/2021 - Present

Executive Committee: Jupiter Laser Facility User Group — 1/2021 - Present

Canadian Association of Physicists, Division of Plasma Physics:

- Vice Chair — 04/2023 - Present
- Webmaster — 04/2021 - 04/2022

Board of Directors: Fusion Energy Council of Canada — 10/2022 - 04/2024

Postdoctoral representative: UCI Committee on Inclusive Excellence 02/2020 - 06/2020

**ACADEMIC & RESEARCH**

Mentor: The Indigenous and Black Engineering Technology PhD Project 05/2021 - Present

Curriculum Committee : UAlberta Energy Systems Signature Area 04/2021 - Present

Faculty Advisor: AlbertaSat 09/2020 - Present

Co-Founder: UAlberta Climate Hack Student Engagement 2/2021

**CONFERENCES**

Program Committee Member: 2025 Laser Plasma Accelerator Workshop 10/2024 - Present

Program Committee Chair: 2024 APS Division of Plasma Physics Meeting 10/2023 - Present

Technical Program Committee: CLEO Conference 6/2022 - Present

Moderator: 2023 Alberta Innovates Inventure$, Soil Carbon Quantification and Credits Panel 06/2023

Program Committee: 2023 Laser Plasma Accelerators Workshop 9/2022 - 03/2023

Program Committee: 2022 APS Division of Plasma Physics Meeting 2/2022 - 10/2022

Chair: 2022 IEEE ICOPS, Women in Engineering Reception 8/2021 - 05/2022

Session chair: 2021 OSA Frontiers in Optics + Laser Science Annual Meeting 11/2021

Session chair: 2019 APS Division of Plasma Physics Meeting 10/2019

**OUTREACH**

Board member: The University Infant Toddler Center 12/2023 - Present

Board member: The Tomorrow Foundation for a Sustainable Future 09/2023 - Present

Board member: Women in Scholarship, Engineering, Science, and Technology 07/2023 - Present

Committee member: APS Women+ in Plasma Physics 1/2021 - 01/2024

Co-organizer: UAlberta Exploring Energy Systems Webinar Series, Sessions 1,4 11/2021

Invited panelist: UAlberta Climate Change Action Theatre 11/2021

Volunteer: UAlberta WISEST SET Conference 2020/21

Evaluation committee: UAlberta William Muir Edwards Citizenship Award 2021

## TEACHING EXPERIENCE

**Course professor:** UAlberta ECE 475: Optoelectronic and Photovoltaic Devices — Winter 2024
42 students

**Course professor:** UAlberta ECE 202: Electrical Circuits I — Fall 2023
117 students

**Technical advisor:** UAlberta ECE 490/491: Electrical Engineering Capstone Design — 2021/2022

**Course professor:** UAlberta ECE 202: Electrical Circuits I — Fall 2021
52 students, student ratings of instructor effectiveness 5.0/5.0.

**Lecturer:** PPPL Introduction to Fusion Energy and Plasma Physics Course — June 2021

**Course professor:** UAlberta ECE 209: Fundamentals of Electrical Engineering — Winter 2021
136 students, student ratings of instructor effectiveness 4.8/5.0.

**Course assistant:** Michigan Math and Science Scholars — 06/2019

**Volunteer lecturer:** Code.org — 11/2016 - 07/2019

**Volunteer tutor:** Washtenaw Literacy — 11/2016 - 07/2019

## MEMBERSHIPS

| | |
|---|---|
| The Institute of Electrical and Electronics Engineers (IEEE) | Since 2013 |
| American Association of Physicists | Since 2013 |
| The International Society for Optics and Photonics (SPIE) | Since 2013 |
| Canadian Association of Physicists | Since 2013 |
| Optica (Formerly the Optical Society of America) | Since 2020 |

## SKILLS AND COMPETENCIES

**Languages:** English (native), French (professional)

**Laboratory experience:** Experience leading and collaborating with international teams of scientists on high-intensity laser plasma experiments performed at the following facilities:

- PI of a 1 kHz, 14 mJ, 30 fs Ti:Sapphire laser and experimental end-station at the University of Alberta
- Co-PI of a 10 Hz, 600 mJ, 30 fs Ti:Sapphire laser and experimental end-station at the University of Alberta
- HERCULES laser, University of Michigan, USA
- OMEGA EP laser, Laboratory for Laser Energetics, University of Rochester, USA
- Gemini laser, Rutherford Appleton Laboratory, UK

- Trident laser, formerly at Los Alamos National Laboratory, USA
- ELFIE laser, Laboratoire pour l'Utilisation des Laser Intenses, France
- ALEPH laser, Colorado State University, USA
- Advanced Laser Light Source, Institut national de la recherche scientifique, Canada

**Programming:** Shell-script, MATLAB, Fortran, Python, Julia
**Software:** EPOCH, VisIt, AutoCAD, TRIM/SRIM, ImageJ, VisRad

## PRESENTATIONS

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### INVITED TALKS & SEMINARS

