



**SCHOOL ON LARGE SCALE PROBLEMS IN MACHINE LEARNING AND  
WORKSHOP ON COMMON CONCEPTS IN  
MACHINE LEARNING AND STATISTICAL PHYSICS  
20 - 31 August 2012, Trieste, Italy**

**Variational Methods in Inference and Optimisation**

**David BARBER  
UC London, U.K.**

Abstract:

I will discuss some variational methods for inference in Bayesian Machine learning, in particular inference in large-scale probabilistic models and discuss convexity properties of the resulting objective functions. These techniques are promising and enable us to apply scalable Bayesian methods to problems that contain many thousands of variables and beyond. I'll also discuss related variational techniques using Lagrange duality in solving Markov Decision Processes that have remarkable performance in policy learning. Time permitting, I will also discuss a simple general method for optimisation in discrete or non-continuous problems that can have excellent performance at modest expense.