

CONTENTS

EXPLOSIVE GENERATORS AND ENERGY STORAGE -
ELECTRIC, MAGNETIC AND MECHANICAL

A Survey of Recent Work on Explosive Driven
Magnetic Flux Compression Generators 1
R.S. Caird, C.M. Fowler, D.J. Erickson,
B.L. Freeman, and W.B. Garn

Flux Compression Generators as Plasma Compression
Power Sources 19
C.M. Fowler, R.S. Caird, D.J. Erickson, B.L. Freeman,
D.B. Thomson, and W.B. Garn

The Development of High Energy Heavy Ions for Inertial
Confinement Fusion: A Phased Approach 43
R.L. Martin

Fundamental Concepts of Energy Compression 55
O. Zucker

Neutron Pulse-Train Generation in a Plasma Focus
Device Powered by a Long-Lasting Current 75
J. Salge, B. Fell, U. Bransberger, I. Ueno,
and H. Conrads

On Repetitive Operation of a Plasma Focus 87
H. Conrads, and J. Salge

High Density Z-Pinch 99
A. Fisher and J. Shiloh

FREE ELECTRON LASERS -
CURRENT FILAMENTATION AND Z-PINCH

Coherent Wave-Particle Interaction Mechanisms 107
J.D. Lawson

Light Amplification by an Undulator	119
H. Motz	
A Free Electron Laser Based on the Nonlinear Force	131
H. Hora	
A High-Power, Submillimeter Free Electron Laser Based on Intense Relativistic Electron Beams	139
V.L. Granatstein, R.K. Parker, and P. Sprangle	
The Non-Linear Theory and Efficiency Enhancement of Free Electron Lasers	149
P. Sprangle, C-T. Tang, and W.M. Hanheimer	
The Energy Balance in a High Voltage High Current Z Pinch	161
M.G. Haines	
Current Filamentation Caused by the Electrothermal Instability in a Fully Ionized Plasma	181
M.G. Haines and F. Marsh	
Free Electron Lasers for Laser Fusion	201
S. Segall	
Free Electron Laser Using Collective Effect	219
H.J. Doucet	

PLASMA FOCUS

Present Status of the Frascati 1 MJ Plasma Focus Programme	221
C. Gouylan, H. Kroegler, C. Maissonnier, J.P. Rager, B.V. Robouch, L. Bertalot, A. Gentilini, B. Arcipiani, E. Pedretti, and K. Steinmetz	
The Electrode Shape Effects for the Neutron Yield of a 3-kJ Filippov Type Plasma Focus	247
T. Kobata	
Production of GW Electron and Ion Beams by Focussed Discharges	267
W.H. Bostick, V. Nardi, W. Prior, J. Feugeas, A. Bortolotti, C. Cortese, F. Mezzetti, and F. Pedrielli	
Optimal Regimes of Mather-Type Plasma Focus Devices	289
H. Bruzzone, H. Kelly, J. Pouzo, R. Gratton, and J. Gratton	

Deuteron Beams in the Megaampere Range Created in a Turbulent Plasma	307
A. Bernard, J.P. Garconnet, A. Jolas, J.P. LeBreton, and J. de Mascureau	
Energy Coupling in the Plasma Focus	317
T.E. Wainwright, W.L. Pickles, H.L. Sahlin, and D.F. Price	
Plasma Focus Experiments with DT-Filled Microballons	325
H.L. Sahlin, T.H. Masegawa, W.L. Pickles, D.F. Price, T.W. Wainwright, J.W. McClure, R.L. Gullickson, and J.S. Luce	
Studies of a 60 KV Plasma Focus	329
D.C. Gates	
Two Dimensional Electrochemical Model of the Plasma Focus	353
F. Gratton and J.M. Vargas	
Two-Dimensional Magnetohydrodynamic Calculations for a 5 MJ Plasma Focus (Manuscript in the final form received by the Editors on May 4, 1979)	387
S. Maxon	
Some Remarks on the Anisotropic Neutron Emission of a Mather-Type Plasma Focus	407
K. Hübner, H. Bruhns, and K. Steinmetz	
High Voltage Focus Programme at Dusseldorf University	413
G. Decker, W. Kies, and G. Pross	
BEAM GENERATION AND PROPAGATION	
Generation, Focusing and Transport of Intense Light Ion Beams	417
S.A. Goldstein	
Extraction and Division of the Kinetic Energy of Energetic Electron Beams	423
L.J. Demeter	
LLL Experiments in Collective Field Acceleration	437
J.S. Luce, W.H. Bostick, and V. Nardi	
Structure and Propagation of Electron Beams	449
V. Nardi	

