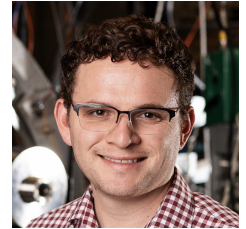


Derek A. Sutherland, Ph.D.

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Education

- 2012 — 2019** **Ph.D. University of Washington**, Plasma Physics and Fusion Energy
Thesis title: *Measurements of neutral particles and simulations of plasma-neutral dynamics in the HIT-SI3 experiment*
Advisor: Prof. Thomas Jarboe, Committee Members: Prof. Brian Nelson and Prof. Uri Shumlak
- 2008 — 2012** **B.S. Massachusetts Institute of Technology**, Nuclear Engineering and Physics
Thesis title: *A Study of Prompt Fast Ion Losses from Neutral Beam Injection in the DIII-D Tokamak*
Advisor: Prof. Dennis Whyte

Employment History

- 2019 — Present** **Principal Investigator**, CTFusion, Inc. — Seattle, WA
ARPA-E Project: *Plasma driver technology demonstration for economical fusion power plants*, Program Manager: Dr. Scott Hsu
- 2015 — Present** **Co-Founder and CEO**, CTFusion, Inc. — Seattle, WA
- 2016 — 2021** **Adjunct Fellow**, The American Security Project, Washington, D.C.
- 2012 — 2019** **Graduate Research Associate**, HIT-SI Research Group, Department of Aeronautics and Astronautics, College of Engineering, University of Washington — Seattle, WA
- 2015** **Graduate Instructor**, University of Washington
Course AA523: Tokamak Fusion Physics and Technology
- 2015** **Graduate Instructor**, University of Washington
Course AA523: Nuclear Reactor Physics and Technology
- 2012** **Controlled Fusion Plasma Physicist**, General Fusion, Inc. — Burnaby, BC, Canada
- 2011** **National Undergraduate Fellowship Intern**, DIII-D National Fusion Facility, General Atomics — San Diego, CA
- 2010** **Student Intern**, General Fusion, Inc. — Burnaby, BC, Canada
- 2009** **Student Intern**, FRX-L Research Group, Los Alamos National Laboratories (LANL)

Skills

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|--------------------------|--|
| Operating Systems | macOS, iOS, UNIX/Linux, Windows |
| Languages | English, Python, MATLAB, Mathematica, Fortran, C/C++, LaTeX |
| Comp. Tools | PSI-Tet (Extended-MHD), PSI-Tri (MHD Equilibria), COMSOL Multiphysics, MCNP6.2/MCNPX, HotSpot, FEMM, Solidworks, AutoCAD, Git, Microsoft Office |
| Technical | Experimental and computational plasma physics, plasma-material interactions (PMI), fusion neutron diagnostics, neutronics, structural engineering, thermal-hydraulics, thermal power cycles, fusion energy system design, space propulsion system design |
| Economics/Safety | Fusion energy system costing, energy market research, radiation protection, radioactive release analysis, safety analysis and protocols |
| Business/Outreach | Fundraising (public and private), team & culture building, accounting & compliance (GAAP, DCAA), project management, corporate governance, public communication and engagement, regulatory engagement (U.S. NRC, FERC), customer engagement |

Selected Works

Journal Articles and Thesis

K.D. Morgan, C.J. Hansen, A.C. Hossack, and **D.A. Sutherland**, "Effect of injected flux and current temporal phasing on self-organization in the HIT-SI3 experiment," *Phys. Plasmas* 29(5) (2022), <https://doi.org/10.1063/5.0090665>

A.C. Hossack, K.D. Morgan, C.J. Hansen, **D.A. Sutherland**, "A multi-chord, two-color interferometer using Hilbert transform phase detection for measuring electron density in spheromak plasmas," *Rev. Sci. Instrum.* 93(9) (2022), <https://doi.org/10.1063/5.0097459>

K.D. Morgan, C.J. Hansen, A.C. Hossack, B.A. Nelson, and **D.A. Sutherland**, "High-speed feedback control of an oscillating magnetic helicity injector using a graphics processing unit," *Rev. Sci. Instrum.* 29(5) (2021), <https://doi.org/10.1063/5.0044805>

D.A. Sutherland and C.J. Hansen, "Driven resonant current amplification in self-organized plasma configurations with uniform λ and plasma pressure confinement," *Phys. Plasmas* 28(2) (2021), <https://doi.org/10.1063/5.0025959>

D.A. Sutherland, "Measurements of neutral particles and simulations of plasma-neutral dynamics in the HIT-SI3 experiment," Ph.D. Thesis, *University of Washington* (2019), <https://digital.lib.washington.edu/researchworks/handle/1773/45098>

A.C. Hossack, T.R. Jarboe, R.N. Chandra, K.D. Morgan, **D.A. Sutherland**, J.M. Penna, C.J. Everson, and B.A. Nelson, "Plasma response to sustainment with imposed-dynamo current drive in HIT-SI and HIT-SI3," *Phys. Plasmas* 57(7) (2017), <https://doi.org/10.1088/1741-4326/aa6ec7>

A.C. Hossack, **D.A. Sutherland**, and T.R. Jarboe, "Derivation of dynamo current drive in a closed-current volume and stable current sustainment in the HIT-SI," *Phys. Plasmas* 24(2) (2017), <https://doi.org/10.1063/1.4975663>

D. Elliott, **D. Sutherland**, U. Siddiqui, E. Scime, C. Everson, K. Morgan, A. Hossack, B. Nelson and T. Jarboe, "Two-photon LIF on the HIT-SI3 experiment: Absolute density and temperature measurements of deuterium neutrals," *Rev. Sci. Instrum.* 87(11) (2016), <https://doi.org/10.1063/1.4955494>

