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This book presents a self-contained overview of the state of the art in the complexity of lattice problems, with particular emphasis on problems that are related to the construction of cryptographic functions.

Complexity of Lattice Problems: A Cryptographic ...
The study of lattices, specifically from a computational point of view, was marked by two major breakthroughs: the development of the LLL lattice reduction algorithm by Lenstra, Lenstra and Lovasz in the early 80's, and Ajtai's discovery of a connection between the worst-case and average-case hardness of certain lattice problems in the late 90's.

Complexity of Lattice Problems - A Cryptographic ...
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Complexity of Lattice Problems: A Cryptographic Perspective is an essential reference for those researching ways in which lattice problems can be used to build cryptographic systems. It will also be of interest to those working in computational complexity, combinatorics, and foundations of cryptography. The book presents a self-contained overview of the state of the art in the complexity of lattice problems, with particular emphasis on problems that are related to the construction of ...

Complexity of lattice problems: a cryptographic perspective
In other words, A is a discrete additive subgroup of m . - f6 COMPLEXITY OF LATTICE PROBLEMS Determinant 1.1 The determinant of a lattice Λ = £ (B), denoted det (Λ), is the n dimensional volume of the fundamental parallelepiped P (B) spanned by the basis vectors. (See shaded areas in Figures 1.1 and 1.2.)

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Complexity of lattice problems: a cryptographic perspective By Daniele Micciancio and Shafi Goldwasser Topics: Mathematical Physics and Mathematics

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Abstract. We survey some recent developments in the study of the complexity of certain lattice problems. We focus on the recent progress on complexity results of intractability. We will discuss Ajtai ' s worst-case/average-case connections for the shortest vector problem, similar results for the closest vector problem and short basis problem, NP-hardness and non-NP-hardness, transference theorems between primal and dual lattices, and application to secure cryptography.

The Complexity of Some Lattice Problems | SpringerLink
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May 21, 2007. Abstract Lattice problems are known to be hard to approximate to within sub-polynomial factors. For larger approximation factors, such as. p n, lattice problems are known to be in complexity classes such as NP\coNP and are hence unlikely to be NP-hard. Here we survey known results in this area.

On the Complexity of Lattice Problems with Polynomial ...
In computer science, lattice problems are a class of optimization problems related to mathematical objects called lattices. The conjectured intractability of such problems is central to the construction of secure lattice-based cryptosystems: Lattice problems are an example of NP-hard problems which have been shown to be average-case hard, providing a test case for the security of cryptographic algorithms. In addition, some lattice problems which are worst-case hard can be used as a basis for ext

Lattice problem - Wikipedia
In [4] it was shown that exactly solving the lattice basis reduction problem is equivalent in complexity to solving the closest vector problem, meaning that at least hyper-exponential complexity ...

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Complexity of Lattice Problems
about lattices and complexity theory Complexity of lattice problems a cryptographic perspective-Complexity of Lattice Problems A Cryptographic Perspective is an essential reference for those researching ways in which lattice problems can be used to build cryptographic systems It will also be of interest to those working in computational complexity

Complexity Of Lattice Problems
However, before lattice cryptography goes live, we need major advances in understanding the hardness of lattice problems that underlie the security of these cryptosystems. Significant, groundbreaking progress on these questions requires a concerted effort by researchers from many areas: (algebraic) number theory, (quantum) algorithms, optimization, cryptography, and coding theory.

Lattices: Algorithms, Complexity, and Cryptography ...
Pris: 1259 kr. Häftad, 2012. Skickas inom 10-15 vardagar. Köp Complexity of Lattice Problems av Daniele Micciancio, Shafi Goldwasser på Bokus.com.

