

## Dr. Christen H. Fleming <http://www2.physics.umd.edu/~hfleming/>

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### Professional Appointments

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- Associate research scientist at UMDCP (2018-present)

### Research Background

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- Movement ecology with Dr. Justin Calabrese at SCBI (2011-2018)
- Quantum information with Dr. Jake Taylor at UMDCP (2011)
- Nonequilibrium quantum field theory with Dr. Bei-Lok Hu at UMDCP (2002-2011)
- Molecular dynamics with Dr. Michael S. Murillo at LANL (2001)
- Approximation theory with Dr. Vasilij Prokhorov at USA (1999-2001)
- Experimental AMO with Dr. Justin M. Sanders at USA (2000)

### Educational Background

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- Ph.D in Physics, University of Maryland, College Park (2002-2011)
- B.S. in Physics, Mathematics and Statistics, University of South Alabama (1997-2002)

### Honors & Awards

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- [NSF ABI award #1458748](#)<sup>1</sup> (2015-2017)
- [Smithsonian Institution Fellowship](#) (2015)
- Departmental Fellowship (University of Maryland) (2002-2004)
- Dr. Victorino S. Blanco Mathematics Scholarship (2002)
- USA Scholarship (2001-2002)
- Chris Nash Scholarship (2001)
- Sigma Pi Sigma physics honor society membership (2000)
- University of South Alabama Math Contest: 1<sup>st</sup> place (2000-2001)
- Physics Scholarship (University of South Alabama) (1997-2001)

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<sup>1</sup>The NSF would not allow me to be both a co-PI and salaried post-doc on this grant, and so my co-PI status is unofficial.

## Journal Referee

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- African Journal of Ecology; Annals of Applied Statistics; Annals of Physics; Behavioral Ecology; Canadian Journal of Physics; Diversity and Distributions; Ecological Modelling; Ecology; Ecosphere; European Journal of Operational Research; Functional Ecology; IEEE Transactions on Cybernetics; Journal of Agricultural, Biological, and Environmental Statistics; Journal of Animal Ecology; Journal of Asia-Pacific Biodiversity; Journal of Mathematical Biology; Journal of Physics A; Journal of Physics B; Journal of Physics Communications; Journal of the Royal Statistical Society C; Methods in Ecology and Evolution; Movement Ecology; PeerJ; Philosophical Transactions of the Royal Society B; Physica Scripta; Physics Letters A; Physical Review Letters; Physical Review A; Physical Review E; PLOS One; Royal Society Open Science; The American Naturalist; Wildlife Research

## Teaching Experience

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- [AniMove: animal movement and remote sensing for conservation](#) instructor (2014-present)
- SMSC instructor (MCCS 0517, SMSC 0531) (2014,2019)
- UMD physics instructor (PHYS 142, 260, 270) (2005-2011)
- [UMD:MRSEC-GK-12](#) middle school and high school outreach (2002-2003)

## Publications

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### Print

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- [1] M. A. Tucker et al, “Large birds travel farther in homogeneous environments”, [Global Ecology and Biogeography](#) [10.1111/geb.12875](#) (2019)
- [2] M. J. Noonan and M. A. Tucker, **C. H. Fleming** et al, “A comprehensive analysis of autocorrelation and bias in home range estimation”, [Ecological Monographs](#) [10.1002/ecm.1344](#) (2018)
- [3] Q. Huang and **C. H. Fleming** B. Robb and A. Lothspich and M. Songer, “How different are species distribution model predictions?—Application of a new measure of dissimilarity and level of significance to giant panda *Ailuropoda melanoleuca*”, [Ecological Informatics](#) [46](#), 114–124 (2018)
- [4] K. Winner, M. J. Noonan, **C. H. Fleming**, K. Olson, T. Mueller, D. Sheldon, J. M. Calabrese, “Statistical inference for home range overlap”, [Methods in Ecology and Evolution](#) [9](#):7, 1679–1691 (2018)
- [5] **C. H. Fleming**, D. Sheldon, W. F. Fagan, P. Leimgruber, T. Mueller, D. Nandintsetseg, M. J. Noonan, K. A. Olson, E. Setyawan, A. Siarnipar, J. M. Calabrese, “Correcting for missing and irregular data in home-range estimation”, [Ecological Applications](#) [28](#):4, 1003–1010 (2018)
- [6] M. A. Tucker et al, “Moving in the Anthropocene: Global reductions in terrestrial mammalian movements”, [Science](#) [359](#):6374, 466-469 (2018)
- [7] J. M. Calabrese, **C. H. Fleming**, W. F. Fagan, M. Rimmler, P. Kaczensky, S. Bewick, P. Leimgruber, T. Mueller, “Disentangling social interactions and environmental drivers in multi-individual wildlife tracking data”, [Philosophical Transactions B](#), [Philosophical Transactions of the Royal Society B](#) [10.1098/rstb.2017.0007](#) (2018)
- [8] **C. H. Fleming**, D. Sheldon, E. Gurarie, W. F. Fagan, S. LaPoint, J. M. Calabrese, “Kálmán filters for continuous-time movement models”, [Ecological Informatics](#) [40](#), 8–21 (2017)
- [9] E. Gurarie and **C. H. Fleming**, K. L. Laidre, J. Hernandez-Pliego, W. F. Fagan, O. Ovaskainen, “Correlated velocity models as a fundamental unit of animal movement: synthesis and applications”, [Movement Ecology](#) [5](#):13, [10.1186/s40462-017-0103-3](#) (2017)
- [10] E. Gurarie, F. Cagnacci, W. Peters, **C. H. Fleming**, J. M. Calabrese, T. Mueller, W. F.

