CURRICULUM VITAE
IKJYOT SINGH KOHLI, PH.D.

PERSONAL INFORMATION:

Address: *Cineplex LLP, 1303 Yonge St, Toronto, Ontario, M4T 2Y9*
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Citizenship: Canadian
Date of Birth: December 10, 1985
Marital Status: Single

RESEARCH INTERESTS

Dynamical Systems, Mathematical aspects of general relativity, early-universe cosmological models, Lie Algebras and Lie groups as related to spacetime isometries, finite-time singularities of differential equations, stochastic differential equations, differential geometry, mathematical aspects of classical mechanics, classical field theories, Quantum field theory in curved Spacetime, Mathematics Education. I am also interested in examining the connections between dynamical systems theory and machine learning, in particular, deep learning and neural network architectures.

EDUCATION

York University, Toronto, Ontario
Ph.D. in Mathematical Physics   **2014**
Dissertation: "Topological Dynamical Systems Methods in Early-Universe Cosmologies"
Dissertation Advisor: M.C. Haslam

York University, Toronto, Ontario
M.Sc. in Mathematical Physics   **2012**
Thesis: "A Bianchi Type IV Viscous Fluid Model of the Early Universe"
Thesis Advisor: M.C. Haslam

University of Toronto, Toronto, Ontario
Honours B.Sc. Physics Specialist Program, Minor in Mathematics   **2010**
Honours Thesis: "Dynamical Chaos in Hyperbolic FLRW Spacetimes"
Thesis Advisor: C.C. Dyer

EMPLOYMENT HISTORY

Cineplex, Toronto, Ontario
Senior Data Scientist 2019-Present
Senior Data Scientist responsible for the implementation and
development of all AI and ML models for the various lines of the
business. Mathematical consultant for various parts of the business as
well.

Schulich School of Business, York University, Toronto, Ontario
Lecturer / Course Developer 2019-Present
Lecturer and course developer for the MBAN and MMAI programs.
Specifically responsible for courses related to AI, Machine Learning,
Mathematical Statistics, and Numerical Analysis.

Cineplex, Toronto, Ontario
Senior Manager, Data Science and Analytics 2018-2019
Senior manager for various parts of Cineplex's business that utilize
analytics and data science methodologies. This includes: Media, Finance,
Marketing/Social media and operations. Responsible for the design,
building out, and testing of such models using a variety of machine
learning and big data technologies.

McMaster University, Hamilton, Ontario
Instructor and Course Developer – Big Data Analytics 2017 - 2018
Course/curriculum developer and instructor for McMaster's program in
Big Data Analytics.

Cineplex, Toronto, Ontario
Manager, Data Science and Analytics 2017-2018
Analytics manager for various parts of Cineplex's business. Immediate
focus on building "big data" forecasting models to predict theatre
attendance.

York University, Toronto, Ontario
Instructor Member - Graduate Program in Physics & Astronomy 2016 – 2017
Developed and taught an advanced graduate-level course that covered
geometric foundations of classical mechanics – symplectic manifolds,
differential forms, and geometric quantization.

York University, Toronto, Ontario
Postdoctoral Fellow – Department of Mathematics and Statistics 2015 – 2017
Research in problems related to dynamical systems and mathematical
physics including general relativity, mathematical cosmology, quantum

field theory in curved spacetime. Responsible for teaching and organizing
a number of courses in the department: Analysis, Calculus, Partial
Differential Equations, and Ordinary Differential Equations.

RBC, Toronto, Ontario
Senior Analyst, Analytics   **2015**
Worked as a senior analyst within the Operational Risk group developing
predictive models to forecast the bank's operational risk exposure.

York University, Toronto, Ontario
Research Assistant   **2011 – 2014**
Worked on problems in General Relativity, Dynamical Systems Theory,
and Fluid Mechanics.

