

Friedlander, John; Iwaniec, Henryk

Opera de cribro. (English) Zbl 1226.11099

Colloquium Publications. American Mathematical Society 57. Providence, RI: American Mathematical Society (AMS) (ISBN 978-0-8218-4970-5/hbk). xx, 527 p. (2010).

Sieve methods have been an important tool in additive number theory ever since the seminal work of Brun in 1915. Friedlander and Iwaniec are leading experts in this area, and they have made many fundamental contributions to the subject.

The title of this work indicates an extended metaphor the authors use as an organizing principle. Most of the chapters have subtitles with a musical theme. For example, the chapter on sieve terminology is “Tuning Up,” the chapter on the equidistribution of Gaussian primes is “Jitterbug,” and the chapter on the asymptotic sieve and the parity principle “Les Barricades Mystérieuses.”

The book contains many of the traditional applications such as almost-prime values of polynomials, short intervals, arithmetic progressions, and the “hyperbolic” prime number theorem. There are also many non-traditional applications on topics such as elliptic curves, points on cubic surfaces, and the illusory sieve. The latter explores the interaction of the sieve with a possible exceptional quadratic character.

The authors include many nuggets of “insider information.” These are useful little insights about the inner workings of sieves. Most of these have not appeared in the literature before, but they provide key understanding for both the reach and the limitations of sieve methods. Section 7.2 (“Comments on the Λ^2 -sieve”) and Chapter 10 (“Molecular Structure of Sieve Weights”) are sterling examples.

In summary, this book is an important addition to sieve literature. It is indispensable for any novice or expert trying to understand and appreciate this beautiful topic.

Reviewer: [Sidney W. Graham \(Mount Pleasant\)](#)

MSC:

[11N35](#) Sieves

[11-02](#) Research exposition (monographs, survey articles) pertaining to number theory

Cited in **132** Documents

Keywords:

[Sieve methods](#)