1. **A.E. Hussein**, New frontiers in intense laser-matter interactions, University of Waterloo Department of Physics Symposium, October 26th, 2024 (cancelled)
2. **A.E. Hussein**, High-throughput LWFA betatron x-ray imaging at 2.5 Hz, *10th International Conference on Ultrahigh Intensity Lasers*, Cozumel, MX, September 9-13, 2024 (cancelled)
3. **A.E. Hussein**, Smart analysis techniques for laser-produced plasmas, *2024 Gordon Research Conference on Plasma Processing Science*, Andover, New Hampshire, July 21-26, 2024
4. **A.E. Hussein**, Advancing laser-induced breakdown spectroscopy for soil monitoring, *The Canadian Society for Analytical Sciences and Spectroscopy*, Niagara Falls, ON, June 17-20, 2024
5. **A.E. Hussein**, High-throughout x-ray imaging using a laser-plasma accelerator, *7th International Conference on Matter and Radiation at Extremes*, Hangzhou, CN, May 13-17, 2024 (cancelled)
6. **A.E. Hussein**, Intense laser-plasma interactions and laser-plasma accelerators, *University of Alberta Department of Physics Colloquium*, Edmonton, AB, April 3, 2024
7. **A.E. Hussein**, Smart Laser-Plasma Based Diagnostics for Complex Materials, *University of British Columbia Department of Physics Seminar Series*, Virtual, February 2, 2024
8. **A.E. Hussein**, High-resolution tomography of porosity evolution in additively manufactured alloys using betatron x-rays, *Advanced Laser Light Source Workshop*, St Sauveur, Canada, September 5-8, 2023
9. **A.E. Hussein**, High-resolution tomography of porosity evolution in additively manufactured alloys using betatron x-rays, *US Department of Energy LaserNetUS Annual Meeting*, College Park, USA, June 27-29, 2023
10. **A.E. Hussein**, Laser-induced breakdown spectroscopy for analysis of complex environmental samples, *Photonics North Conference 2023*, Montréal, Canada, June 12-15, 2023
11. **A.E. Hussein**, Micron-scale high energy density matter generated by relativistic laser-solid interactions, *International Conference on High Energy Density Science 2023*, Yokohama, Japan, April 18-21, 2023
12. **A.E. Hussein**, Laser-driven X-rays for characterization of advanced materials, *International Conference on Extreme Light (ICEL 2022)*, Prague, Czech Republic, November 2-4, 2022
13. **A.E. Hussein**, Multi-modal radiation sources from laser-driven electron accelerators, *Optica Frontiers in Optics + Laser Science meeting*, Rochester, USA, October 16-20, 2022

14. **A.E. Hussein**, Laser induced breakdown spectroscopy (LIBS) for in-situ soil analysis, *Optica Optical Sensors and Sensing Congress*, Vancouver, BC, July 11-15, 2022

15. **A.E. Hussein**, Caractérisation des matériaux en utilisant de sources de rayons X générés par laser, *89e Congrès de l'Acfas*, Virtual, May 9-10, 2022 (cancelled)

16. **A.E. Hussein**, Characterization of advanced materials using laser-driven x-ray sources, *University of Texas at Austin Plasma Physics Seminar*, Virtual, March 8, 2022

17. **A.E. Hussein**, Laser-plasma interactions in the relativistic regime, *IEEE Nanotechnology Young Professionals World Marathon*, Virtual, November 24, 2021

18. **A.E. Hussein**, Multi-millijoule infrared pulses from a laser wakefield accelerator, Optical Society of America (OSA) *Optica Frontiers in Optics and Laser Science meeting*, Virtual, October 31 - November 4 2021

19. **A.E. Hussein**, Laser wakefield accelerators as a broadband radiation source, *European Optical Society Annual Meeting*, Virtual, September 13-17 2021

20. **A.E. Hussein**, X-ray production using relativistically intense laser pulses, *Canadian Association of Physicists, Division of Plasma Physics Symposium*, Virtual, June 6-11 2021

21. **A.E. Hussein**, Laser-wakefield accelerators for high-resolution X-ray imaging of complex microstructures, *International High Power Laser Ablation Conference*, Virtual, April 12-15 2021

22. **A.E. Hussein**, Laser-wakefield accelerators for high-resolution, time-resolved probing of complex matter, *2020 Sino-Canadian Bilateral Workshop*, Remote, November 25-27 2020

23. **A.E. Hussein**, Optimizing Direct Laser Acceleration, *The 61st Annual Meeting of the APS Division of Plasma Physics*, Fort Lauderdale, FL, USA, October 21-25 2019

24. **A.E. Hussein**, Optimizing Direct Laser Acceleration, *The 46th European Physical Society Conference on Plasma Physics*, Milan, Italy, July 8th - 12th 2019

25. **A.E. Hussein**, New frontiers in laser-plasma interactions: from fundamental physics to high-resolution diagnostics, *UC Irvine Plasma Physics Special Seminar*, June 20, 2019

26. **A.E. Hussein**, Laser wakefield accelerators as a broadband radiation source - from infrared to X-rays, *University of Alberta Department of Electrical and Computer Engineering Research Seminar*, Alberta, Canada, April 29th, 2019

27. **A.E. Hussein**, Exploring electron and radiation production using femtosecond and picosecond laser pulses, *UC Irvine Plasma Physics Seminar Series*, February 19, 2019

28. **A.E. Hussein**, Exploring electron and radiation production using femtosecond and picosecond laser pulses, *University of Rochester Laboratory for Laser Energetics Research Seminar*, Rochester, NY, USA, September 24, 2018

