



**MAXENT 2013 PROGRAM, Version 7**  
**Pavilion on Northbourne, Canberra, Australia.**  
**15-20 December 2013**

**SUNDAY, 15 December 2013**

Page

**Venue: Forest Room, Pavilion on Northbourne**

10:00 AM - 10:30 AM	<b>Tutorial Sessions:</b> Opening and morning tea (catered)
10:30 AM - 11:30 AM	Tutorial 1: Probability
11:30 AM - 12:30 PM	Tutorial 2: MaxEnt (Robert Niven)
12:30 PM - 1:30 PM	Lunch (catered)
1:30 PM - 2:30 PM	Tutorial 3: Bayesian Inference (Udo von Toussaint)
2:45 PM - 3:15 PM	Afternoon tea (catered)
3:15 PM - 4:15 PM	Tutorial 4: Bayesian nested sampling (John Skilling)
4:15 PM - 5:00 PM	Discussion

6:00 PM - 8:00 PM	<b>Welcome Reception</b> , Forest Atrium, Pavilion on Northbourne: canapes and drinks will be served
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**MONDAY, 16 December 2013**

**Venue: Four Seasons Room, Pavilion on Northbourne**

8:00 AM - 8:40 AM Registration desk open; tea/ coffee provided  
 Conference Wifi available in vicinity of Four Seasons Room

8:40 AM - 8:45 AM	<b>Opening of MaxEnt 2013</b>		
8:45 AM - 8:50 AM	<b>Session 1: Entropy and Optimisation</b>		
8:50 AM - 9:50 AM	Prof. Jonathan Borwein	Keynote Lecture: Entropy and projection methods for (non-) convex programming	1
9:50 AM - 10:10 AM	Dr Mark Reid	Convex foundations for generalized MaxEnt models	3
10:10 AM - 10:30 AM	Prof. Alexis Akira Toda	Error estimate and convergence analysis of moment-preserving discrete approximations of continuous distributions	5

10:30 AM - 10:50 AM Morning tea (catered)

10:50 AM - 10:55 AM	<b>Session 2: Bayesian Inference</b>		
10:55 AM - 11:55 AM	Prof. Kerrie Mengersen	Keynote Lecture: Bayesian approaches to spatial inference: modelling and computational challenges and solutions	7
11:55 AM - 12:15 PM	Dr Charles Jenkins	Using evidence to make decisions	9
12:15 PM - 12:35 PM	Miss Sarah Gengler	(Student Lecture): Bayesian data fusion for spatial prediction of categorical variables in environmental sciences	11

12:35 PM - 1:30 PM Lunch (catered)

1:30 PM - 1:35 PM	<b>Session 3: Flow and Dissipative Systems</b>		
1:35 PM - 2:35 PM	Prof. Vijay P. Singh	Keynote Lecture: Hydrologic modeling using entropy theory	13
2:35 PM - 2:55 PM	Prof. Bruce Hobbs	Hydrothermal systems as open flow controlled chemical reactors	15
2:55 PM - 3:15 PM	Prof. Alison Ord	Critical behaviour, multifractals and entropy production	17
3:15 PM - 3:35 PM	Dr Yongxiang Hu	Evaluating entropy production of the climate system using multiple satellite observations	19

3:35 PM - 3:55 PM Afternoon tea (catered)

3:55 PM - 4:00 PM	<b>Session 4: Network Analysis</b>		
4:00 PM - 4:20 PM	Dr Robert K. Niven	Maximum entropy analysis of flow networks	21
4:20 PM - 4:40 PM	Prof. Julio M. Stern	Affinity structure in reaction networks: minimum entropy or power dissipation	23
4:40 PM - 5:00 PM	Dr Paul Goggans	Design-as-inference: probability-based design of intermodal transportation networks	25

