

# RESEARCH INTERESTS OF FRANK DEN HOLLANDER

(update: 11 January 2019)

## Research interests – areas:

- Probability Theory
- Statistical Physics
- Ergodic Theory
- Population Genetics
- Complex Networks

## Research interests – topics:

large deviation theory  
network theory  
random access wireless networks  
structure of random graphs: static and dynamic  
spectra of random graphs  
random polymers  
metastability of interacting particle systems  
transitions between Gibbs and non-Gibbs under stochastic dynamics  
breaking of ensemble equivalence  
random walks in static and dynamic random environments  
parabolic Anderson model: intermittency in catalytic random media  
branching processes in random environments  
heat conduction and spectra in random domains  
Wiener sausage  
critical percolation and invasion percolation  
interacting diffusions, measure-valued diffusions and Cannings processes  
renormalisation  
variational principles for capacity  
ergodic classification of random sequences  
populations with seed-banks  
T-cells in immunology  
synchronisation  
fluorescence in photosynthesis

A common theme in my research has been the application of large deviation theory and potential theory to interacting particle systems, multi-type genetic populations and complex networks. My focus has been on the description of critical behaviour and phase transitions with the help of variational techniques.

**Research monographs:**

- F. den Hollander, *Large Deviations*, Fields Institute Monographs, Volume 14, American Mathematical Society, Providence RI, 2000, x + 143 pp., ISBN 0-8218-1989-5. (Second print in 2008.)
- F. den Hollander, *Random Polymers*, Lecture Notes in Mathematics, Volume 1974, Springer, Berlin, 2009, xiii + 258 pp., ISBN 978-3-642-00332-5.
- A. Bovier and F. den Hollander, *Metastability – A Potential-Theoretic Approach*, Grundlehren der mathematischen Wissenschaften 351, Springer, Berlin, 2015, xxi + 581 pp., ISBN 978-3-319-24775-5.