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# EMERGING NUCLEAR ENERGY SYSTEMS 1989

**ICENES '89**  
Karlsruhe 3 - 6 July

Proceedings of the fifth  
International Conference on  
Emerging Nuclear Energy Systems

Editors

**Ulrich von Möllendorff**

**Balbir Goel**

World Scientific

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Kernforschungszentrum Karlsruhe

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**World Scientific**

Singapore • New Jersey • London • Hong Kong

Published by

World Scientific Publishing Co. Pte. Ltd.,  
P O Box 128, Farrer Road, Singapore 9128

USA office: 687 Hartwell Street, Teaneck, NJ 07666

UK office: 73 Lynton Mead, Totteridge, London N20 8DH



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ISBN: 981-02-0010-2

Printed in Singapore by JBW Printers & Binders Pte. Ltd.

180 P 75 22

## Preface

This book contains the papers presented at ICENES'89, the fifth International Conference on Emerging Nuclear Energy Systems. The conference was organized by Kernforschungszentrum Karlsruhe (Karlsruhe Nuclear Research Center) and held in Karlsruhe, Federal Republic of Germany, on 3-6 July 1989 with about 150 participants from 24 countries. It was co-sponsored by

American Nuclear Society  
Atomic Energy Society of Japan  
Canadian Nuclear Society  
Chinese Nuclear Society  
European Nuclear Society  
Kerntechnische Gesellschaft  
Laser Society of Japan

and financially supported by Kernforschungszentrum Karlsruhe and

Badenwerk AG  
Fichtner Consulting Engineers  
IBM Stiftungsfonds  
Interatom GmbH  
Kraftanlagen AG  
Uhde GmbH.

The Organizing Committee (H.H.Hennies, general chairman, G. Kessler, organizing chairman) expresses its gratitude to all of them.

The field of Emerging Nuclear Energy Systems, as this series of conferences has perceived it, is vast and interdisciplinary. It encompasses every advanced way of producing or utilizing energy from nuclear reactions, ranging from improvements in today's fission reactors, or their safety containments, or the treatment of their waste, to entirely new ways of tapping the immense energy potential which exists in nuclei. Consequently, the conference participants are coming from a variety of backgrounds -- industrial enterprises, consulting companies, universities and governmental research institutions. This mixture (which is clearly reflected in the different character of the papers) and mutual exposure to each other's ideas is intended because it helps to overcome the traditional separations between the many "pure" and "applied" fields. Bridging the gaps between the scientist, the engineer and the manager can be decisive in transforming an idea or discovery into an achievement of the real world. If some of the papers appear highly speculative to the reader he should realize that -- as A.A.Harms has put it -- it will be necessary to look at a hundred different concepts to find perhaps ten that will be technically feasible, and among these perhaps one that will be economically and ecologically feasible.

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In comparing the fifth ICENES to the fourth<sup>1</sup>, some tendencies and shifts of emphasis appear worth mentioning. The interest in new ways of nuclear waste management has increased (5 papers versus 2); in fission reactor work, the aspect of safety (and public acceptance) is strongly dominating in the wake of the Chernobyl accident of 1986; the field of advanced-fuel fusion has grown and is concentrating on D-<sup>3</sup>He fuel, certainly spurred by the discovery of the helium-3 resource in the moon; muon catalyzed fusion has also grown and presents, in addition to fundamental physics work, new reactor and application concepts. Also, an increased interest in space power systems is observed. Finally, "Cold Fusion", first reported in March 1989, the possible fusion at ambient temperature of deuterium absorbed in solid matter, made a most exciting addition to ICENES'89. A somewhat improvised special session, without advance abstract submission and acceptance procedure for lack of time, was held on this topic. Its presentations are included here as far as their authors have been able and willing to provide manuscripts in the short time available. The editors are especially grateful for the support from these authors in rendering the proceedings up-to-date.

Ulrich von Möllendorff  
Balbir Goel

<sup>1</sup> Emerging Nuclear Energy Systems (Madrid, 1986). Edited by G. Velarde and E. Mínguez. World Scientific, 1987.

## CONTENTS

Preface	v
Organizing Committee	vii
<b>a) Advanced Fission Reactors</b>	
Safety of Emerging Nuclear Energy Systems: Criteria and Ways to Meet Them <i>V.M. Novikov &amp; I.S. Slesarev</i>	3
An Innovative Liquid Metal Design with Worldwide Application Potential <i>J.E. Quinn &amp; R.C. Berglund</i>	9
Metallic Fuel Fast Breeder Reactors in the Uranium-Plutonium and Thorium Fuel Cycle <i>V.M. Murogov, V.G. Ilyin, A.I. Zinin, V.Y. Rudneva, &amp; A.N. Shmelev</i>	13
Improved Containment Concept for Future Pressurized Water Reactors <i>H.H. Hennies, G. Kessler, &amp; J. Eibl</i>	19
Status and Prospects of the Cooperative KWU High Converter Development 1989 <i>H. Moldaschl, R. Brogli, &amp; B. Kuczera</i>	25
Safety Related Design Features of the HTR-Module <i>G.H. Lohnert</i>	30
Molten Salt Reactor as Asymptotic Safety Nuclear System <i>V.M. Novikov &amp; V.V. Ignatyev</i>	35
Neutron and Thermal Dynamics of a Gaseous Core Fission Reactor <i>H. van Dam, J.C. Kuijper, A.J.C. Stekelenburg, J.E. Hoogenboom, W. Boersma-Klein, &amp; J. Kistemaker</i>	39
The Gas Blanket in a Gas Core Fission Reactor <i>J. Kistemaker &amp; W. Boersma-Klein</i>	45
Simulator Studies of a Gaseous Core Fission Reactor <i>J.C. Kuijper, H. van Dam, A.J.C. Stekelenburg, &amp; J.E. Hoogenboom</i>	51
<b>b) Fission Reactor Waste Management</b>	
An Advanced Management Concept for Wastes from Reprocessing and MOX Fuel Fabrication <i>H. Krause</i>	59
Transuranium Element Fuel Cycle in LWR-FR Symbiosis <i>L. Koch</i>	65