29. **A.E. Hussein**, The role of plasma density in the generation of high energy, low divergence electron beams, *US-Japan Workshop Theory and Simulations of High-Field and High Energy Density Physics*, Hiroshima, Japan, March 2018

30. **A.E. Hussein**, Influence of plasma density on the generation of 100s MeV electrons via Direct Laser Acceleration, *US-Japan Workshop on Laser-Plasma Interactions and High Energy Density Physics*, General Atomics, San Diego, CA, December 2017

31. **A.E. Hussein**, The role of hot electrons in the creation of hollow atoms by relativistic laser-plasma interaction, *Lawrence Berkeley National Lab, Berkeley Lab Laser Accelerator Center Seminar*, Berkeley, CA, USA, April 2016

32. **A.E. Hussein**, Experimental and computational analysis of ultra-short laser-matter interactions, Argonne National Lab, *Advanced Photon Source, Time Resolved Research Group Seminar*, Lemont, IL, USA, March 2015

## CONTRIBUTED CONFERENCE PRESENTATIONS

*As presenter only*

1. **Talk: A.E. Hussein**, V. Senthilkumaran, N. Beier, S. Fourmaux, L. Zhou, J.A. Moore, Characterization of laser-plasma betatron x-rays at 2.5 Hz, *2024 Canadian Association of Physicists Congress*, London, ON, May 26-31, 2024

2. **Talk: A.E. Hussein**, V. Senthilkumaran, N. Beier, S. Fourmaux, T. Richards, A. Arce-Borkent, S. Meschian, S. Knudsen, M. Lipsett, P. Shabaninezhad, J. Stinehart, L. Zhou, J.A. Moore, Imaging of dynamic processes in materials using high-repetition rate betatron X-rays, *Laser and Plasma Accelerators Workshop* 2023, Lagos, Portugal, March 6-10, 2023

3. **Talk: A.E. Hussein**, *The role of hot electrons in the generation of anomalous X-ray spectra from ultra-intense laser-plasma interactions*, *62th Annual Meeting of the APS Division of Plasma Physics*, Remote, November 2020

4. **Talk: A.E. Hussein**, *Applications of plasma-based betatron radiation*, *American Physical Society Division of Particles and Fields Particle Physics Community Planning Exercise* (Snowmass), Virtual, October 2020

5. **Poster: A.E. Hussein**, A.V. Arefiev, F. Dollar, Z. Gong, Y. Ma, T. Wang, K. Weichman, L. Willingale, *The effect of pulse duration on the generation of high-charge, high-average energy electron beams via Direct Laser Acceleration*, *NIF and JLF User Group Meeting, Lawrence Livermore National Lab*, CA, USA, February 2020

6. **Poster: A.E. Hussein**, J. Ludwig, W. Rozmus, Y. Ma, P-E. Masson-Laborde, J. Nees, A. Maksimchuk, J. Hinojosa, E. Peterson, A. Thomas, K. Krushelnick, *Measurements of mid-infrared radiation from a laser wakefield accelerator*, *61th Annual Meeting of the APS Division of Plasma Physics*, Fort Lauderdale, FL, USA, October 2019

7. **Talk: A.E. Hussein**, N. Senabulya, Y. Ma, M.J.V. Streeter, B. Kettle, S.J.D. Dann, J.M. Cole, F. Albert, N. Bourgeois, S. Cipiccia, O. Finlay, E. Gerstmayr, I. Gallardo González, A. Higginbotham, D.A. Jaroszynski, K. Falk, K. Krushelnick, N. Lemos, N.C. Lopes, C. Lumsden, O. Lundh, S.P.D. Mangles, Z. Najmudin, P.P. Rajeev, M. Shahzad, M. Smid, R. Spesyvtsev, M.J.V. Streeter, D.R. Symes, G. Vieux, J. C. Wood, A.J. Shahani and A.G.R. Thomas, *Laser-wakefield accelerators for high-resolution X-ray imaging of complex microstructures*, *4th European Advanced Accelerator Concepts Workshop*, Isola d'Elba, Italy, September 2019

8. **Poster: A.E. Hussein**, N. Senabulya, Y. Ma, M.J.V. Streeter, B. Kettle, S.J.D. Dann, J.M. Cole, F. Albert, N. Bourgeois, S. Cipiccia, O. Finlay, E. Gerstmayr, I. Gallardo González, A. Higginbotham, D.A. Jaroszynski, K. Falk, K. Krushelnick, N. Lemos, N.C. Lopes, C. Lumsden, O. Lundh, S.P.D. Mangles, Z. Najmudin, P.P. Rajeev, M. Shahzad, M. Smid, R. Spesyvtsev, M.J.V. Streeter, D.R. Symes, G. Vieux, J. C. Wood, A.J. Shahani and A.G.R. Thomas, *Laser-wakefield accelerators for high-resolution X-ray imaging of complex microstructures*, *Michigan Institute of Plasma Sciences and Engineering*, Ann Arbor, MI, USA, November 2018