5:00 PM - 5:10 PM Short break

5:10 PM - 5:15 PM	<b>Session 5: Bayesian Inference</b>		
5:15 PM - 5:35 PM	Dr Udo von Toussaint	Sequential experimental design for a probabilistic mastermind	27
5:35 PM - 5:55 PM	Dr Peter Sunehag	On nicod's condition, rules of induction and the raven paradox in Bayesian confirmation theory	29
5:55 PM - 6:15 PM	Dr Nicholas Armstrong	Estimating density functions using moments-constrained maximum entropy method combined with Bayesian model selection	31
6:15 PM - 6:35 PM	Mr Wesley Henderson	(Student Lecture): Parallelizing nested sampling	33

**TUESDAY, 17 December 2013****Venue: Four Seasons Room, Pavilion on Northbourne**

8:00 AM - 8:30 AM Venue open; tea / coffee available

8:30 AM - 8:40 AM	<b>Announcements + Session 1: Extremum Methods in Non-Equilibrium Systems</b>		
8:40 AM - 9:40 AM	Prof. Roderick Dewar	Keynote Lecture: MaxEnt as a statistical basis for nonequilibrium extremal principles	35
9:40 AM - 10:00 AM	Prof. Gian Paolo Beretta	Steepest entropy ascent paths towards the MaxEnt distribution	37
10:00 AM - 10:20 AM	Dr Nathaniel Virgo	Possible dynamical explanations for maximum entropy production	39
10:20 AM - 10:30 AM	<b>Conference Photo</b>		
10:30 AM - 10:50 AM	Morning tea (catered)		
10:50 AM - 10:55 AM	<b>Session 2: Turbulence Flow Systems</b>		
10:55 AM - 11:55 AM	Prof. Bernd Noack	Keynote Lecture: Turbulence modelling and control using maximum entropy principles	41
11:55 AM - 12:15 PM	Dr Yohei Kawazura	Self-organization and entropy production rate in thermally driven turbulence	43
12:15 PM - 12:35 PM	Miss Eurika Kaiser	(Student Lecture): Cluster-based reduced-order modelling of shear flows	45
12:35 PM - 2:00 PM	Lunch in Dickson (1.2 km walk) - see separate maps		
2:00 PM - 2:05 PM	<b>Session 3: Probability Distributions</b>		
2:05 PM - 3:05 PM	Dr Iain Murray	Keynote Lecture: Learning multivariate probability distributions	47
3:05 PM - 3:25 PM	Prof. Gwo Dong Lin	Weak convergence of Bayramoglu's distributions based on bivariate order statistics	49
3:25 PM - 3:45 PM	Afternoon tea (catered)		
3:45 PM - 3:50 PM	<b>Session 4: Network Analysis</b>		
3:50 PM - 4:10 PM	Dr Habib N. Najm	Inference of chemical model parameters given partial information	51
4:10 PM - 4:30 PM	Dr Hassan Nasser	(Student Lecture): Inferring spatio-temporal correlations in large scale neural networks	53
4:30 PM - 4:40 PM	Short break		
4:40 PM - 4:45 PM	<b>Session 5a: Information Geometry</b>		
4:45 PM - 5:05 PM	Dr John Skilling	Critique of entropy and geometry	55
5:05 PM - 5:10 PM	<b>Session 5b: Bayesian Methodologies</b>		
5:10 PM - 5:30 PM	Dr Geert Verdoolaege	Bayesian regression on information manifolds	57

