Preface

This book is based in part on a graduate course given by the first author at the Courant Institute in fall 2005. Subsequently, the second author gave a modified version of this course at the University of Rochester in spring 2007. In an earlier book on the subject [**21**] the author considered only unitary ensembles; here the primary focus is on orthogonal and symplectic ensembles.

In the first part of this book we present a unified treatment of the algebraic aspects of the unitary, orthogonal, and symplectic ensembles, following the approach of Tracy and Widom [**99**] and Widom [**103**]. The second part of the book contains an exposition of the work of the authors on the proof of universality in the bulk for orthogonal and symplectic ensembles in [**24**]. A proof of universality in the bulk for unitary ensembles can be found in [**21**].

Universality at the edge for the three types of invariant ensembles was addressed in [**23**]. The proof of universality in the bulk and at the soft and hard spectral edges for orthogonal and symplectic ensembles with generalized Laguerre-type weights using the methods of [**23, 24**] was given in [**25**]. In this introductory text, however, we will limit our presentation to results from [**24**]. We will, however, incorporate the streamlined proof of an important technical result (see Section 6.8) from [**16**]: this replaces the more cumbersome approach in [**23, 24**].

We note that in this book we prove quantitative versions of the error estimates for the Widom correction terms for orthogonal and symplectic ensembles with generalized Hermite-type weights. This is in contrast to [**23, 24**], where the authors prove only $o(1)$ estimates for the errors (see Section 1.3).

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