*Best Poster Award

9. **Talk: A.E. Hussein**, Y. Ma, J. Hinojosa, J. Nees, A. Maksimchuk, A.G.R. Thomas, K. Krushelnick, *Spectral measurements of mid-infrared radiation from a laser wakefield accelerator*, *60th Annual Meeting of the APS Division of Plasma Physics*, Portland, OR, USA, November 2018

10. **Poster: A.E. Hussein**, N. Senabulya, Y. Ma, M.J.V. Streeter, B. Kettle, S.J.D. Dann, J.M. Cole, F. Albert, N. Bourgeois, S. Cipiccia, O. Finlay, E. Gerstmayr, I.G. González, A. Higginbotham, D.A. Jaroszynski, K. Falk, K. Krushelnick, N. Lemos, N.C. Lopes, C. Lumsden, O. Lundh, S.P.D. Mangles, Z. Najmudin, P.P. Rajeev, M. Shahzad, M. Smid, R. Spesyvtsev, M.J.V. Streeter, D.R. Symes, G. Vieux, J. C. Wood, A.J. Shahani and A.G.R. Thomas, *Laser-wakefield accelerators for high-resolution X-ray imaging of complex microstructures*, *University of Michigan Engineering Graduate Symposium*, Ann Arbor, MI, USA, October 2018

11. **Poster: A.E. Hussein**, A.V. Arefiev, T. Batson, H. Chen, R.S. Craxton, A. Davies, D.H. Froula, D. Haberberger, O. Jansen, K. Krushelnick, P.M. Nilson, W. Theobald, T. Wang, K. Weichman, G.J. Williams L. Willingale, *The role of quasi-static channel fields in Direct Laser Acceleration of electron beams to 0.6 GeV*, *Laser Megajoule - Petal User Meeting*, Bordeaux, France, October 2018

12. **Poster: A.E. Hussein**, J. Ludwig, K. Behm, Y. Horovitz, C. Chvykov, A. Maksimchuk, T. Matsuoka, P.-E. Masson- Laborde, C. McGuffey, W. Rozmus, V. Yanovsky, K. Krushelnick, *Stimulated Raman Backscatter from a laser wakefield accelerator*, *Conference of the International Committee on Ultrahigh Intensity Lasers*, Lindau, Germany, September 2018

    *Best Poster Award

13. **Poster: A.E. Hussein**, A.V. Arefiev, T. Batson, H. Chen, R.S. Craxton, A. Davies, D.H. Froula, D. Haberberger, O. Jansen, K. Krushelnick, P.M. Nilson, W. Theobald, T. Wang, K. Weichman, G.J. Williams L. Willingale, *Direct Laser Acceleration of electron beams to 0.6 GeV using optimized plasma targets*, *US Department of Energy, LaserNet USA Meeting*, Lincoln, NE, August 2018

14. **Talk: A.E. Hussein**, A.V. Arefiev, T. Batson, H. Chen, R.S. Craxton, A. Davies, D.H. Froula, D. Haberberger, O. Jansen, K. Krushelnick, P.M. Nilson, W. Theobald, T. Wang, K. Weichman, G.J. Williams L. Willingale, *Direct Laser Acceleration of electron beams to 0.6 GeV using optimized plasma targets*, *Advanced Accelerator Concepts Workshop*, Breckenridge, CO, USA, August 2018

15. **Poster: A.E. Hussein**, T. Batson, A.V. Arefiev, H. Chen, R.S. Craxton, A. Davies, D.H. Froula, D. Haberberger, O. Jansen, K. Krushelnick, P.M. Nilson, W. Theobald, K. Weichman, G.J. Williams L. Willingale, *The role of quasi-static channel fields in Direct Laser Acceleration*, *OMEGA Laser Facility Users Workshop, Lab for Laser Energetics*, Rochester, NY, USA, April 2018

    *Best Poster Award

16. **Poster: A.E. Hussein**, T. Batson, A.V. Arefiev, H. Chen, R.S. Craxton, A. Davies, D.H. Froula, D. Haberberger, O. Jansen, K. Krushelnick, P.M. Nilson, W. Theobald, T. Wang, G.J. Williams L. Willingale, *Influence of plasma density on the generation of 100s MeV electrons via Direct Laser Acceleration*, *Applied Physics 30th Anniversary Symposium*, University of Michigan, Ann Arbor, MI, USA, December 2017

17. **Talk: A.E. Hussein**, T. Batson, A.V. Arefiev, H. Chen, R.S. Craxton, A. Davies, D.H. Froula, D. Haberberger, O. Jansen, K. Krushelnick, P.M. Nilson, W. Theobald, T. Wang, G.J. Williams L. Willingale, *Influence of plasma density on the generation of 100s MeV electrons via Direct Laser Acceleration*, *58th Annual Meeting of the APS Division of Plasma Physics*, Milwaukee, WI, USA, October 2017

18. **Poster: A.E. Hussein**, T. Batson, A.V. Arefiev, H. Chen, R.S. Craxton, A. Davies, D.H. Froula, D. Haberberger, O. Jansen, K. Krushelnick, P.M. Nilson, W. Theobald, T. Wang, G.J. Williams L. Willingale, *Influence of plasma density on the generation of 100s MeV electrons via Direct Laser Acceleration*, *Michigan Institute for Plasma Science and Engineering*, Ann Arbor, MI, USA, October 2017

