ALIREZA HOJJATI

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SUMMARY

I am an astrophysicist working on the preparation and analysis of data from cosmological surveys. I am experienced in statistical modeling, probabilistic programming and visualization of large data sets. I have used a variety of computational tools and numerical techniques to make forecast for future surveys.

I have led and contributed to research projects in collaboration with various international groups and have also taught a wide range of courses in Physics and Mathematics at the university level.

EDUCATION

Simon Fraser University *August 2012*
PhD in Physics (Cosmology)

Isfahan University of Technology *August 2006*
M.Sc. in Physics (Particle Physics)

Isfahan University of Technology *August 2003*
B.Sc. in Physics

SKILLS

Analytical	Problem Solving through Statistics, Machine Learning, Visualization, Bayesian Analysis, Monte Carlo Simulations, Gaussian Processes
Programming	Python, Fortran, Bash, R, MATLAB & IDL
Development	mySQL, Rails, HTML &CSS

EXPERIENCE

Postdoctoral Fellow September 2013 - Present
University of British Columbia, Vancouver, Canada

- ***Programming and Visualization***: As an active member of ongoing Weak Lensing surveys, e.g. Red Sequence Cluster Survey Lensing (RCSLenS), constructed a pipeline where raw data is processed and converted to applicable formats for analysis. Theoretical studies are performed based on different statistics of data and model selection from Bayesian approach.
- ***Statistical Analysis***: Developed methods to extract higher order statistics from large and noisy astrophysical data, which were used in Monte Carlo analysis to put joint constraints on cosmological parameters.

Postdoctoral Researcher September 2012 - August 2013
Institute for the Early Universe, Seoul, Korea

- *Gaussian Processes*: Applied Gaussian Processes techniques to classify, reconstruct and predict properties of astrophysical objects, extracted from simulation suit in preparation for the upcoming cosmological surveys.
- *Machine learning*: Used machine learning tools to analyze large simulated data sets of quasar light curves in the Strong Lens Time Delay Challenge.

Research Assistant May 2007 - August 2012
Simon Fraser University, Vancouver, Canada

- ***MGCAMB*** : Developed MGCAMB code where Einstein equations of General Relativity are modified to accommodate a wide range of modified gravity theories in Cosmology. MGCAMB is widely used in the community to make predictions for cosmological models.
- ***Monte Carlo with MGcosmoMC*** : Modified a commonly used MCMC package to accommodate MGCAMB code. MGCosmoMC is widely used to put joint constraints on modified gravity parameters.
- ***Data reduction with PCA*** : Applied Principal Component Analysis to compress and store cosmological information from large data sets.
- ***Wavelets*** : Employed wavelets to develop a framework for reconstructing the dark energy equation of state from sparse and noisy data.

SELECTED HONORS AND AWARDS

- NSERC Postdoctoral Fellowship, UBC, 2014-2016.
- Billy Jones Graduate Award in Physics, SFU, 2011.
- Graduate fellowship, SFU, 2010, 2011, 2012.
- President research stipend, SFU, 2009.
- First-rank elite status, "Iranian National Elites Foundation", 2006.
- Best M.Sc. student, IUT, 2006.
- Top rank B.Sc. student, IUT, 2003.

ACADEMIC SKILLS

- ***Superviser*** : Co-supervised the thesis research of two PhD and two M.Sc. students, SFU, 2012-2015.
- ***Lecturer*** : Experienced in teaching a wide range of university undergraduate and graduate level Physics courses.
- ***Certificate***: Program in University Teaching & Learning.
- ***Organizer***: Planned, held and contributed to several academic conferences and public outreach programs, including :
  - *Scientific Programming Study Group*, SFU (2015);
  - *Software Carpentry workshop*, SFU (2015);
  - *Testing Gravity 2015*, Vancouver (2015);
  - *TRIUMF Saturday morning lecture series*, SFU (2012);
  - *Science in Action series*, SFU (2009-2011);
  - *Starry Nights workshop series*, SFU (2009-2011).

