



IAU Colloquium No. 79

Very Large Telescopes, their Instrumentation and Programs

held in Garching bei München (Federal Republic of Germany)

April 9–12, 1984

Edited by: M.-H. Ulrich
K. Kjær



EUROPEAN SOUTHERN OBSERVATORY



IAU Colloquium No. 79

Very Large Telescopes, their Instrumentation and Programs

held in Garching bei München (Federal Republic of Germany)

April 9–12, 1984

Edited by: M.-H. Ulrich
K. Kjær

September 1984

ESO Conference and Workshop Proceedings No. 19

Scientific Organizing Committee

R. Angel	N.V. Steshenko
R. Cayrel	J.-P. Swings
O. Citterio	M.-H. Ulrich (Chairman)
M. Longair	S. van den Bergh
G. Münch	H. van der Laan

Proceedings published and distributed by the European Southern Observatory,
Karl-Schwarzschild-Str. 2, D-8046 Garching bei München, Federal Republic of Germany

ISBN 3-923524-19-6

TABLE OF CONTENTS

Foreword	iii
M.-H. Ulrich	
Acknowledgements and Editors' Note	v
I. INTRODUCTION	
Thoughts About Very Large Telescopes	3
E.J. Wampler	
II. MIRRORS AND DOMES	
Steps Towards 8m Honeycomb Mirrors - a Method for Polishing Aspheres as Fast as F/1	11
J.R.P. Angel	
From Passive Support Systems to the NTT Active Support	23
R.N. Wilson, F. Franza and L. Noethe	
Support System for the 1m ESO Active Optics Experiment	41
O. Citterio, G. Conti, E. Mattaini and F. Franza	
ESO's New Technology Telescope (NTT) Metallic Primary Mirror Project	57
K.N. Mischung	
Optical Wavefront Analysis of Thermally Cycled 500mm Metallic Mirrors	67
L. Noethe, F. Franza, P. Giordano and R. Wilson	
A Finite Element Approach to the Design of the Support System for the ESO 1m Active Optics Experiment	75
G. Ballio, R. Contro, C. Poggi and O. Citterio	
* Consideration for the Design of the Driving and Bearing System for Large Telescopes	95
F. Taddei and R. Tomelleri	
Mirrors: Fabrication, Processing, Testing and Tolerances	109
A.B. Meinel, M.P. Meinel, R.R. Shannon and R.E. Parks	
The ESO Off-line Telescope Testing Technique Illustrated with Results for the MPIA 2.2m Telescope II	119
R.N. Wilson, F. Franza, L. Noethe and M. Tarenghi	

* Contributed papers or posters

* Mirror Compensator for Testing Convex Secondary P. Junhua	131
* How to Quantify Ripple H. Geib, C. Kühne and E. Morgenbrod	135
Optical Shop Testing of Liquid Mirrors E.F. Borra, M. Beauchemin, R. Arsenault and R. Lalande	147
* Sundai's 75cm Alt-Az Telescope with an E6 Honeycomb Mirror S. Isobe, H. Seo, H. Osawa, M. Konno, N. Shinohara and S. Norizuki	157
Large Telescope Wind Loading F.F. Forbes	165
Pointing Errors of Large Telescopes Due to Wind B.L. Ulich	177
* Large European Solar Telescope (LEST) - a Solar Telescope for High Spatial Resolution and Polarimetric Observations O. Engvold	183
III. ATMOSPHERIC SEEING, INTERFEROMETRY, SPECKLE, MMTs AND ARRAYS	
Measuring Atmospheric Seeing F. Roddier	191
* A Method to Estimate Fried's Seeing Parameter from a Time Series of Arbitrary Resolved Structures Imaged Through the Atmosphere O. von der Lühe	203
Adaptive Optics N.J. Woolf	221
Astronomical Seeing at Mauna Kea and in Particular at the CFHT R. Racine	235
Interferometry with Large Telescopes P. Léna	245
Pathlength Stability of Synthetic Aperture Telescopes - the Case of the 25cm CERGA Interferometer J.M. Mariotti and G.P. di Benedetto	257