19. **Talk: A.E. Hussein**, K. Behm, Y. Horovitz, C. Chvykov, J. Ludwig, A. Maksimchuk, T. Matsuoka, P.-E. Masson- Laborde, C. McGuffey, A.G.R. Thomas, W. Rozmus, V. Yanovsky, K. Krushelnick, *Stimulated Raman Backscatter from a laser wakefield accelerator*, *IBS Conference on Laser Plasma Accelerators*, Jeju Island, Korea, August 2017

20. **Poster: A.E. Hussein**, T. Batson, K. Krushelnick, A. Arefiev, T. Wang, P. Nilson, D. Froula, D. Haberberger, A. Davies, W. Theobald, J. Walson, H. Chen, L. Willingale, *PIC simulations of direct laser accelerated electrons from under-dense plasmas using the OMEGA EP Laser*, *OMEGA Laser Facility Users Workshop, Lab for Laser Energetics*, Rochester, NY, USA, April 2017

21. **Talk: A.E. Hussein**, T. Batson, K. Krushelnick, A. Arefiev, T. Wang, P. Nilson, D. Froula, D. Haberberger, A. Davies, W. Theobald, J. Walson, H. Chen, L. Willingale, *PIC simulations of direct laser accelerated electrons from under-dense plasmas using the OMEGA EP Laser*, *US-Japan Workshop on High Energy Density Physics and Laser Plasma Interactions*, San Jose, CA, USA, November 2016

22. **Poster: A.E. Hussein**, T. Batson, K. Krushelnick, A. Arefiev, T. Wang, P. Nilson, D. Froula, D. Haberberger, A. Davies, W. Theobald, J. Walson, H. Chen, L. Willingale, *PIC simulations of direct laser accelerated electrons from under-dense plasmas using the OMEGA EP Laser*, *57th Annual Meeting of the APS Division of Plasma Physics*, San Jose, CA, USA, November 2016

23. **Poster: A.E. Hussein**, J. D. Hager, K. Krushelnick, J. L. Kline, B. C. Tappan, W. L. Boncher, F. Elsner, A. Nikroo, K. A. Flippo, *The role of hot electrons in the creation of hollow atoms by relativistic laser-plasma interaction*, *NIF and JLF User Group Meeting, Lawrence Livermore National Laboratory*, CA, USA, January 2017

24. **Poster: A.E. Hussein**, J. D. Hager, K. Krushelnick, J. L. Kline, B. C. Tappan, W. L. Boncher, F. Elsner, A. Nikroo, K. A. Flippo, *The role of hot electrons in the creation of hollow atoms by relativistic laser-plasma interaction,*, *Michigan Institute for Plasma Science and Engineering*, Ann Arbor, MI, USA, October 2016

25. **Poster: A.E. Hussein**, K. Behm, J. Nees, A. Maksimchuk, S. Reed, V. Yanovsky, Y. Horovitz, K. Krushelnick, *Stimulated Raman Backscattering in laser wakefield accelerators*, *Advanced Accelerator Concepts Workshop*, National Harbor, MD, USA, August 2016

26. **Poster: A.E. Hussein**, J. D. Hager, K. Krushelnick, J. L. Kline, B. C. Tappan, W. L. Boncher, F. Elsner, A. Nikroo, K. A. Flippo, *Development of a cold k-alpha short-pulse backlighter source at relativistic laser intensities*, *OMEGA Laser Users' Facility Workshop*, University of Rochester, Laboratory for Laser Energetics, Rochester, NY, USA, April 2016

    **Best Poster Award*

27. **Poster: A.E. Hussein**, J. D. Hager, K. Krushelnick, J. L. Kline, B. C. Tappan, W. L. Boncher, F. Elsner, A. Nikroo, K. A. Flippo, *Development of a cold k-alpha short-pulse backlighter source at relativistic laser intensities*, *American Physical Society Division of Plasma Physics Meeting*, Savannah, GA, USA, November 2015

28. **Poster: A.E. Hussein**, L. Willingale, *Enhancement of relativistic electron heating in picosecond laser-driven accelerators for generation of high-energy photon beams*, *High Energy Density Summer School*, University of California San Diego, San Diego, CA, USA, August 2015
29. **Talk: A.E. Hussein**, V. Morozov, *Evaluation and enhancement of the SKOPE source-to-source compiler*, *Argonne Leadership Computing Facility*, Lemont, IL, USA, August 2015
30. **Poster: A.E. Hussein**, S. S. Harilal, A. Hassanein, *Relativistic self-focusing in under-dense plasma and applications for proton beam generation*, *OMEGA Laser Users' Facility Workshop*, University of Rochester, Laboratory for Laser Energetics, Rochester, NY, USA, April 2014
31. **Poster: A.E. Hussein**, P. K. Diwakar, S. S. Harilal, A. Hassanein, *Effects of excitation wavelength on laser ablation and laser-induced plasma formation*, *Conference for Undergraduate Women in Physics*, California Institute of Technology, Pasadena, CA, USA, January 2013

    **Best Poster Award*
32. **Talk: A.E. Hussein**, P. K. Diwakar, S. S. Harilal, A. Hassanein, *Effects of excitation wavelength on laser ablation and laser-induced plasma formation*, *Canadian Undergraduate Physics Conference*, University of British Columbia, Vancouver, BC, Canada, November 2012