Generation of Powerful Impulses of Electromagnetic Radiation by Beams of Relativistic Electrons in Both Vacuum and Plasma System	467
M. Rabinovich, M. Raizer, A. Ruchadze, and P. Strelkov	
Collective Ion Acceleration from a Localized Ion Source . .	477
W.W. Destler	
Energy Storage, Compression and Switching by an Electron Beam in the Autoaccelerator	485
J.G. Siambis	
APPLICATIONS AND DIAGNOSTICS	
Laser-Fusion Employing Direct Nuclear Pumped Lasers	501
G.H. Miley	
X-Ray Laser Pumping with Enhanced Radiation from Electron Storage Rings	519
P.L. Csonka	
An Analysis of the Collective Free Electron Laser	543
D.B. McDermott and T.C. Marshall	
Conductivity Measurements of an High Current Density Discharge by Optical Means	551
M. Skowronek, L. Giry, V.T. Gia, and P. Romeas	
Spectroscopic Measurement of Magnetic Fields in Dense Plasma	563
N.J. Peacock	
Ion Beam Production in the Plasma Focus Device	579
R.L. Gullickson, W.L. Pickles, D.F. Price, H.L. Sahlin, and T.E. Wainwright	
Upper Mybrid Resonance Absorption of Laser Irradiation in a Magnetized Plasma	597
Y. Kitagawa, Y. Yamada, I. Tsuda, M. Yokoyama, and C. Yamanaka	
Generation of Kilogauss Radial Magnetic Fields in the Plasma Focus Current Sheath	607
C.F. Fontan and A.S. Schifino	
Some Observations on Ion Acceleration from Image- Structures of a 2 kJ Plasma Focus	617
H. Fischer, K.H. Haering, and R. Klemm	

Electron Burst Measurements Produced by a Plasma Focus . . . G.M. Molen	629
Design and Construction of the PF-II Device J. Pouzo and J. Gratton	643
SPECIAL TOPICS	
Some Approaches to Macron Acceleration M.N. Kreisler	655
The Dense Plasma Focus and Nuclear Energy: A Possible Path Towards Fuel-Selfsufficiency M. Heindler and A.A. Harms	673
A Plasma Focus Driven Fusion-Fission Hybrid Reactor J.H. Lee	693
A Large Area Cold Cathode Electron Gun A. Alamon, R. Gratton, R. Lembo, and J. Niedbalski	705
Analytical Methods in Laser Fusion T.A. Minelli and M. Pusterla	719
Space-Time Energy Concentration and the Design of DT Fusion Micro-Explosions H. Sahlin and J.E. Brandenburg	729
Shock Compression of Layered Structures V. Belokogne	745
Numerical Calculations of Gravity Waves J.R. Wilson	781
Magnetized Whirls in Plasma Focus Discharges E.A. Witalis	787
Recent Development in High Energy Plasma Production Techniques by the Deflagration Plasma Gun D.Y. Cheng, P.P. Tripathi, and C.N. Chang	807
Vacuum Thermalization of High Intensity Laser Beams and the Uncertainty Principle R.P. Gupta, E. Panarella, and B.S. Bhakar	831
Supercoherent Phenomena in Pulsed Power R.C. O'Rourke	839

ENERGY STORAGE

The Use of Rotating Relativistic Electron Beams to Create Magnetically Confined Plasma Inside Imploding Liners	851
A.E. Robson and J.D. Sethian	
Long Pulse, Low Ripple, High Voltage Accelerator Design . .	853
J.L. Harrison, J. Shannon, J.B. Smith, and R. White	
Elements of Magnetic Switching	869
K. Aaland	
Development of Imploding Liner Systems for the NRL Linus Program	881
P.J. Turchi, R.L. Burton, A.L. Cooper, R.D. Ford, D.J. Jenkins, J. Cameron, and R. Lanham	
Capillary Fusion	891
S.K. Händel, O. Jonsson, and C. Randle	
Enhanced Electron Deposition	901
M.M. Widner	
Electromagnetic-Implosion Generation of Pulsed High Energy Density Plasma	903
W.L. Baker, J.H. Degnan, T.W. Hussey, G.F. Kiuttu, D.A. Kloc, R.E. Reinovsky, and N.F. Roderick	
Advanced Magnetohydrodynamic Power Generation	917
E.A. Witalis	
Compulsator -- A High Power Compensated Pulsed Alternator	925
W.F. Weldon, M.D. Driga, W.L. Bird, K.M. Tolk, H.H. Woodson, and H.G. Rylander	

COMPRESSION CIRCUITRY AND SWITCHING

Laser Activated Semiconductor Switches	939
D.J. Page	
Current Interruption in Inductive Storage Systems Using Inertial Current Source	953
I.M. Vitkovitsky, D. Conte, R.D. Ford, and W.H. Lupton	

CONTENTS

xvii

A Laser Triggered Solid Dielectric Switch	973
A.H. Guenther, D.M. Strickland, J.R. Bettis, and R.P. Copeland	
High Power Switches Capabilities	987
H.B. Odom, T. Burkes, M. Kristiansen, W. Portnoy, M. Hagler, and J.P. Craig	
The Reflex Switch - An Opening Switch for Use with Magnetic Energy Storage	1007
J.M. Creedon, B.A. Lippmann, and V.L. Bailey	
Magnetic Insulation	1017
B.A. Lippmann	
Staged Implosion Plasma Switch for Vacuum Magnetic Energy Stores	1023
L.J. Demeter and V.L. Bailey	
DISCUSSION AND CONCLUDING REMARKS	
Comments on the Free Electron Lasers	1031
S. Segall	
Concluding Remarks on the Second International Conference on Storage, Compression and Switching	1035
J.G. Linhart	
CONFERENCE PHOTOGRAPH	1039
MEMORIAL TO HARRY SAHLIN	1041
AUTHOR INDEX	1045
SUBJECT INDEX	1049