

Preface

This volume is an outgrowth of the conference “Moduli Spaces and Vector Bundles—New Trends” that took place at the University of Warwick (U.K.), July 25–29, 2022. The conference used a hybrid format with over 50 people physically present and a larger number attending on-line. The theme of the conference was moduli theory in a broad sense. The main topics covered were the general theory of stability conditions in derived categories, non-reductive geometric invariant theory, Brill-Noether theory, and Higgs bundles and character varieties. There were twenty talks given by both established researchers and young mathematicians. The program was completed with a poster session both in person and on-line and a question and answer session with participation of S. Ramanan, Miles Reid, Peter Gothen and Peter Newstead. Titles, abstracts and in many cases videos from lectures are available at <https://vbac.wikidot.com/vbac2022>. The conference was organized in partnership with the Clay Mathematics Institute by Leticia Brambila-Paz, Gavin Brown, Antony Maciocia and the three editors of the present volume. We would like to take this opportunity to thank the sponsors of the conference: the Edinburgh Mathematical Society, the Foundation Compositio Mathematica, the London Mathematical Society, the National Science Foundation (USA), and the Warwick Mathematics Institute.

While the contents of this volume do not completely mirror conference presentations, its spirit and general themes are similar, and most authors were speakers at the conference. The volume includes both survey and original research articles. Most articles contain substantial background that we hope will help the novice get acquainted with the topics. The volume should therefore be a useful resource for both beginning and experienced researchers.

The conference, initially planned for 2021 but postponed due to the Covid epidemic, was dedicated to Peter Newstead on the occasion of his eightieth birthday. Peter Newstead has been a leading figure in algebraic geometry, especially moduli theory, since the 1960’s. His book *Introduction to moduli problems and orbit spaces* provided access to a very abstract but crucial technique in the construction of moduli spaces. His early work on the homology of moduli spaces of vector bundles on curves has been generalized in many directions. His interest in Brill–Noether Theory and Coherent Systems for vector bundles on curves has grown into a field of its own.

Aside from his scientific contributions, Peter Newstead has been an extraordinary mentor, reliable organizer of conferences and indefatigable traveller and participant in all kinds of events. He has mentored large numbers of young researchers sometimes officially but most often unofficially. Peter Newstead is a generous mathematician willing to share his ideas and expertise with those around him. His efforts

and leadership over the years have been instrumental for the careers of many young algebraic geometers.

Peter Newstead started the VBAC (Vector Bundles on Algebraic Curves) research group in 1994. Since then this group has been responsible for organizing annual workshops which have been highly influential in setting directions for future research and integrating young researchers in the community. During the covid lockdown, the conferences morphed into on-line bimonthly webinars and post covid both conferences and webinars are continuing.

Finally, no reference to the mathematical work of Peter Newstead would be complete without mentioning his wife Ann Newstead who supported not just Peter but also Peter's work and social connections talking to conference participants and collaborators, providing practical support and encouragement.

The editors of this volume are happy to dedicate it to Peter and Ann Newstead as a token both of their personal gratitude for the way they touched their lives and for Peter's general contribution to the progress of Mathematics.

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