University of Toronto, Toronto, Ontario
Advanced Physical Laboratories Researcher   **2007 – 2010**
Performed several advanced-level experiments involving the use of the
cloud chamber, 3-D conductivity, high energy physics, magnetization,
and other special projects.

UNIVERSITY TEACHING EXPERIENCE

Schulich School of Business, York University, Toronto, Ontario
Lecturer/Course Developer – MBAN and MMAI   **2019 - Present**
MBAN 6510 – Artificial Intelligence II
MBAN 6110 – Data Science I
MBAN 6120 – Data Science II
MMAI 5300 – Numerical Methods and Analysis

McMaster University, Hamilton, Ontario
Lecturer/Course Developer – Big Data Analytics Program   **2017 - 2018**
BDA101 – Data Analytics and Modeling
BDA102 – Big Data Analytics
BDA104 – Predictive Modelling and Data Mining

York University, Toronto, Ontario
Lecturer and Course Director – Department of Mathematics and Statistics   **2016 - 2017**
MATH2270 – Differential Equations – VIDEO Lectures -
https://youtu.be/ET1A6pRQLvI
MATH1013 – Calculus I

York University, Toronto, Ontario
Lecturer and Course Director – Department of Physics and Astronomy   **2016 - 2017**
PHYS 6213 – Advanced Topics in Classical Mechanics – Graduate course

York University, Toronto, Ontario
Lecturer and Course Director – Department of Mathematics and Statistics   **2015-2016**
MATH3271 - Partial Differential Equations for Mathematical Physics
MATH1300 - Analysis I

Head Teaching Assistant – Department of Mathematics and Statistics   **2011-2014**
(Duties included lecturing, marking of tests/assignments, and holding office hours)
MATH1013 – Applied Calculus I
MATH1025 – Applied Linear Algebra
Math/Stats Lab – General small-group tutor for a range of first and second-year mathematics courses

Head Teaching Assistant – Faculty of Science   **2011-2014**
(Duties included lecturing, marking of tests/assignments, lab demonstrations, and holding office hours)
PHYS1510 – Introduction to Physics
PHYS2030 – Computational Methods for Physicists and Engineers
NATS1810 – Energy
NATS1840 – Science, Technology, and the Environment

PUBLICATIONS AND PAPERS

PEER-REVIEWED PUBLICATIONS

"Einstein's Field Equations as a Fold Bifurcation", I.S. Kohli and M.C. Haslam
Journal of Geometry and Physics, vol. 123 – 434-437 arXiv: 1607.05300[physics.gen-ph]   2017

"An Analysis of the Replicator Dynamics for an Asymmetric Hawk-Dove Game", I.S. Kohli and M.C. Haslam
International Journal of Differential Equations, vol. 2017, 8781570 – arXiv: 1607.05192[math.DS]   2017

"The Osgood Criterion and Finite-Time Cosmological Singularities", I.S. Kohli
Annalen Phys. 528 (2016) no.7-8, 603-611, arXiv: 1507.02241[gr-qc]   2016

"Stochastic Eternal Inflation in a Bianchi Type I Universe", I.S. Kohli and M.C. Haslam
Physical Review D, vol. 93, no. 2, pp.023513, arXiv: 1508.02670   2016

"Mathematical Issues in Eternal Inflation", I.S. Kohli and M.C. Haslam
Classical and Quantum Gravity, vol. 32, no. 7, pp. 075001, arXiv: 1408.2249[gr-qc]   2015

"Dynamics of a Closed Viscous Universe", I.S. Kohli and M.C. Haslam
Physical Review D, vol. 89, no. 4, pp. 043518, arXiv: 1311.0389[gr-qc]   2014

"Dynamical Systems Approach to a Bianchi Type I Viscous MHD Model", I.S. Kohli and M.C. Haslam
Physical Review D, vol. 88, no. 6, pp. 063518, arXiv: 1304.8042[gr-qc]   2013