    **Best Talk Award*
33. **Poster: A.E. Hussein**, P. K. Diwakar, S. S. Harilal, A. Hassanein, *Effects of excitation wavelength on laser ablation and laser-induced plasma formation*, *University Faculty of Science Undergraduate Research Conference*, McGill University, Montréal, QC, Canada, October 2012
34. **Poster: A.E. Hussein**, P. K. Diwakar, S. S. Harilal, A. Hassanein, *Effects of excitation wavelength on laser ablation and laser-induced plasma formation*, *McGill University Department of Physics Undergraduate Research Conference*, Montréal, QC, Canada, September 2012

    **Best Poster Award*
35. **Poster: A.E. Hussein**, P. K. Diwakar, S. S. Harilal, A. Hassanein, *Effects of excitation wavelength on laser ablation and laser-induced plasma formation*, *Federation of Analytical Chemists and Spectroscopy Societies for Scientific Exchange Conference*, Kansas City, MO, September 2012

**TRAINEE CONFERENCE CONFERENCE PRESENTATIONS**

** denotes presenting author*

*Underline denotes supervised students, double underline denotes supervised postdoctoral fellows.*

1. **Poster:** V. Senthilkumaran*, N. F. Beier, S. Fourmaux, L. Zhou, J.A. Moore, **A. E Hussein**, High-flux betatron x-rays for fast tomography of pore dynamics in advanced materials, *2024 Advanced Accelerators Workshop*, Naperville, USA, 2024
2. **Poster:** S. Mohajan*, M. Khalaji, Y. Huang, N. F. Beier, M. Dyck, F. Hegmann, A. Bais, **A. E Hussein**, Soil Nitrogen content determination using Laser-induced breakdown spectroscopy in ambient atmospheric conditions, *2024 Gordon Plasma Processing Science GRC*, Andover, USA, 2024
3. **Talk:** S. Mohajan*, N. F. Beier, D. Attiyah, C. Kim, V. Senthilkumaran, C. Gardner, A. M. Linder, L. Gao, K. Hill, K.Flippo, S. Hansen, R. Shepherd, F. Dollar, **A. E Hussein**, Investigation of plasma heating in the relativistic regime through copper K shell and L shell x-ray spectroscopy, *2024 LaserNetUS Users' Meeting*, Austin, USA, 2024

4. **Talk:** V. Senthilkumaran*, A. Dorval, N. F. Beier, S. Mohajan, S. Fourmaux, A. Hamdan, **A.E. Hussein**, Dynamic imaging of plasma discharges in liquids using betatron x-rays, *LaserNetUS User Group Meeting*, July 2024, Austin, USA, 2024

5. ***Invited Talk:** Y. Huang*, S. Mohajan, N. F. Beier, A. Bais, M. Dyck, **A.E. Hussein**, Determination of soil texture using laser-induced breakdown spectroscopy and partial least squares regression, *IEEE International Conference on Plasma Science (ICOPS)*, Beijing, CN, June 16-20, 2024

6. **Poster:** Y. Huang*, A. Bais, S. Mohajan, **A.E. Hussein**, *Adaptive Learning with Logistic Regression for soil classification with LIBS IEEE International Conference on Plasma Science (ICOPS)*, Beijing, CN, June 16-20, 2024

7. **Poster:** N. F. Beier*, V. Senthilkumaran, S. Fourmaux, F. Légaré, T. Ma, **A. E. Hussein**, Online Source Characterization of Betatron Radiation using a Deep Learning Based X-ray spectrometer, *LaserNetUS User Group Meeting*, July 2024, Austin, USA, 2024

   **Best Poster Award*

8. **Poster:** S. Mohajan*, N. F. Beier, D. Attiyah, C. Kim, V. Senthilkumaran, C. Gardner, A. M. Linder, L. Gao, K. Hill, K. Flippo, S. Hansen, R. Shepherd, F. Dollar, **A. E Hussein**, Investigation of the role of hot electrons in laser- produced plasma heating via simultaneous measurement of Cu K shell and L shell emissions, *American Physical Society Division of Plasma Physics Meeting*, Denver, USA, October 30 - November 6, 2023

9. **Talk:** V. Senthilkumaran*, N. F. Beier, P. Shabaninezhad, J. Stinehart, S. Fourmaux, L. Zhou, J. Moore, **A. E. Hussein**, High-throughput betatron X-ray tomography of pore evolution in additively manufactured alloys, *American Physical Society Division of Plasma Physics Meeting*, Denver, USA, October 30 - November 6, 2023

10. **Talk:** N. F. Beier*, V. Senthilkumaran, S. Fourmaux, F. Légaré, T. Ma, **A. E. Hussein**, Machine-learning based X-ray spectrometer for high repetition rate analysis of betatron radiation, *American Physical Society Division of Plasma Physics Meeting*, Denver, USA, October 30 - November 6, 2023

11. **Poster:** N. F. Beier*, V. Senthilkumaran, S. Mohajan, S. Fourmaux, F. Legare, T. Ma, **A. E. Hussein**, Machine-learning based X-ray spectrometer for high repetition rate analysis of betatron radiation, *2023 LaserNetUS Users' Meeting*, College Park, USA June 27-29, 2023