T.R. Jarboe, B.A. Nelson, **D.A. Sutherland**, "A mechanism for the dynamo terms to sustained closed-flux current, including helicity balance, by driving the current which crosses the magnetic field," *Phys. Plasmas* **22** (2015), <https://doi.org/10.1063/1.4926522>

T.R. Jarboe, C.J. Hansen, A.C. Hossack, G.J. Marklin, K.D. Morgan, B.A. Nelson, **D.A. Sutherland**, and B.S. Victor, "A Proof of Principle of Imposed Dynamo Current Drive: Demonstration of Sufficient Confinement," *Fus. Sci. Tech.* **66**(3) (2014), <https://doi.org/10.13182/FST14-782>

B.N. Sorbom, J. Ball, T.R. Palmer, F.J. Mangiarotti, J.M. Sierchio, P. Bonoli, C. Kasten, **D.A. Sutherland**, H.S. Barnard, C.B. Haakonsen, J. Goh, Choongki Sung, D.G. Whyte, "ARC: A compact, high-field, fusion nuclear science facility and demonstration power plant with demountable magnets," *Fus. Eng. Design* **100**, 378 - 405 (2015), <https://doi.org/10.1016/j.fusengdes.2015.07.008>

D.A. Sutherland, T.R. Jarboe, K.D. Morgan, M. Pfaff, E.S. Lavine, Y. Kamikawa, M. Hughes, P. Andrist, G. Marklin, B.A. Nelson, "The dynamak: An advanced spheromak reactor concept with imposed-dynamo current drive and next-generation nuclear power technologies," *Fus. Eng. Design* **89**(4) (2014), <https://doi.org/10.1016/j.fusengdes.2014.03.072>

Recent Conference Proceedings

D.A. Sutherland, C.J. Hansen, A.C. Hossack, K.D. Morgan, "Projections of spheromak configurations sustained with steady, inductive magnetic helicity injection (SIHI) towards high Lundquist number," *APS-DPP Conference (2022)*, Poster TP11.00037, <https://meetings.aps.org/Meeting/DPP22/Session/TP11.37>

D.A. Sutherland, A.C. Hossack, K.D. Morgan, and C.J. Hansen, "Overview of the HIT-SI3 and HIT-SIU Experiments: Spheromaks Sustained with Steady, Inductive Helicity Injection (SIHI)," *ANS TOFE Conference (2022)*, Invited Talk, <https://www.ans.org/meetings/am2022/session/view-1255/>

D.A. Sutherland, C.J. Hansen, A.C. Hossack, and K.D. Morgan, "High- β , large current amplification sustained spheromak equilibria with Mercier stable pressure profiles and plasma shaping," *APS-DPP Conference (2021)*, Poster TP11.077, <https://ui.adsabs.harvard.edu/abs/2021APS..DPPTP1077S/abstract>

D.A. Sutherland, T.R. Jarboe, and C.J. Hansen, "Driven resonant current amplification in sustained spheromak configurations with plasma pressure gradients," *APS-DPP Conference (2020)*, Poster PO07.002, <https://ui.adsabs.harvard.edu/abs/2020APS..DPPP07002S/abstract>

Patents

T.R. Jarboe and **D.A. Sutherland**, "Plasma confinement system and methods for use," U.S. Patent 9,754,686 B2 (2017), <https://patents.google.com/patent/US9754686B2/en>

Other Works

D.A. Sutherland, "The Prospect of Fusion Energy," *The American Security Project*, Jan. 27, 2017, <https://www.americansecurityproject.org/prospect-of-fusion-energy/>

D.A. Sutherland, "Fusion: The need for clean energy sources beyond renewables," *The American Security Project*, Jun. 27, 2017, <https://www.americansecurityproject.org/fusion-the-need-for-clean-energy-sources-beyond-renewables/>

D.A. Sutherland, "Why is fusion so challenging to achieve?," *The American Security Project*, Mar. 2, 2018, <https://www.americansecurityproject.org/why-fusion-is-difficult/>

Invitations, Awards, and Recognition

Selected Invited Presentations

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|-------------|---|
| 2022 | EPRI-Sponsored Workshop on Fusion Prototypic Neutron Sources (FPNS) Executive Committee Member and Invited Speaker |
| 2022 | U.S. Nuclear Regulatory Commission (NRC) Public Meeting Developing Options for a Regulatory Framework for Fusion Energy Systems |
| 2021 | U.S. Nuclear Regulatory Commission (NRC) Public Meeting Developing the Regulatory Framework for Fusion Energy Systems |
| 2021 | U.S. Congressional Fusion Caucus Kick-Off Event |
| 2020 — 2022 | Annual Meeting of the Fusion Power Associates |
| 2018 & 2022 | American Nuclear Society (ANS) Technology of Fusion Energy (TOFE) |
| 2017 | US Magnetic Fusion Research Strategic Directions Workshop |
| 2016 | American Nuclear Society (ANS) Fusion and Plasma Technology Panel |
| 2014 | Exploratory Plasma Research (EPR) Conference |
| 2012 | American Nuclear Society (ANS) Winter Conference |

Awards and Recognition

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| 2015 | CoMotion Innovation Fund Award , University of Washington — Seattle, WA |
| 2015 | CoMotion Graduate Innovators Award , University of Washington — Seattle, WA |
| 2015 | Forbes' 30 under 30 in Energy , Forbes Magazine |
| 2012 | William E. Boeing Endowed Graduate Fellowship , University of Washington - Seattle, WA |
| 2012 | American Nuclear Society (ANS) Design Competition Finalist , ANS |
| 2011 | Irving Kaplan Award , Department of Nuclear Science and Engineering, MIT |

References

Available on request!