**WEDNESDAY, 18 December 2013****Venue: Four Seasons Room, Pavilion on Northbourne**

8:00 AM - 8:30 AM Venue open; tea / coffee available

8:30 AM - 8:35 AM	<b>Announcements + Session 1: Astronomy</b>		
8:35 AM - 9:35 AM	Prof. David Hogg	Keynote Lecture: Probabilistic inference in astronomy	59
9:35 AM - 9:55 AM	Dr Torsten Enßlin	Astrophysical data analysis with information field theory	61
9:55 AM - 10:15 AM	Dr Marcus Frean	Source detection in astronomical images by Bayesian model comparison	63
10:15 AM - 10:35 AM	Dr Brendon J. Brewer	Computing astrophysical inferences with diffusive nested sampling	65
10:35 AM - 10:50 AM	Morning tea (catered)		
10:50 AM - 10:55 AM	<b>Session 2: Cosmology and Quantum Systems</b>		
10:55 AM - 11:55 AM	Prof. Marcus Hutter	Keynote Lecture: Observer localization in multiverse theories	67
11:55 AM - 12:15 PM	Dr Charley Lineweaver	Can the low entropy of the universe be a local fluctuation?	69
12:15 PM - 12:35 PM	Prof. Philip Goyal	An information-theoretic approach to identical particles in quantum theory	71
12:35 PM - 12:45 PM	<b>Planning of breakout sessions</b>		
12:45 PM - 1:40 PM	Lunch (catered)		
1:40 PM - 3:00 PM	<b>Breakout sessions; division into groups</b>	Available locations: Four Seasons Room (divided); Forest Room; Boardroom; also central Atrium	
3:00 PM - 3:30 PM	Return from breakout sessions; summary presentations		
3:30 PM - 3:50 PM	Afternoon tea (catered)		
3:50 PM - 3:55 PM	<b>Session 4: Ranking Systems and Probability Distributions</b>		
3:55 PM - 4:15 PM	Dr Wray Buntine	Bayesian topic models	73
4:15 PM - 4:35 PM	Mr Ian Wood	(Student Lecture): Recent advances and applications of probabilistic topic models	75
4:35 PM - 4:55 PM	Dr Vladislav Bina	An operator of composition for the multivariate copula construction	77
4:55 PM - 5:10 PM	Short break		

**WEDNESDAY, 18 December 2013 (cont'd)****POSTER SESSION: 5:10 to 6:30 PM**

Location: foyer area outside Four Seasons Room

Posters are to be put up Monday (you will require stick-on velcro, not pins), and removed on Thursday morning

1	Mrs Yasmin Abdelraouf	Geological sequestration of CO <sub>2</sub> with SO <sub>2</sub> : a thermodynamic-flow-deformation model	79
2	Dr Ewan Cameron	Recursive pathways to marginal likelihood estimation with prior-sensitivity analysis	81
3	Dr Carlos Diniz	Bayesian analysis and diagnostic of binary data models in the presence of extra-binomial variation	83
4	Mr Matt Edwards	Surfing through the universe: Bayesian inference of gravitational waves	85
5	Prof. Adom Giffin	Using Bayes factors for multifactor, biometric authentication	87
6	Mr Wesley Henderson	Assigning priors for parameters constrained to a simplex volume	89
7	Prof. Marcus Hutter	Universal Bayesian rational agents	91
8	Prof. Marcus Hutter	On universal prediction and Bayesian confirmation	93
9	Mr Do Kester	Correction of standing waves	95
10	Ms Alex Poppinga	Bayesian inference of epidemic parameters and extension for serially-sampled genetic data	97
11	Prof. Julio M. Stern	Sequential intentional sampling made haphazard by stochastic perturbations	99
12	Mr Barrie Stokes	A new implementation of nested sampling	101
13	Mr Muhammed Sutcu	First order dependence trees with cumulative residual entropy	103
13	Dr Udo von Toussaint	Prediction of data with help of the Gaussian process method	105
14	Mr Steven Waldrip	Maximum entropy analysis of hydraulic pipe networks	107