Lattices are geometric objects that can be pictorially described as the set of intersection points of an infinite, regular n-dimensional grid. De spite their apparent simplicity, lattices hide a rich combinatorial struc ture, which has attracted the attention of great mathematicians over the last two centuries. Not surprisingly, lattices have found numerous ap plications in mathematics and computer science, ranging from number theory and Diophantine approximation, to combinatorial optimization and cryptography. The study of lattices, specifically from a computational point of view, was marked by two major breakthroughs: the development of the LLL lattice reduction algorithm by Lenstra, Lenstra and Lovasz in the early 80's, and Ajtai's discovery of a connection between the worst-case and average-case hardness of certain lattice problems in the late 90's. The LLL algorithm, despite the relatively poor quality of the solution it gives in the worst case, allowed to devise polynomial time solutions to many classical problems in computer science. These include, solving integer programs in a fixed number of variables, factoring polynomials over the rationals, breaking knapsack based cryptosystems, and finding solutions to many other Diophantine and cryptanalysis problems.

The first book to offer a comprehensive view of the LLL algorithm, this text surveys computational aspects of Euclidean lattices and their main applications. It includes many detailed motivations, explanations and examples.

New and classical results in computational complexity, including interactive proofs, PCP, derandomization, and quantum computation. Ideal for graduate students.

Surveys most of the major developments in lattice cryptography over the past ten years. The main focus is on the foundational short integer solution (SIS) and learning with errors (LWE) problems, their provable hardness assuming the worst-case intractability of standard lattice problems, and their many cryptographic applications.

This volume constitutes the refereed proceedings of the 27th Annual International Cryptology Conference held in Santa Barbara, California, in August 2007. Thirty-three full papers are presented along with one important invited lecture. The papers address current foundational, theoretical, and research aspects of cryptology, cryptography, and cryptanalysis. In addition, readers will discover many advanced and emerging applications.

This book constitutes the thoroughly refereed post-proceedings of the International Conference on Cryptography and Lattices, CaLC 2001, held in Providence, RI, USA in March 2001. The 14 revised full papers presented together with an overview paper were carefully reviewed and selected for inclusion in the book. All current aspects of lattices and lattice reduction in cryptography, both for cryptographic construction and cryptographic analysis, are addressed.

This book constitutes the refereed proceedings of the 28th Annual International Cryptology Conference, CRYPTO 2008, held in Santa Barbara, CA, USA in August 2008. The 32 revised full papers presented were carefully reviewed and selected from 184 submissions. Addressing all current foundational, theoretical and research aspects of cryptology, cryptography, and cryptanalysis as well as advanced applications, the papers are organized in topical sections on random oracles, applications, public-key crypto, hash functions, cryptanalysis, multiparty computation, privacy, zero knowledge, and oblivious transfer.

Partition functions arise in combinatorics and related problems of statistical physics as they encode in a succinct way the combinatorial structure of complicated systems. The main focus of the book is on efficient ways to compute (approximate) various partition functions, such as permanents, hafnians and their higher-dimensional versions, graph and hypergraph matching polynomials, the independence polynomial of a graph and partition functions enumerating 0-1 and integer points in polyhedra, which allows one to make algorithmic advances in otherwise intractable problems. The book unifies various, often quite recent, results scattered in the literature, concentrating on the three main approaches: scaling, interpolation and correlation decay. The prerequisites include moderate amounts of real and complex analysis and linear algebra, making the book accessible to advanced math and physics undergraduates.

Two central problems in computer science are P vs NP and the complexity of matrix multiplication. The first is also a leading candidate for the greatest unsolved problem in mathematics. The second is of enormous practical and theoretical importance. Algebraic geometry and representation theory provide fertile ground for advancing work on these problems and others in complexity. This introduction to algebraic complexity theory for graduate students and researchers in computer science and mathematics features concrete examples that demonstrate the application of geometric techniques to real world problems. Written by a noted expert in the field, it offers numerous open questions to motivate future research. Complexity theory has rejuvenated classical geometric questions and brought different areas of mathematics together in new ways. This book will show the beautiful, interesting, and important questions that have arisen as a result.