- Fagan, “A framework for modeling range shifts and migrations: Asking whether, whither, when, and will it return”, *Journal of Animal Ecology* **86**, 943–959 (2017)
- [11] G. Péron, **C. H. Fleming**, O. Duriez, J. Fluhr, C. Itty, S. Lambertucci, K. Safi, E. L. C. Shepard, J. M. Calabrese, “The energy landscape predicts flight height and wind turbine collision hazard in three species of large soaring raptor”, *Journal of Applied Ecology* [10.1111/1365-2664.12909](https://doi.org/10.1111/1365-2664.12909) (2017)
- [12] G. Péron, **C. H. Fleming**, R. C. de Paula, N. Mitchell, M. Strohbach, P. Leimgruber, J. M. Calabrese, “Periodic continuous-time movement models uncover behavioral changes of wild canids along anthropization gradients”, *Ecological Monographs* **87**, 442–456 (2017)
- [13] R. G. Morato, J. A. Stabach, **C. H. Fleming**, J. M. Calabrese, R. C. De Paula, K. M. P. M. Ferraz, D. L. Z. Kantek, S. S. Miyazaki, T. D. C. Pereira, G. R. Araujo, A. Paviolo, C. De Angelo, M. S. Di Bitetti, P. Cruz, F. Lima, L. Cullen, D. A. Sana, E. E. Ramalho, M. M. Carvalho, F. H. S. Soares, B. Zimbres, M. X. Silva, M. D. F. Moraes, A. Vogliotti, J. A. May Jr., M. Haberfeld, L. Rampim, L. Sartorello, M. C. Ribeiro, P. Leimgruber, “Space Use and Movement of a Neotropical Top Predator: The Endangered Jaguar”, *PLOS ONE* [10.1371/journal.pone.0168176](https://doi.org/10.1371/journal.pone.0168176) (2016)
- [14] A. M. Moßbrucker, **C. H. Fleming**, M. A. Imron, S. Pudyatmoko, Sumardi, “AKDE home range size and habitat selection of Sumatran elephants”, *Wildlife Research* **43**, 566–575 (2016)
- [15] **C. H. Fleming**, J. M. Calabrese, “A new kernel-density estimator for accurate home-range and species-range area estimation”, *Methods in Ecology and Evolution* **8**, 571–579 (2017)
- [16] G. Péron, **C. H. Fleming**, R. C. de Paula, J. M. Calabrese, “Uncovering periodic patterns of space use in animal tracking data with periodograms, including a new algorithm for the Lomb-Scargle periodogram and improved randomization tests”, *Movement Ecology* **4**:19, [10.1186/s40462-016-0084-7](https://doi.org/10.1186/s40462-016-0084-7) (2016)
- [17] J. M. Calabrese, **C. H. Fleming**, E. Gurarie, “ctmm: An R package for analyzing animal relocation data as a continuous-time stochastic process”, *Methods in Ecology and Evolution* **7**, 1124–1132 (2016)
- [18] **C. H. Fleming**, W. F. Fagan, T. Mueller, K. A. Olson, P. Leimgruber, J. M. Calabrese, “Estimating where and how animals travel: An optimal framework for path reconstruction from autocorrelated tracking data”, *Ecology* [10.1890/15-1607](https://doi.org/10.1890/15-1607) (2016)
- [19] K. E. Jenks, E. O. Aikens, N. Songasen, J. M. Calabrese, **C. H. Fleming**, N. Bhumpakphan, S. Wanghongsa, B. Kanchanasaka, M. Songer, P. Leimgruber, “Comparative movement analysis for a sympatric dhole and golden jackal in a human-dominated landscape”, *The Raffles Bulletin of Zoology* **63**, 546–554 (2015)
- [20] C. S. Teitelbaum, W. F. Fagan, **C. H. Fleming**, G. Dressler, J. M. Calabrese, P. Leimgruber, T. Mueller, “How far to go? Determinants of migration distance in land mammals”, *Ecology Letters* **18**, 545–552 (2015)
- [21] **C. H. Fleming**, W. F. Fagan, T. Mueller, K. A. Olson, P. Leimgruber, J. M. Calabrese, “Rigorous home-range estimation with movement data: A new autocorrelated kernel-density estimator”, *Ecology* **96**, 1182–1188 (2015)
- [22] **C. H. Fleming**, Y. Subaşı, J. M. Calabrese, “A maximum-entropy description of animal movement”, *Physical Review E* **91**, 032107 (2015)
- [23] **C. H. Fleming**, J. M. Calabrese, T. Mueller, K. A. Olson, P. Leimgruber, W. F. Fagan, “Non-Markovian maximum likelihood estimation of autocorrelated movement processes”, *Methods in Ecology and Evolution* **5**, 462–472 (2014)
- [24] **C. H. Fleming**, J. M. Calabrese, T. Mueller, K. A. Olson, P. Leimgruber, W. F. Fagan, “From fine-scale foraging to home ranges: A semi-variance approach to identifying movement modes across spatiotemporal scales”, *The American Naturalist* **183**, E154–E167 (2014)
- [25] **C. H. Fleming**, B. L. Hu, Albert Roura, “Non-equilibrium fluctuation-dissipation inequality and non-equilibrium uncertainty principle”, *Physical Review E* **88**, 012102 (2013)
- [26] Y. Subaşı, **C. H. Fleming**, J. M. Taylor, B. L. Hu, “The equilibrium states of open quantum systems in the strong coupling regime”, *Physical Review E* **86**, 061132 (2012)