12. **Poster:** S. Mohajan*, N. F. Beier, D. Attiyah, C. Kim, V. Senthilkumaran, C. Gardner, A. M. Linder, L. Gao, K. Hill, K. Flippo, S. Hansen, R. Shepherd, F. Dollar, **A. E Hussein**, Simultaneous measurement of Cu K shell and L shell emissions to investigate the role of hot electrons in laser-produced plasma heating, *2023 LaserNetUS Users' Meeting*, College Park, USA, June 2023

13. **Talk:** Y. Huang, S. Mohajan*, N. F. Beier, A. Bais, M. Dyck, F. Hegmann, **A.E. Hussein** *Domain Adaptation in LIBS Streaming Using Transfer Learning and Self-Learning for Soil Classification*, *50th IEEE International Conference on Plasma Science (ICOPS)*, Santa Fe, USA, May 21-25, 2023

14. **Talk:** S. Mohajan*, Y. Huang, N. F. Beier, M. Dyck, F. Hegmann, A. Bais, **A. E Hussein**, The effect of laser wavelength on carbon measurement in soil using laser-induced breakdown spectroscopy, *50th IEEE International Conference on Plasma Science (ICOPS)*, Santa Fe, USA, May 21-25, 2023

15. **Poster:** S. Mohajan*, N. F. Beier, S. Lamothe, Y. Wan, **A. E Hussein**, Development of high sensitivity laser based probes for agricultural applications, *Faculty of Engineering Graduate Research Symposium (FEGRS)*, University of Alberta, Edmonton, Canada, November 2022

16. **Talk:** S. Mohajan*, N. F. Beier, S. Lamothe, Y. Wan, **A. E Hussein**, Optimization of laser-induced breakdown spectroscopy for analyzing heterogeneous materials, *64th Annual Meeting of the APS Division of Plasma Physics*, Spokane, USA, October 17-21, 2022

17. **Talk:** V. Senthilkumaran*, N. F. Beier, S. Fourmaux, and **A. E. Hussein**. Betatron X-rays for high-resolution imaging of micrometer-scale features in advanced materials, *64th Annual Meeting of the APS Division of Plasma Physics*, Spokane, WA, USA, October 2022.

18. **Talk:** N. F. Beier*, B. Nima, V. Senthilkumaran, H. Allison, Y. Musthafa, M. Logantha, P. Efthimion, L. Gao, K. Hill, K. Flippo, S. Hansen, R. Hollinger, R. Nedbailo, H. Song, S. Wang, V. Shlyaptsev, R. Shepherd, F. Dollar, J. Rocca, **A.E. Hussein**, Constraining Temperature Profiles in High Energy Density Matter Through High-resolution X-ray Spectroscopy, *64th Annual Meeting of the APS Division of Plasma Physics*, Spokane, USA, October 17-21, 2022

19. **Talk:** V. Senthilkumaran, N. F. Beier*, P. Shabaninezhad, J. Stinehart, S. Fourmaux, T. Richards, A. A-BORKENT, S. Meschian, S. Knudsen, M. Lipsett, L. Zhou, J. A. Moore and **A. E. Hussein**, High-resolution imaging of micrometer-scale features in additively manufactured materials using laser-driven X ray betatron source, *US Department of Energy LaserNetUS Annual Meeting*, Fort Collins, USA, August 2022

20. **Talk:** N. F. Beier*, B. Nima, V. Senthilkumaran, H. Allison, Y. Musthafa, M. LOGANTHA, P. Efthimion, L. Gao, K. Hill, K. A. Flippo, S. B. Hansen, R. Hollinger, R. Nedbailo, H. Song, S. Wang, V. N. Shlyaptsev, R. Shepherd, F. Dollar, J. J. Rocca, **A. E. Hussein**, Homogeneous, Micron-scale High Energy Density Matter Generated by High-intensity, Laser-solid Interactions, *US Department of Energy LaserNetUS Annual Meeting*, Fort Collins, USA, August 2022

21. ***Invited Talk:** N. F. Beier*, Homogeneous, Micron-scale High Energy Density Matter Generated by Relativistic Laser-solid Interactions, *Canadian Association of Physicists Congress*, Hamilton, ON, June 8, 2022

22. **Talk:** V. Senthilkumaran*, N. F. Beier, P Shabaninezhad, J Stinehart, S Fourmaux, T Richards, A Arce-Borken, S Meschian, S Knudsen, M Lipsett, L Zhou, J Moore, **A.E. Hussein**, Imaging of Defects in Additively Manufactured Alloys Using Betatron X-Rays, 2022 *IEEE International Conference on Plasma Science (ICOPS)*, Seattle, USA, May, 2022

23. **Talk:** S. Mohajan*, F. Mehravaran, Y. Huang, F. Keserwan, L. Droog, N. F. Beier, A Bais, R Fedosejevs, M Gamal El-Din, **A.E. Hussein**, Determination Of Bitumen Concentration by Analyzing Laser-Induced Breakdown Spectra (LIBS) Using Partial Least Squared Regression (PLSR) Method, 2022 *IEEE International Conference on Plasma Science (ICOPS)*, Seattle, USA, May, 2022