"Future Asymptotic Behavior of a nontilted Bianchi Type IV Viscous Model", I.S. Kohli and M.C. Haslam
Physical Review D, vol. 87, no.6, pp. 063006, arXiv: 1207.6132[gr-qc]   2013

PREPRINTS/WORKS IN PROGRESS

"Dynamics of a Vaccum Bianchi Type V Universe with Arbitrary Cosmological Constant", I.S. Kohli
arXiv:1609.01310 [gr-qc]   2016

"A Degenerate Bogdanov-Takens Normal Form for FLRW Cosmologies", I.S. Kohli and M.C. Haslam
arXiv:1607.02401 [gr-qc]   2016

"On Past Singularities in k=0 FLRW Cosmologies", I.S. Kohli
arXiv:1602.02456 [gr-qc]   2016

"On Singularities in Cosmic Inflation", I.S. Kohli
arXiv: 1505.07770 [gr-qc]   2016

"Exploring Vacuum Energy in a Two-Fluid Bianchi Type I Universe", I.S. Kohli and M.C. Haslam
arXiv: 1402.1967[gr-qc]   2015

AWARDS

Postdoctoral Fellowship, *York University* – Department of Mathematics and Statistics   **2015 – 2017**

Graduate Assistantship, *York University* – Department of Physics and Astronomy   **2011 – 2014**

PUBLIC LECTURES / TALKS

"Enabling Automation and AI/ML", I.S. Kohli
Invited Talk – Big Data / AI Toronto 2019   2019

"Enabling Big Data Analytics at Cineplex", I.S. Kohli
Invited Talk – Data Marketing Toronto Conference 2018   2018

"Enabling Predictive Analytics", I.S. Kohli
Invited Talk – Toronto Big Data Conference 2018   2018

"Dynamics of Bianchi II Cosmological Models", I.S. Kohli
York University Physics Society   2017

"Stochastic Eternal Inflation in Heisenberg Universes", I.S. Kohli
2016 Midwest Relativity Meeting – Perimeter Institute   2016

"Dynamical Systems and Cosmology", I.S. Kohli
Public Lecture – York University   2014

"Numerical Methods in Solving Einstein's Equations for a Closed Universe", I.S. Kohli
SONAD Conference (Southern Ontario Numerical Analysis Day)   2014

"Dynamical Systems Theory", I.S. Kohli
Invited Lecture – York University Cosmology Group   2014

"Lectures on Classical Mechanics", I.S. Kohli
Series of invited lectures on classical mechanics for NATS1810 – York
University   2013

"Dynamics of Plane-Wave Spacetimes", I.S. Kohli
Public Lecture – York University   2012

"Dynamical Systems and Game Theory in Economics", I.S. Kohli
Invited Lecture – SCS0082 – University of Toronto   2011

"Chaos in General Relativity", I.S. Kohli
Department of Physics – University of Toronto   2010

MEMBERSHIPS

International Society on General Relativity and Gravitation – Closed-group membership based on number of publications in the fields of general relativity, cosmology, or gravitation.

American Physical Society – Member of the topical group in gravitation, member of the topical group on statistical and nonlinear physics – Member ID# - 61147872

American Mathematical Society

REFEREES

Michael C. Haslam – Associate Professor – Department of Mathematics and Statistics – York University – mchaslam@mathstat.yorku.ca

Peter C. Gibson – Associate Professor – Department of Mathematics and Statistics – York University – pcgibson@mathstat.yorku.ca

Joe Repka – Professor – Department of Mathematics – University of Toronto – repka@math.toronto.edu

George F.R. Ellis – Professor of Applied Mathematics – University of Cape Town – George.ellis@uct.ac.za

Charles C.C. Dyer – Professor – Department of Physics / Astrophysics – University of Toronto – dyer@astro.utoronto.ca

Randy Lewis – Professor – Department of Physics and Astronomy – York University – randy.lewis@yorku.ca