Contents

In	Introduction. By G. Schmahl and D. Rudolph				
Pa	Part I X-Ray Sources				
1.	The BESSY Soft X-Ray Source and Future Developments By G. Mülhaupt (With 2 Figures)	4			
2.	Recent and Future Developments at L.U.R.E. (Orsay) By Y. Petroff (With 7 Figures)	11			
3.	X-Ray Emission from a 1kJ Plasma Focus By G. Herziger (With 6 Figures)	19			
4.	Laser Produced Plasma VUV and Soft X-Ray Light Sources By M.L. Ginter (With 2 Figures)	25			
5.	Spectral Radiant Power Measurements of VUV and Soft X-Ray Sources By M. Kühne and B. Wende (With 5 Figures)	30			
Pa	rt II X-Ray Optics	_			
б.	Optimum Zone Plate Theory and Design By R.O. Tatchyn (With 2 Figures)	40			
7.	Planar Techniques for Fabricating X-Ray Diffraction Gratings and Zone Plates. By H.I. Smith, E.H. Anderson, A.M. Hawryluk, and M.L. Schattenburg (With 13 Figures)	51			
8.	Zone Plates for X-Ray Microscopy. By G. Schmahl, D. Rudolph, P. Guttmann, and O. Christ (With 10 Figures)	63			
9.	Construction of a Micro Zone Plate and Evaluation of Imaging Properties. By P. Guttmann (With 16 Figures)	75			
10	.Construction of Condenser Zone Plates for a Scanning X-Ray Microscope. By J. Thieme (With 6 Figures)	91			
11	. Recent Advances in X-Ray Optics				

12.	Fabrication of Small Linewidth Diffractive Optics for Use with Soft X-Rays. By A.G. Michette, M.T. Browne, P. Charalambous, R.E. Burge, P.J. Duke, and M.J. Simpson (With 11 Figures)	109
13.	Submicron Lithography by Demagnifying Electron-Beam Projection By H.W.P. Koops and J. Grob (With 5 Figures)	119
14.	Grazing Incidence Optics for X-Ray Microscopy By A. Franks and B. Gale (With 4 Figures)	129
15.	Use of Multilayers for X-UV Optics: Their Fabrication and Tests in France. By P. Dhez (With 6 Figures)	139
16.	Multilayers for X-Ray Optical Applications By T.W. Barbee, Jr. (With 18 Figures)	144
17.	Performance Tests on Layered Synthetic Microstructures (LSM's) for X-Ray Optical Elements. By W.K. Warburton, Z.U. Rek, and T.W. Barbee, Jr. (With 14 Figures)	163
Par	t III X-Ray Detectors	
	Charge and Scintillation Gaseous Detectors for Low Energy X-Rays By A.J.P.L. Policarpo (With 12 Figures)	172
19.	The Detection of Soft X-Rays with Charge-Coupled Detectors By P. Burstein and J.M. Davis (With 1 Figure)	184
Par	t IV X-Ray Microscopes	
20.	The Göttingen X-Ray Microscope and X-Ray Microscopy Experiments at the BESSY Storage Ring. By D. Rudolph, B. Niemann, G. Schmahl, and O. Christ (With 10 Figures)	192
21.	Recent Results from the Stony Brook Scanning Microscope By H. Rarback, J.M. Kenney, J. Kirz, M.R. Howells, P. Chang, P.J. Coane, R. Feder, P.J. Houzego, D.P. Kern, and D. Sayre (With 5 Figures)	203
22.	The Göttingen Scanning X-Ray Microscope. By B. Niemann (With 5 Figures)	217
23.	A Scanning Soft X-Ray Microscope Using Normal Incidence Mirrors By E. Spiller (With 3 Figures)	226
24.	X-Ray Microscopy at the Daresbury Laboratory By P.J. Duke (With 5 Figures)	232
25.	X-Ray Microscopy at Imperial College By R.J. Rosser (With 12 Figures)	242
26.	Photoelectron X-Ray Microscopy: Recent Developments By F. Polack and S. Lowenthal (With 7 Figures)	251

Part	V Applications of X-Ray Microscopy	
27.	Prospects and Problems in X-Ray Microscopy By J. Kirz and D. Sayre	262
28.	Biological Applications of X-Ray Contact Microscopy By B.J. Panessa-Warren (With 13 Figures)	268
29.	Recent Developments in X-Ray Contact Microscopy. By R. Feder, V. Mayne-Banton, D. Sayre, J. Costa, B.K. Kim, M.G. Baldini, and P.C. Cheng (With 8 Figures)	279
30.	Soft X-Ray Contact Microscopy and Microchemical Analysis of Biological Specimens. By P.C. Cheng, K.H. Tan, J.Wm. McGowan, R. Feder, H.B. Peng, and D.M. Shinozaki (With 15 Figures)	285
31.	X-Ray Microscopy as a Possible Tool for the Investigation of Plant Cells. By V. Sarafis	294
32.	Possible Applications of X-Ray Microscopy in Pathology By F. Pfannkuch, D. Hoder, and H. Baumgärtel	300
33.	Time Resolved X-Ray Spectroscopy in Biology. By R. Rigler (With 1 Figure)	304
34.	Quantitative Microanalysis with High Resolution Using Soft X-Rays — Possible Applications. By J. Kirschner (With 2 Figures)	308
35.	On the Possibility of Imaging Microstructures by Soft X-Ray Diffraction Pattern Analysis. By D. Sayre, RP. Haelbich, J. Kirz, and W.B. Yun	314
Par	t VI X-Ray Holography	
36.	Possibilities for X-Ray Holography Using Synchrotron Radiation By M.R. Howells (With 15 Figures)	318
37.	The Study of the Helical Undulator Parameters Installed in the Storage Ring VEPP-2M as a Source of X-Ray Microscopy and Holography. By E.S. Gluskin, G.N. Kulipanov, G.Ya. Kezerashvili, V.F. Pindyurin, A.N. Skrinsky, A.S. Sokolov, and P.P. Ilyinsky (With 9 Figures)	336
Ind	ex of Contributors	345