Preface

The present lecture notes arose from the masterclass "Free Probability and Operator Algebras" held September 2–6, 2013 in Münster, Germany. We would like to express our deep gratitude to the lecturers

- Dan-V. Voiculescu for providing a comprehensive account on early days of free probability and hints where this theory may lead in the future,
- Roland Speicher for explaining intriguing connections of free probability to the theory of *random matrices and combinatorics*,
- Dima Shlyakhtenko for presenting the state of the art theory concerning *free monotone transport*,
- Ken Dykema for telling us the fascinating, yet unfinished story of *free group factors*,
- Hari Bercovici for discussing *free convolution*, the free way of dealing with sums and products of independent random variables, and finally
- Moritz Weber for introducing us to *easy quantum groups* and explaining to us why we might want to care about them.

The lectures were attended by roughly 50 participants from various countries whose seniority ranged from master student to full professor, but most participants were PhD students and young postdoctoral researchers. Taken into account the impressions we got during the week as well as the feedback we collected afterwards, we feel that this event has been very successful in stimulating sustainable interactions between distinguished experts in the field and young emerging researchers.

As the lecturers conveyed their themes with great enthusiasm that struck the audience, a lot of work was carried out behind the curtains, both during and before this event: Since the idea of having such a masterclass in Münster came to life on a pleasant evening spent in the leisure room of the MFO (Oberwolfach) in October 2012, the organizers received advice and support from their mentors Joachim Cuntz and Roland Speicher.

Many small and not so small things were taken care of by our phenomenal team of secretaries: Elke Ernsting, Gabriele Dierkes and Lisa Steggemann. Without their well-structured, competent work and their patience, this event would have been impossible.

In order to ease the preparation of these lecture notes for the lecturers, the participants Cédric Schonard and Jonas Wahl took notes and typeset a useful first draft for each lecturer. We would like to thank both of them for their contribution as well as Siegfried Echterhoff for the financial support granted to undertake this step. In addition, we would like to thank Linus Kramer (WWU) for all his efforts that led to the creation of this new lecture notes series within the framework of the EMS Publishing House, Karin Halupczok (WWU) and Simon Winter (Dimler & Albroscheit) for their valuable editing, and Thomas Hintermann (EMS Publishing House) for his efficient and competent handling.

Finally and quite importantly, we wish to thank the SFB *Groups, Geometry and Actions* at the Mathematics Department in Münster for hosting the event and providing us with generous support. This enabled us to invite renowned specialists to Münster as well as to offer support for young talented researchers from distant places that otherwise would not have had access to sufficient funding in order to attend.

We are convinced that this masterclass added to the outstanding reputation of the Mathematics Department at the University of Münster. On the other hand, it also served the mathematical community as a whole by stimulating scientific interaction and spreading knowledge. With this perspective in mind, the creation of a lecture notes for this masterclass is nothing but the canonical next step. The result of our efforts is right in front of you, and we hope that it will prove itself an enjoyable and valuable source.

It is supposed to serve as an introduction into free probability from an operator algebraic point of view as well as a reference book for this approach. This is why we also inserted a lecture on *basics* of free probability which was not part of the original masterclass lectures.

Again, we thank all speakers not only for giving the lectures in Münster but also for all their efforts to improve these lecture notes and all their detailed proof-reading. Finally, we thank Dan-V. Voiculescu for co-editing these lecture notes together with us.

Nicolai Stammeier and *Moritz Weber*
(organizers of the masterclass)

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