Alex Dara Infanger

email: alexdinfanger[at]gmail[dot]com, website: https://alexinfanger.github.io

Education	**Stanford University**. (09/2016-06/2022)

Stanford University.   (09/2016-06/2022)
PhD in Computational and Mathematical Engineering.
Dissertation, *Truncation Algorithms for Markov Chains and Processes*.
Honorable Mention for Gene Golub Dissertation Award.
ICME Teaching Assistant Award (2020-2021).

Research Topics: My thesis focuses on the problem of approximating an infinite or very large state space Markov chain $X = (X_n : n \geq 0)$ on a smaller subset of the state space A. A well-known approach to this problem is to re-route transitions of the original chain that attempt to leave A into A^c back into A. We give new conditions under which such an approximation is good for estimating the stationary distribution π of X. We also provide a new approximation for estimating π on A that comes with error bounds. More generally, I've worked a lot on the structured numerical linear algebra and optimization problems that arise when computing/bounding expected values in the context of Markov chain modeling.

University of California, Santa Cruz.   (08/2012-09/2016)
Summa cum laude, Phi Beta Kappa.
BS in Physics, highest honors.
Senior Thesis, *The Existence of Terrestrial Gamma-Ray Flashes that Paralyze RHESSI*, awarded the Dean's and Chancellor's Awards.
Minor in Mathematics.

Research & Work

Adobe Systems Incorporated   (07/2018-09/2018)
Data Science Intern

- Estimated Markov model for Creative Cloud customers in PySpark and Pandas.

Infanger Investment Technology   (06/2017-09/2017)
Quantitative Analyst Intern

- Optimized sparse regression code for an ML based portfolio.
- Automatized fund analyses using the Bloomberg API and VBA.

Santa Cruz Institute for Particle Physics   (06/2013-09/2016)
Research Assistant

- Discovered a new class of Terrestrial Gamma-ray Flashes (TGFs) in the Reuven Ramaty High Energy Solar Spectroscopic Imager (RHESSI) data set.
- Performed Monte Carlo analyses with lightning location data in order to estimate the probability of a TGF candidate coming from background processes.

Lawrence Livermore National Laboratory   (06/2014-08/2014)
Research Assistant

- Modeled response of Radiation Portal Monitors and other instruments to TGFs.
- Determined that TGF attenuation due to Compton scattering in the atmosphere makes it unlikely for ground-based nuclear safety detectors to trigger on TGFs.

Scientific Slug Magazine   (08/2014-01/2016)
Managing Editor & Contributor

- Managed and contributed to *Scientific Slug*, a science and art magazine that publishes

- survey articles on current research in science and maths, research papers,
- speculative essays on the intersection of science with literature, art and philosophy,
- poetry, fiction.

Honors	Selected to attend IPAM Mean Field Games Summer School, June 2018. Session Chair: Instrumentation and Data Analysis, TEPA[1] 2014. Ron Ruby Award: $2540.00 award to attend TEPA 2014 Conference. UCSC Representative for Ina Coolbrith Poetry Prize. Ranked 1/127 in undergraduate data structures course (C and Java).
Programming	Python, Tensorflow, Keras, Julia, PySpark, Pandas, SQL, Matlab.
Languages	Fluent: English, German. Conversational: French, Farsi.
Preprints	"A new truncation algorithm for Markov chain equilibrium distributions with computable error bounds." (2022). A. Infanger, P. Glynn. arXiv:2208.14406 "On convergence of general truncation-augmentation schemes for approximating stationary distributions of Markov chains." (2022). A. Infanger, P. Glynn, Y. Liu. arXiv:2203.15167. "On convergence of a truncation scheme for approximating stationary distributions of continuous state space Markov chains and processes." (2022). A. Infanger, P. Glynn. arXiv:2206.11738. "Solving Poisson's equation: existence, uniqueness, martingale structure, and CLT." (2022). P. Glynn, A. Infanger. arXiv:2202.10404.
Publications	"Solutions of Poisson's equation for stochastically monotone Markov chains". P. Glynn, A. Infanger. *Queueing Models and Service Management.* (2022) "On the spectral radius and stiffness of Markov jump process rate matrices" P. Glynn, A. Infanger. *Stochastic Models.* (2020) "Special classes of terrestrial gamma-ray flashes from *RHESSI*" D. M. Smith, N.A. Kelley, P. Buzbee, A. Infanger, M. Splitt, R.H. Holzworth, J. R. Dwyer. *Journal of Geophysical Research: Atmospheres.* (2020) "The rarity of terrestrial gamma-ray flashes II: *RHESSI* stacking analysis" D. M. Smith, P. Buzbee, N. A. Kelley, A. Infanger, R. H. Holzworth, J.R. Dwyer. *Journal of Geophysical Research: Atmospheres.* (2016)
Essays/Articles	"Solid State Dream: *Fermi*-LAT" Alexander Infanger, *Scientific Slug*, Spring 2015. "The Scientific Joy" Alexander Infanger, art by Marie Calapa, *Scientific Slug*, Winter 2014. "Revenge of the WIMPs: A History of Dark Matter and the Research Happening at UCSC to Capture It" Alexander Infanger, art by Kira Moser, *Scientific Slug*, Fall 2013.

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[1] Conference for Thunderstorms and Energetic Particle Acceleration