* Contributed papers or posters

Progress of the Large Interferometer at CERGA	267
A. Labeyrie, G. Schumacher, C. Thom, M. Dugué, F. Foy, R. Foy, P. Cormier and F. Vakili	
The Use of the MMT for Interferometric Imaging	279
J.M. Beckers and E.K. Hege	
* 16m Large Slit Aperture Telescope for Very High Angular Resolution Astronomy	295
R.G. Petrov, C. Aime, J. Borgnino, F. Martin and G. Ricort	
Infrared Speckle Methods	309
A. Chelli	
Speckle Interferometry, Speckle Masking, Speckle Spectroscopy and Speckle Frame Selection	337
G. Weigelt	
The Two-Mirror Telescope (2MT)	347
R.G. Bingham	
On the Importance of Active Image Stabilisation	367
J.E. Noordam	
Cost Scaling Laws and Their Origin: Design Strategy for an Optical Array Telescope	379
C.M. Humphries, V.C. Reddish and D.J. Walshaw	
* The Mersenne-Schmidt Telescope	395
R.V. Willstrop	
* A Modular Structural Design for a Spectrographical MMT	405
R. Freire Ferrero, M. Chevreton and P. Felenbok	
Pointing, Tracking, Guiding, and Dome Seeing at the AAT	415
P.R. Gillingham	
* Some Possible VLT Sites in Chile	417
A. Ardeberg and H. Lindgren	
IV. INSTRUMENTATION - COMPONENTS	
Optical and Infrared Instruments Requirements for a VLT	431
H.R. Butcher	
ESO 16 Metre Very Large Telescope - Instrument Matching in Spectroscopy and Direct Imaging	439
D. Enard	

* Contributed papers or posters

* C.F.H.T. Focal Reducer: Image and Multiaperture Spectroscopy	465
B. Fort, G. Lelièvre, J.P. Picat, Y. Rio and L. Vigroux	
Image-Slicers	469
E.H. Richardson, J.M. Fletcher and W.A. Grundmann	
Fabry-Perot Spectrographs for VLT's	493
G. Monnet	
High-Resolution Fourier Transform Spectroscopy with a VLT	497
D.N.B. Hall	
* The New Coudé Echelle Spectrograph for the Anglo-Australian Telescope	499
D.D. Walker and F. Diego	
Imaging Spectroscopy on Very Large Telescopes	515
P. Atherton	
Advanced Wide-Field Broad-Passband Refracting Field Correctors for Large Telescopes	519
H.W. Epps, J.R.P. Angel and E. Anderson	
Refractive vs Reflective Correctors	549
E.H. Richardson and C.L. Morbey	
System Requirements for Polarization Capability	569
J. Tinbergen	
Focal Reducer Techniques for Direct Imaging and Field Spectroscopy with Large Telescopes	575
E.H. Geyer and B. Nelles	
Two-Dimensional Infrared Detector Arrays	585
C.R. McCreight	
* Qualifying a Mosaic of Detectors for Infrared Astronomy	603
F. Lacombe, D. Rouan, D. Stefanovitch, B. Talureau, J. Berezne, G. Epstein, S. Pau, D. Phan Van and Y. Zéau	
Recent Developments in Coatings, Gratings, and Reflective Components	607
R.R. Shannon	
Prospects for Fibreoptics in Future Telescope Instrumentation	617
G. Lund	

* Contributed papers or posters

Considerations in Photographic Detection for Very Large Telescopes	637
A.G. Millikan	
* Emploi de la caméra électronique grand champ avec les très grands télescopes - Extrapolation des résultats obtenus avec le télescope C.F.H.	639
G. Wlérick, L. Renard, D. Horville, F. Gex, J.M. Munier, G. Lelièvre, A. Llebaria, A. Bijaoui, R. Dubout and M. Petit	
* Rubicon - a New Diode Array Detector System	659
Th. Schmidt-Kaler, R. Rudolph and H. Tüg	
* A Simultaneous Five Colour Three Channel Photometer with Fiber Optics - Design and First Results	665
H. Barwig and R. Schoembs	
V. ASTRONOMICAL PROGRAMS FOR A VERY LARGE TELESCOPE	
Interstellar Matter with Very Large Telescopes	675
J. Lequeux	
Star Formation	679
A.F.M. Moorwood	
Very Large Telescopes and Stellar Astrophysics	695
V. Castellani	
Uses of Very Large Telescopes for Galaxy Research	703
M.-H. Ulrich	
The Nature of Galaxies and Clusters of Galaxies at Very Large Distances	713
J.B. Oke	
The Uses of a VLT for Complementing Observations with Radio and Space Telescopes	723
D.N.B. Hall	
VI. VERY LARGE TELESCOPE PROJECTS	
The 15-Meter National New Technology Telescope: an Update	727
L.D. Barr	
The 6-Meter Optical Telescope of the USSR: Instrumentation and Observational Possibilities	745
J.M. Kopylov and A.F. Fomenko	

* Contributed papers or posters

The University of California Ten Meter Telescope Project: Recent Developments J.E. Nelson	755
ESO 16 Metre Very Large Telescope: The Linear Array Concept D. Enard	767
The University of Texas 7.6-m Telescope R.G. Tull	789
Update on the 18m Aperture Multi-Mirror Telescope Concept B. Mack and D.J. Harman	817
Options for a New Arizona Observatory: Configurations, Costs and Site N.J. Woolf, J.R.P. Angel and J.T. Williams	831
Japanese National Large Telescopes (JNLT) S. Isobe	845
The Penn State Spectroscopic Survey Telescope L.W. Ramsey and D.W. Weedman	851
VII. SUMMARY AND DISCUSSION	863
VIII. LIST OF PARTICIPANTS	904