Theory of Accretion Disks

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Theory of Accretion Disks

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TABLE OF CONTENTS

CONFERENCE PHOTOGRAPH	viii
PREFACE	xi
LIST OF PARTICIPANTS	xiii
WELCOMING ADDRESS	
R. Kippenhahn	1
OBSERVATIONAL EVIDENCE FOR ACCRETION DISKS IN GALACTIC NUCLEI	
M.-H. Ulrich	3
THE LOW-FREQUENCY SPECTRA OF ACCRETION DISKS IN ACTIVE GALACTIC NUCLEI: THE DARK SIDE OF THE BIG BLUE BUMP	
M. Malkan	19
OBSERVATIONAL CONSTRAINTS ON VISCOSITY IN THE AGN ACCRETION DISCS	
A. Siemiginowska and B. Czerny	29
ACCRETION DISK MAGNETOHYDRODYNAMICS AND THE ORIGIN OF JETS	
R. D. Blandford	35
FORMATION OF RELATIVISTIC MHD JETS IN THE MAGNETOSPHERE OF ACCRETION DISKS	
M. Camenzind	59
NONSTEADY MHD JETS FROM MAGNETIZED ACCRETION DISKS – SWEEPING-MAGNETIC-TWIST MECHANISM –	
K. Shibata and Y. Uchida	65
STATISTICAL MODELLING OF IR/UV SPECTRA IN AGN	
Z. Loska and B. Czerny	71
FORMATION AND EVOLUTION OF THE SOLAR NEBULA	
P. Bodenheimer	75
ANGULAR MOMENTUM TRANSPORT IN PROTOSTELLAR DISKS	
D. N. C. Lin	89
PROTOSTELLAR DISCS	
J. E. Pringle	105

FORMATION OF VISCOUS PROTOSTELLAR ACCRETION DISKS	
W. M. Tscharnuter	113
FORMATION AND STRUCTURE OF PROTOSTELLAR ACCRETION DISKS	
R. E. Pudritz	125
MERGING WHITE DWARFS, DISK FORMATION AND TYPE I SUPER-NOVAE	
M. Livio	135
VARIABILITY OF ACTIVE GALACTIC NUCLEI AND GALACTIC QPO SOURCES: A DIAGNOSIS	
M. A. Abramowicz, E. Szuszkiewicz, and F. Wallinder	141
NONLINEAR PULSATION IN THE TRANSONIC REGION OF GEOMETRICALLY THIN ACCRETION DISKS	
R. Matsumoto, S. Kato, and F. Honma	167
ONE-ARMED OSCILLATIONS OF DISKS AND THEIR APPLICATIONS	
S. Kato	173
THERMAL AND TIDAL INSTABILITIES IN ACCRETION DISKS OF DWARF NOVAE	
Y. Osaki	183
HYDRODYNAMIC SIMULATION OF ACCRETION DISKS IN CATAclysmic VARIABLES	
M. Hirose and Y. Osaki	207
SIMULATIONS OF ACCRETION FLOW IN CLOSE BINARY STARS	
R. Whitehurst	213
VISCOUS EVOLUTION OF ACCRETION DISCS IN THE QUIESCENCE OF DWARF NOVAE	
S. Mineshige and J. H. Wood	221
BLACK HOLE ACCRETION DISC INSTABILITY AND SOFT X-RAY TRANSIENTS	
J. C. Wheeler and S. Mineshige	227
NON-AXISYMMETRIC SHEAR INSTABILITIES IN THICK ACCRETION DISKS	
R. Narayan and J. Goodman	231
INSTABILITIES OF ACCRETION FLOWS CAUSED BY THE INTERACTION OF INTERNAL GRAVITY MODES	
W. Glatzel	249
SIMULATIONS OF THREE-DIMENSIONAL SLENDER TORI	
J. F. Hawley	259
ACCRETION DISKS IN LOW MASS X-RAY BINARIES	
N. E. White	269

