

B

Progress in Mathematics

Volume 70

Series Editors

J. Oesterlé

A. Weinstein

Analytic Number Theory and Diophantine Problems

Proceedings of a Conference at
Oklahoma State University, 1984

Edited by
A.C. Adolphson
J.B. Conrey
A. Ghosh
R.I. Yager

1987

Birkhäuser
Boston · Basel · Stuttgart

A.C. Adolphson
J.B. Conrey
A. Ghosh
Department of Mathematics
Oklahoma State University
Stillwater, OK 74078
U.S.A.

R.I. Yager
Macquarie University
New South Wales 2113
Australia

Library of Congress Cataloging-in-Publication Data
Analytic number theory and diophantine problems.

(Progress in mathematics ; v. 70)

Includes bibliographies.

I. Numbers. Theory of—Congresses. I. Adolphson, A.C.

II. Series: Progress in mathematics (Boston, Mass.) ;
vol. 70

QA241.A487 1987 512'.73 87-14635

CIP-Kurztitelaufnahme der Deutschen Bibliothek

Analytic number theory and diophantine problems:
proceedings of a conference at Oklahoma State Univ.,
1984 / ed. by A.C. Adolphson . . . —Boston ;
Basel ; Stuttgart : Birkhäuser, 1987.

(Progress in mathematics ; Vol. 70)

NE: Adolphson, A.C. [Hrsg.] ; Oklahoma State
University [Stillwater, Okla.] ; GT

© Birkhäuser Boston, 1987

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior permission of the copyright owner.

Permission to photocopy for internal or personal use, or the internal or personal use of specific clients, is granted by Birkhäuser Boston, Inc., for libraries and other users registered with the Copyright Clearance Center (CCC), provided that the base fee of \$0.00 per copy, plus \$0.20 per page is paid directly to CCC, 21 Congress Street, Salem, MA 01970, U.S.A. Special requests should be addressed directly to Birkhäuser Boston, Inc., 675 Massachusetts Avenue, Cambridge, MA 02139, U.S.A.
3361-8/87 \$0.00 + .20

ISBN-13: 978-1-4612-9173-2 e-ISBN-13: 978-1-4612-4816-3

DOI:10.1007/978-1-4612-4816-3

Text prepared by the editors in camera-ready form.

9 8 7 6 5 4 3 2 1

PREFACE

A conference on Analytic Number Theory and Diophantine Problems was held from June 24 to July 3, 1984 at the Oklahoma State University in Stillwater. The conference was funded by the National Science Foundation, the College of Arts and Sciences and the Department of Mathematics at Oklahoma State University.

The papers in this volume represent only a portion of the many talks given at the conference. The principal speakers were Professors E. Bombieri, P. X. Gallagher, D. Goldfeld, S. Graham, R. Greenberg, H. Halberstam, C. Hooley, H. Iwaniec, D. J. Lewis, D. W. Masser, H. L. Montgomery, A. Selberg, and R. C. Vaughan. Of these, Professors Bombieri, Goldfeld, Masser, and Vaughan gave three lectures each, while Professor Hooley gave two. Special sessions were also held and most participants gave talks of at least twenty minutes each. Prof. P. Sarnak was unable to attend but a paper based on his intended talk is included in this volume.

We take this opportunity to thank all participants for their (enthusiastic) support for the conference. Judging from the response, it was deemed a success.

As for this volume, I take responsibility for any typographical errors that may occur in the final print. I also apologize for the delay (which was due to the many problems incurred while retyping all the papers).

A special thanks to Dollee Walker for retyping the papers and to Prof. W. H. Jaco for his support, encouragement and hard work in bringing the idea of the conference to fruition.

A. Ghosh
(on behalf of the Editors).

TABLE OF CONTENTS

K. ALLADI, P. ERDÖS and J. D. VAALER :.....	1
Multiplicative functions and small divisors.	
E. BOMBIERI :.....	15
Lectures on the Thue Principle.	
E. BOMBIERI and J. D. VAALER :.....	53
Polynomials with low height and prescribed vanishing.	
W. W. L. CHEN :.....	75
On the irregularities of distribution and approximate evaluation of certain functions II.	
J. B. CONREY, A. GHOSH and S. M. GONEK :.....	87
Simple zeros of the zeta-function of a quadratic number field II.	
H. DIAMOND, H. HALBERSTAM and H.-E. RICHERT :.....	115
Differential difference equations associated with sieves.	
J. FRIEDLANDER :.....	125
Primes in arithmetic progressions and related topics.	
P. X. GALLAGHER :.....	135
Applications of Guinand's formula	
D. GOLDFELD (appendix by S. FRIEDBERG) :.....	159
Analytic number theory on $GL(r, \mathbf{R})$.	

D. A. GOLDSTON and H. L. MONTGOMERY	183
Pair correlation and primes in short intervals.	
S. W. GRAHAM and G. KOLESNIK	205
One and two dimensional exponential sums.	
R. GREENBERG	223
Non-vanishing of certain values of L-functions.	
G. HARMAN	237
On averages of exponential sums over primes.	
D. HENSLEY	247
The distribution of $\Omega(n)$ among numbers with no large prime factors.	
T. KANO	283
On the size of $\sum_{n \leq x} d(n)e(nx)$	
D. W. MASSER and G. WUSTHOLZ	291
Another note on Baker's Theorem.	
M. B. NATHANSON	305
Sums of polygonal numbers.	
A. D. POLLINGTON	317
On the density of B_2 -bases.	
P. SARNAK	321
Statistical properties of eigenvalues of the Hecke operators.	
H.-B. SIEBURG	333
Transcendence theory over non-local fields.	

PARTICIPANTS

Adolphson, A.
Alladi, K.
Bateman, P.
Beukers, F.
Bombieri, E.
Brownawell, D.
Chakravarty, S.
Chen, W. W. L.
Cisneros, J.
Conrey, J. B.
Cooper, C.
Diamond, H. G.
Friedlander, J.
Gallagher, P. X.
Ghosh, A.
Goldfeld, D.
Goldston, D. A.
Gonek, S. M.
Graham, S.
Greenberg, R.
Gupta, R.
Halberstam, H.
Harman, G.
Hensley, D.
Hildebrand, A.
Hooley, C.
Iwaniec, H.
Jaco, W.
Kano, T.
Kennedy, R. E.
Kolesnik, G.
Kueh, Ka-Lam.
Lewis, D. J.
Maier, H.
Masser, D. W.
McCurley, K.
Montgomery, H. L.
Mueller, J.
Myerson, J.
Nathanson, M.
Ng, E.
Pollington, A.
Schumer, P.
Selberg, A.
Shiokawa, I.
Sieburg, H. B.
Skarda, V.
Spiro, C.
Vaaler, J.
Vaughan, R. C.
Vaughn, J.
Woods, D.
Yildirim, C. Y.
Youngerman, D.
Yager, R.