- [27] **C. H. Fleming**, P. R. Johnson, B. L. Hu, “Nonequilibrium dynamics of charged particles in a quantized electromagnetic field: causal, stable and self-consistent dynamics from  $1/c$  expansion”, *Journal of Physics A* **45**, 255002 (2012)
- [28] **C. H. Fleming**, B. L. Hu, Albert Roura, “Decoherence strength of non-equilibrium environments”, *Physica A* **391**, 4206 (2012)
- [29] **C. H. Fleming**, B. L. Hu, “Non-Markovian Dynamics of Open Quantum Systems: Stochastic Equations and their Perturbative Solutions”, *Annals of Physics* **327**, 1238 (2012)
- [30] **C. H. Fleming**, N. I. Cummings, Charis Anastopoulos, B. L. Hu, “Non-Markovian Dynamics and Entanglement of Two-level Atoms in a Common Field”, *Journal of Physics A* **45**, 065301 (2012) **TOP SELECT**
- [31] **C. H. Fleming**, A. Roura, B. L. Hu, “Initial-state preparation with dynamically generated system-environment correlations”, *Physical Review E* **84**, 021106 (2011)
- [32] **C. H. Fleming**, N. I. Cummings, “Accuracy of perturbative master equations”, *Physical Review E* **83**, 031117 (2011)
- [33] **C. H. Fleming**, Albert Roura, B. L. Hu, “Exact analytical solutions to the master equation of quantum Brownian motion for a general environment”, *Annals of Physics* **326**, 1207 (2011) **Top 25 Hottest Articles (2011)**
- [34] **Chris Fleming**, N. I. Cummings, Charis Anastopoulos, B. L. Hu, “The rotating-wave approximation: consistency and applicability from an open quantum system analysis”, *Journal of Physics A* **43**, 405304 (2010)
- [35] J.M. Sanders, S.L. Varghese, **C. H. Fleming**, G. A. Soosai, “Electron capture by protons and electron loss from hydrogen atoms in collisions with hydrocarbon and hydrogen molecules in the 60-120 keV energy range”, *Journal of Physics B* **36**, 3835 (2003)

## Published software

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- [36] **C. H. Fleming**, J. M. Calabrese, “ctmm: Continuous-Time Movement Modeling”, *R package version 0.5.2* (2015-2018)