24. **Talk:** Y. Huang*, F. Keserwan, L. Droog, S. Mohajan, J Achtymichuk, M Dyck, A Bais, **A.E. Hussein**, Study of Matrix Effects in Laser-Induced Breakdown Spectroscopy by Different Sample Preparation, 2022 *IEEE International Conference on Plasma Science (ICOPS)*, Seattle, USA, May, 2022

25. **Talk:** N. F. Beier*, H. Allison, Y. Musthafa, F. Dollar, V. Senthilkumaran, R. Hollinger, R. Nedbailo, H. Song, S. Wang, J. Rocca, P. Efthimion, L. Gao, B. Kraus, K. Hill, K. Flippo, S. Hansen, R. Shepherd, **A.E. Hussein**, K-shell emission of highly-ionized copper from relativistically-intense laser pulses, *American Physical Society, Division of Plasma Physics*, Pittsburg, USA, November 2021

26. **Talk:** V. Senthilkumaran*, K. Behm, D. Bailie, J. Warwick, G. Samarin, A. Maksimchuk, J. Nees, G. Sarri, A. Thomas, K. Krushelnick, **A.E. Hussein**, Quadrupole focused LWFA electron beam driven bremsstrahlung gamma ray source, *American Physical Society, Division of Plasma Physics*, Pittsburg, USA, November 2021

27. **Talk:** N. F. Beier*, H Allison, F Dollar, Y Musthafa, V. Senthilkumaran, MK Kabir, R Hollinger, R Nedbailo, JJ Rocca, H Song, S Wang, P Efthimion, L Gao, B Kraus, K Hill, K. Flippo, S Hansen, R Shepherd, **A.E. Hussein**, Measurement of heating depth of highly-ionized copper from relativistically- intense laser pulses, *2021 IEEE International Conference on Plasma Science (ICOPS)*, Remote, September, 2021
28. **Talk:** V. Senthilkumaran*, T Richards, S Knudsen, A Arce-Borkent, Z Li, M Lipsett, S Fourmaux, L Zhou, JA Moore, **A.E. Hussein**, High-resolution betatron X-ray imaging of porosity evolution in additively manufactured alloys, *2021 IEEE International Conference on Plasma Science (ICOPS)*, Remote, September, 2021
29. **Poster:** M. Kabir, F. Mehravaran, R Fedosejevs, MG El-Din, L. Droog*, **A.E. Hussein**, Laser- Induced Breakdown Spectroscopy for Environmental Engineering Applications, *2021 IEEE International Conference on Plasma Science (ICOPS)*, Remote, September, 2021
30. **Talk:** N. F. Beier*, H. Allison, Y. Musthafa, M. Logantha, F. Dollar, V. Senthilkumaran, R. Hollinger, R. Nedbailo, H. Song, S. Wang, J. J. Rocca, P. C Efthimion, L. Gao, B. F. Kraus, K. Hill, K. A. Flippo, S. B. Hansen, R. Shepherd, **A. E. Hussein**, High-resolution X-ray spectroscopy from high-intensity laser experiments, *LaserNetUS User Group Meeting*, Remote, August 2021
31. **Talk:** V. Senthilkumaran*, K. Behm, D. Bailie, R. Warick, GM. Samarin, A. Maksimchuk, J. Nees, G. Sarri, K. Krushelnick, **AE. Hussein,** Generation of focus LWFA electron and gamma beams using a triplet quadrupole magnet system, *Canadian Association of Physicists Annual Congress*, Division of Plasma Physics, Remote, May 2020

## COLLABORATIONS

**Academia:**

- **University of Alberta:** Faculty of Engineering (Electrical and Computer Engineering, Mechanical Engineering), Faculty of Science (Physics, Computer Science, Earth and Atmospheric Sciences), Faculty of Agriculture, Life and Environmental Sciences (Renewable Resources), Faculty of Medicine
- **Canada:** Université de Montréal (QC), Institut national de la recherche scientifique (QC), University of Regina (SK)
- **International:** Princeton Plasma Physics Laboratory (USA), Marquette University (USA), Colorado State University (USA), University of California Irvine (USA), Tecnológico de Monterrey (MX), IIT Delhi (IN), Queen's University Belfast (UK), École Polytechnique (FR)

**National Labs:**

- **Canada:** Agriculture and Agri-Food Canada, Canada Grain Commission
- **International:** Lawrence Livermore National Laboratory (USA), Los Alamos National Laboratory (USA), Sandia National Laboratory (USA), Argonne National Laboratory (USA)

## MEDIA COVERAGE

M7. **Video spotlight: Laser and soil scientists team up for a fast field test**, Folio, University of Alberta, 2024.

M6. **U of A project could help children in daycare breathe easier during wildfire season**, Folio, University of Alberta, 2024.

M5. **Amina Hussein - LASERS to Analyze Soil in Real-Time**, UAlberta Sustainability, 2024.

M4. **Learn how Alberta is innovating: Amina Hussein**, Alberta Innovates, 2023.

M3. **High power, high potential**, Folio, University of Alberta, 2022.

M2. **World-record-winning University laser receives $2M donation**, Michigan Daily, 2017.

M1. **ALCF summer students gain experience with high-performance computing**, Argonne Leadership Computing Facility, 2015.