

Workshop on Statistical Physics and Capacity–Approaching Codes

21–25 May 2001



Co-sponsored by the European Science Foundation

P r o g r a m m e

All lectures will be held in the ICTP Main Building, Lecture Room "C"

Monday, 21 May 2001

08:30–09:00 Registration

09:00–09:30 *Welcome Address*
Miguel VIRASORO

Introduction

David FORNEY – Nicolas SOURLAS – Silvio FRANZ

09:30–11:00 Giorgio PARISI
11:00–11:15 *Coffee Break*
11:15–12:45 Robert McELIECE
12:45–14:30 *Lunch Break*
14:30–16:00 Marc MEZARD
16:00–16:30 *Coffee Break*
16:30–18:00 David MACKAY

Tuesday, 22 May 2001

09:00–10:30 Marc MEZARD
10:30–10:45 *Coffee Break*
10:45–11:15 Nicolas SOURLAS
11:15–12:45 Jonathan YEDIDIA
12:45–14:30 *Lunch Break*
14:30–16:00 Rudiger URBANKE
16:00–16:30 *Coffee Break*
16:30–18:00 William FREEMAN

Wednesday, 23 May 2001

09:00–09:30 Alan YUILLE
Two-loop Bethe free energy minimization

- 09:30–10:00 Max WELLING
Belief Optimization: A stable alternative to loopy belief propagation
- 10:00–10:15 *Coffee Break*
- 10:15–10:45 Mung CHIANG
Geometric programming, Bethe free energy minimization and the sum product algorithm
- 10:45–11:15 Thomas RICHARDSON
Fixed points and stability conditions
- 11:15–11:45 Jonathan YEDIDIA
Renormalization group: Applications
- 11:45–12:15 Yair WEISS
Local minima in approximate free energies
- 12:15–13:30 *Lunch Break*
- 13:50 *Meeting point in front of Adriatico Guest House for EXCURSION*

Thursday, 24 May 2001

- 09:00– 09:30 Ido KANTER
Cascading LDPC codes with low complexity
- 09:30–10:00 David SAAD
Statistical physics of LDPC codes
- 10:00–10:15 *Coffee Break*
- 10:15–10:45 Yoshiyuki KABASHIMA
Zero error noise thresholds for Gallager code ensembles
- 10:45–11:15 Andrea MONTANARI
Typical properties of LDPC codes
- 11:15–11:45 Federico RICCI TERSENGHI
Geometrical properties of solutions of LDPC equations

- 11:45–12:15 David SHERRINGTON
p–spin Ising spin glasses with r–spin ferromagnetic
interactions; phase diagrams and
relevance for error–correcting codes
- 12:15–14:30 *Lunch Break*
- 14:30–15:00 Gerard BEN AROUS
Mathematics of statistical physics
- 15:00–15:30 Radford NEAL
Monte Carlo decoding of LDPC codes
- 15:30–16:00 *Coffee Break*
- 16:00–16:30 Martin WAINWRIGHT
Tree–based reparameterization for approximate estimation
of stochastic processes on
graphs with cycles
- 16:30–17:00 Erik SUDDERTH
Embedded trees: estimation of Gaussian processes on
graphs with cycles

Friday, 25 May 2001

- 09:30–10:00 Leticia CUGLIANDOLO
Cluster expansions in dilute systems: applications to
satisfiability problems and spin glasses
- 10:00–10:15 *Coffee Break*
- 10:15–10:45 Andrea MONTANARI
Typical properties of turbo codes and LDPC codes: the
statistical mechanics point of view
- 10:45–11:15 David BURSHTEN
Bounds on the performance of belief propagation
decoding

- 11:15–11:45 Alexander BARG
 On polynomial invariants of linear codes
- 11:45–12:15 Riccardo ZECCHINA
 Statistical physics and optimization
- 12:15–14:30 *Lunch Break*
- 14:30 Working Group Meeting