REFLECTED ACCRETION DISK EMISSION LINES IN CATAclysmic VARIABLES

F. V. Hessman	283
THE STRUCTURE OF THE BOUNDARY LAYER OF ACCRETION DISKS IN CATAclysmic BINARIES	
W. Kley	289
THE DYNAMICS OF TWISTED ACCRETION DISCS	
S. Kumar	297
A FREE ACCRETION DISK IN SN 1987A?	
F. Meyer and E. Meyer-Hofmeister	307
THE SPECTRA OF RELATIVISTIC ACCRETION DISKS	
R. E. Taam and A. Fu	313
THE COMPACT OBJECT IN SS433: NEUTRON STAR OR BLACK HOLE?	
T. Zwitter and M. Calvani	321
PHYSICS OF ACCRETION BY SPIRAL SHOCK WAVES	
H. C. Spruit	325
SPIRAL SHOCKS IN ACCRETION DISKS: A PRELIMINARY NUMERICAL STUDY	
M. Różyczka and H. C. Spruit	341
MASS TRANSFER BY TIDALLY INDUCED SPIRAL SHOCKS IN AN ACCRETION DISC	
T. Matsuda, N. Sekino, E. Shima, K. Sawada, and H. Spruit	355
ACCRETION DISKS AND THE LINK BETWEEN AN AGN AND ITS HOST GALAXY	
M. C. Begelman, J. Frank, and I. Shlosman	373
LARGE-SCALE ACCRETION FLOWS IN AGN	
J. Frank, I. Shlosman, and M. C. Begelman	387
THE DISK ACCRETION OF A TIDALLY DISRUPTED STAR ONTO A MASSIVE BLACK HOLE	
J. K. Cannizzo, H. M. Lee, and J. Goodman	397
LINE RADIATION FROM STATIONARY ACCRETION DISKS	
J. Adam, D. E. Innes, G. Shaviv, H. Störzer, and R. Wehrse	403
CONTINUUM SPECTRA OF ACCRETION DISCS	
G. Shaviv and R. Wehrse	419
INFLUENCE OF RADIATIVE TRANSFER ON THE VERTICAL STRUCTURE OF ACCRETION DISKS	
I. Hubeny	445
DUSTY DISKS AND THE INFRARED EMISSION FROM AGN	
E. S. Phinney	457
INDEX	471

Abramowicz, 24; Adam, 45; Begelman, 8; Blandford, 41; Bodenheimer, 27; Camenzind, 39; Cannizzo, 21; Czerny, 14; Duschl, 35; Frank, 30; Glatzel, 23; Hawley, 40; Hessman, 4; Hubeny, 48; Hummer, 37; Innes, 29; Kato, 46; Kley, 5; Kumar, 20; Lasota, 32; Lin, 44; Livio, 2; Loska, 36; Malkan, 15; Matsuda, 38; Matsumoto, 11; Meyer, 1; Meyer-Hofmeister, 28; Mineshige, 31; Narayan, 9; Osaki, 6; Phinney, 3; Pringle, 42; Pudritz, 43; Rees, 12; Ritter, 7; Rozyczka, 33; Shaviv, 18; Shibata, 34; Siemiginowska, 13; Spruit, 25; Taam, 10; Tscharnuter, 47; Ulnrich, 26; Wehrse, 19; White, 17; Whitehurst, 16; Zwitter, 22.

PREFACE

With the advent of space observatories and modern developments in ground-based astronomy and concurrent progress in the theoretical understanding of these observations it has become clear that accretion of material on to compact objects is an ubiquitous mechanism powering very diverse astrophysical sources ranging in size and luminosity by many orders of magnitude. A problem common to these systems is that the material accreted must in general get rid of its angular momentum and this leads to the formation of an *Accretion Disk* which allows angular momentum re-distribution and converts potential energy into radiation with an efficiency which can be higher than the nuclear burning yield.

These systems range in size from quasars and active galactic nuclei to accretion disks around forming stars and the early solar system and to compact binaries such as cataclysmic variables and low-mass X-ray binaries. Other objects that should be mentioned in this context are SS433, the black hole binary candidates, and possibly gamma-ray burst sources. Observations of these systems have provided important constraints for theoretical accretion disk models on widely differing scales, luminosities, mass-transfer rates and physical environments.

It was therefore appropriate to call together an expert meeting to discuss and evaluate the progress in these different research areas with a common theoretical paradigm: the *Accretion Disk*. This was the purpose of a NATO Advanced Research Workshop on *Theory of Accretion Disks* which took place at the Max-Planck-Institut für Astrophysik in Garching, from 6 to 10 March 1989. The participants constituted a significant fraction of the most active researchers in the field drawn from 10 nations, from different areas of expertise, mainly theoreticians but with a good representation of observers. The hope that recent advances in our understanding of different objects may lead to some cross-fertilization was in our opinion realized in the many open and informal discussions during the meeting.

We are deeply grateful to the NATO Science Committee for providing the main

funding for this Workshop and to the European Space Agency and the Max-Planck-Gesellschaft for further support. We thank Prof. R. Kippenhahn for allowing the Workshop to be held at the Institute and extend our gratitude to the Max-Planck-Institut für Astrophysik and the Institut für Theoretische Astrophysik, Heidelberg, for use of facilities and support before, during and after the meeting. We are also grateful to BMW, the Cray Research Corporation, IBM, and the Tourist Office of the City of Munich for helping us to put together a nice registration folder. We thank all the participants for their lively contributions to the discussion during the sessions and for the prompt submission of their manuscripts. Finally we would like to thank Petra Berkemeyer and colleagues for organizational and secretarial help, and to all the members of our Institute who contributed towards a welcoming environment for our Workshop.

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