**THURSDAY, 19 December 2013****Venue: Four Seasons Room, Pavilion on Northbourne**

8:00 AM - 8:30 AM Venue open; tea / coffee available

8:30 AM - 8:40 AM	<b>Discussion of Thursday afternoon + evening arrangements</b>		
8:40 AM - 8:45 AM	<b>Session 1: Probabilistic Inference in Ecology</b>		
8:45 AM - 9:45 AM	A/Prof. David Warton	Keynote Lecture: Equivalences of maximum entropy and Poisson regression with applications in ecology	109
9:45 AM - 10:05 AM	Dr David Paull	MaxEnt and species distribution modelling: the case of the southern brown bandicoot	111
10:05 AM - 10:25 AM	Mr Jason Bertram	(Student Lecture): Maximum entropy models of ecosystem functioning	113
10:25 AM - 10:45 AM	Morning tea (catered)		
10:45 AM - 10:50 AM	<b>Session 2: Broader Perspectives</b>		
10:50 AM - 11:50 AM	Dr Anne-Marie Grisogono	Keynote Lecture: Open questions about entropy and information	115
11:50 AM - 12:10 PM	Dr Alex Klimenko	Can thermodynamic principles be applied to systems with competition ?	117
12:10 PM - 12:30 PM	Prof. Nestor Caticha	Cognitive limits, social interactions and the breakdown of the egalitarian society: an information theory approach	119
12:30 PM - 2:00 PM	Lunch (catered) and free time		
2:00 PM - 5:00 PM	<b>Conference "Kangaroo Tour", Red Hill, Canberra</b> Attendees will be transported by bus, depart outside hotel at 2:00 pm; return trip approx 5:00pm. This tour will involve a walk of 3 to 5 km (depending on weather), in some places over rocky and sloping ground. Please refer to separate risk assessment Attendees should wear good walking shoes and suitable clothing, and be prepared for all weathers (including >30C and sunny, or <15C with sudden wind and rain) A hat, sunscreen and bottle of water are strongly recommended		
5:00 PM - 6:00 PM	Free time		
6:00 PM - 11:00 PM	<b>Conference dinner, Lake George Winery, Federal Highway (approx 50 km)</b> Dinner attendees will be transported by bus, depart outside hotel at 6:00 pm; return trip 10:30pm to 11:00 pm		

**FRIDAY, 20 December 2013**

**Venue: Four Seasons Room, Pavilion on Northbourne**

8:00 AM - 8:30 AM Venue open; tea / coffee available

8:30 AM - 8:35 AM	<b>Announcements + Session 1a: Prior Information</b>		
8:35 AM - 8:55 AM	Dr Stephan Weis	Is the continuity of MaxEnt independent of the prior?	121
8:55 AM - 9:15 AM	Dr Ali Ghaderi	On coarse graining of information and prior probabilities	123
9:15 AM - 9:35 AM	Mr Brendan van Rooyen	(Student Lecture): Conjugate priors for generalized MaxEnt families	125
<b>Session1b: Astronomy</b>			
9:35 AM - 9:55 AM	Ms Daniela Huppenkothen	(Student Lecture): Timing transients: new methods to understand variability in astrophysical transients	127
9:55 AM - 10:15 AM	Mr Benjamin Pope	(Student Lecture): Bayesian model-fitting in optical imaging and interferometry	129
10:15 AM - 10:35 AM	Mr Marco Selig	(Student Lecture): The NIFTY way of Bayesian signal inference	131
10:35 AM - 11:00 AM	Morning tea (catered)		
11:00 AM - 11:30 AM	<b>Discussion of the future of The MaxEnt and Bayesian Association, Inc.</b>		
11:30 AM - 11:35 AM	<b>Session 2: Economic Systems</b>		
11:35 AM - 11:55 AM	Dr Mike Harré	Macroeconomic diversity, microeconomic choices and the use of MaxEnt in econophysics	133
11:55 AM - 12:15 PM	Dr Hellinton Hatsuo Takada	Portfolio diversification using the maximum entropy principle applied to Brazilian stocks	135
12:15 PM - 12:30 PM	<b>Awards Ceremony:</b> best student oral presentation; best poster		
12:30 PM	<b>Close of MaxEnt 2013</b>		
1:00 PM - 2:30 PM	<b>MaxEnt Business Meeting,</b> Forest Room		