

## ICTS Colloquium

- Title** : Your Dreams May Come True with MTP2
- Speaker** : Caroline Uhler, Massachusetts Institute of Technology, Cambridge
- Date** : Monday, July 22, 2019
- Time** : 3:00 PM
- Venue** : Emmy Noether Seminar Room, ICTS Campus, Bangalore
- Abstract** : We study probability distributions that are multivariate totally positive of order two (MTP2). Such distributions appear in various applications from ferromagnetism to Brownian motion tree models used in phylogenetics to factor analysis models used in finance. We first describe some of the intriguing properties of such distributions with respect to conditional independence and graphical models. In particular, we show that maximum likelihood estimation for MTP2 exponential families is a convex optimization problem and leads to sparsity of the underlying graph in Gaussian or Ising models without the need of a tuning parameter. We then consider the problem of non-parametric density estimation under MTP2, showing that the MLE is a piecewise linear function. We end with an application to covariance matrix estimation for portfolio selection and learning gene regulatory networks.