IN THE NEWS

Astronomers use fake data to tackle dark energy: Nature

First hundred thousand years of our universe Science Daily

kaleidoscope: Physical Review D

PUBLICATIONS

A. Hojjati & E. V. Linder,
CMB Lensing and Scale Dependent New Physics
arXiv:1507.08292.

A. Hojjati, I. G. McCarthy et al,
Dissecting the thermal Sunyaev-Zeldovich-gravitational lensing cross-correlation with hydrodynamical simulations,
JCAP10(2015)047, arXiv:1412.6051.

K. Liao et al,
Strong Lens Time Delay Challenge: II. Results of TDC1 ,
ApJ, 800, 11, arXiv:1409.1254.

A. Hojjati & E. V. Linder,
Next Generation Strong Lensing Time Delay Estimation with Gaussian Processes
Phys. Rev. D 90, 123501, arXiv:1408.5143.

Y.Z. Ma, L. Van Waerbeke, G. Hinshaw, **A. Hojjati** & D. Scott,
Probing the diffuse baryon distribution with the lensing-tSZ cross-correlation,
2015, JCAP, 09, 046, arXiv:1404.4808.

A. Hojjati, L. Pogosian, A. Silvestri & G.B. Zhao,
Observable physical modes of modified gravity,
Phys. Rev. D 89, 083505 (2014), arXiv:1312.5309.

G. Dobler, C. Fassnacht, T. Treu, P. J. Marshall, K. Liao, **A. Hojjati**, E. Linder & N. Rumbaugh,
Strong Lens Time Delay Challenge: I. Experimental Design,
ApJ, 799, 168, arXiv:1310.4830.

S. Asaba, C. Hikage, K. Koyama, G. Zhao, **A. Hojjati** & L. Pogosian,
Principal Component Analysis of Modified Gravity using Weak Lensing and Peculiar Velocity Measurements,
JCAP08(2013)029, arXiv:1306.2546.

A. Hojjati, E. V. Linder & Johan Samsing,
New constraints on the early expansion history,
Phys. Rev. Lett 111, 041301 (2013), arXiv:1304.3724.

A. Hojjati, A. G. Kim & E. V. Linder,
Robust Strong Lensing Time Delay Estimation ,
Phys. Rev. D 87, 123512 (2013), arXiv:1304.0309.

Y. Wang, D. Wands, L. Xu, J. De-Santiago & **A. Hojjati**,
Cosmological constraints on a decomposed Chaplygin gas,

Phys. Rev. D 87, 083503 (2013), arXiv:1301.5315.

A. Hojjati,
Degeneracies in parametrized modified gravity models,
JCAP01(2013)009, arXiv:1210.3903.

A. Hojjati, L. Pogosian, A. Silvestri & S. Talbot,
Practical solutions for perturbed $f(R)$ gravity,
Phys. Rev. D 86, 123503 (2012), arXiv:1210.6880.

A. Hojjati, G. Zhao, L. Pogosian, A. Silvestri, R. Crittenden & K. Koyama,
Cosmological tests of General Relativity: a principal component analysis,
Phys. Rev. D 85, 043508 (2012), arXiv:1111.3960.

A. Hojjati, L. Pogosian & G. Zhao,
Testing gravity with CAMB and CosmoMC,
JCAP 1108:005, arXiv:1106.4543.

A. Hojjati, L. Pogosian & G. Zhao,
Detecting Features in the Dark Energy Equation of State: A Wavelet Approach,
JCAP04(2010)007, arXiv:0912.4843v1.

A. Akhtari Zavareh, **A. Hojjati** & B. Mirza,
Generation of large scale magnetic fields by coupling to curvature and dilaton field,
Prog.Theor.Phys.117:803-822 (2007) arXiv:0707.3493v1.