A Study of Incineration Target System <i>T. Takizuka, I. Kanno, H. Takada, T. Ogawa, T. Nishida, &amp; Y. Kaneko</i>	70
Calculations of a Proton-Accelerator Driven Incineration Reactor <i>T. Matsumoto</i>	75
Systematics of Criticality Properties of Actinide Nuclides and Its Bearing on the Long Lived Fission Waste Problem <i>M. Srinivasan, K. Subba Rao, S.B. Garg, &amp; P.K. Iyengar</i>	80
 <b>c) Magnetic Confinement Fusion, Hybrids and Symbioses</b>	
The NET Design <i>R. Toschi</i>	87
The Emerging Option of Fusion Breeders for the Early Exploitation of Thorium in the Indian Context <i>M. Srinivasan, T.K. Basu, K. Subba Rao, &amp; P.K. Iyengar</i>	91
Fusion-Fission Hybrid Reactor Conceptual Design (Only Producing Fuel) for China <i>L.J. Qiu</i>	95
Rational Non-Pu Fuel-Cycle Composed Simple Power-Stations and Fissile Producers — Thorium Molten-Salt Nuclear Energy Synergetics <i>K. Furukawa, K. Mitachi, Y. Kato, &amp; A. Lecocq</i>	100
Modeling Fuel Cycle Management of Joint Nuclear Energy Systems Using a Personal Computer <i>G. Csom &amp; S. Fehér</i>	105
Thermonuclear Self-Sufficiency in the $R < 2$ Range <i>G.J. Lartigue, D.H. Jiménez, &amp; M.J. Soberón</i>	110
Hydrodynamic and Reaction Fluctuations in a D + T Lorentz Plasma <i>J.L. Muñoz-Cobo</i>	115
Calculation of Beam Focusing Created by Current Filament <i>A. Paulin &amp; B. Jenko</i>	120
 <b>d) Inertial Confinement Fusion</b>	
Advances in Inertial Confinement Fusion <i>C. Yamanaka</i>	125
Prospects for Inertial Fusion as an Energy Source <i>W.J. Hogan</i>	131
KrF Lasers for Inertial Confinement Fusion <i>D.B. Harris, D.C. Cartwright, J.F. Figueira, T.E. McDonald, &amp; M.E. Sorem</i>	136



High-Gain Direct-Drive Capsule Design for ICF <i>G. Velarde, J.M. Aragonés, L. Gámez, C. González, J.J. Honrubia, J.M. Martínez-Val, E. Mínguez, J.M. Perlado, M. Piera, U. Schröder, &amp; P. Velarde</i>	141
Beam Target Nuclear Interactions in a Dense Plasma <i>J.G. Linhart</i>	146
Bethe's $\langle I \rangle$ for the Calculation of Proton Stopping Power in ICF Plasma <i>B. Goel &amp; N.K. Gupta</i>	153
Development of a Boltzmann-Fokker-Planck Code for Fast Ion Transport in ICF Plasmas <i>T. Honda, Y. Nakao, K. Kudo, T. Shiba, H. Nakashima, &amp; M. Ohta</i>	156
Suprathermal Fusion in Inertially Confined Plasmas <i>Y. Nakao, T. Honda, K. Kudo, H. Nakashima, T. Shiba, &amp; M. Ohta</i>	161
Determination of Critical Velocity and Fractions of Suprathermal Electrons in the Implosion of Deuterium-Tritium Pellets by the Inertial Confinement Fusion <i>J.F. Miramar Blázquez</i>	166
Calculation of Heavy-Ion-Beam Conversion Efficiency into Thermal Radiation and Opacity Measurement in the GSI SIS Experiments <i>N.A. Tahir &amp; R.C. Arnold</i>	170
 <b>e) Advanced Fuel Fusion</b>	
Advanced Fuel Fusion <i>M. Heindler &amp; W. Kernbichler</i>	177
Transition to Environmentally Acceptable Fuels in the 21st Century <i>L.J. Wittenberg, G.L. Kulcinski, &amp; W.R. Wilkes</i>	183
Breakeven and Ignition Conditions for D- <sup>3</sup> He Fusion <i>G.A. Emmert, L.A. El-Guebaly, R. Klingelhöfer, G.L. Kulcinski, J.F. Santarius, J.E. Scharer, I.N. Sviatoslavsky, P.L. Walstrom, &amp; L.J. Wittenberg</i>	188
Comparison of the Physics Performance of D- <sup>3</sup> He Fusion in High and Low Beta Toroidal Devices <i>W. Kernbichler, G.H. Miley, &amp; M. Heindler</i>	192
Bootstrap Drive of D- <sup>3</sup> He Tokamak Reactors <i>M.J. Alava, S.J. Karttunen, &amp; R.R.E. Salomaa</i>	197
Production of Intense Polarized Atoms and Its Application to Tokamak Fusion Reactor <i>Y. Wakuta, Y. Watanabe, S. Urano, O. Mitarai, &amp; H. Hasuyama</i>	202

#### **f) Fusion Reactor Neutronics**

- Material Damage in Inertial and Magnetic Fusion Reactors: A Key Aspect to be Considered 209  
*J. Sanz, J.M. Perlado, & M. Piera*
- LOTUS Experimental Lithium-Lead Module (EL<sup>2</sup>M) — Some Preliminary Results 214  
*S. Azam, P.A. Haldy, M. Schaer, P. Strasser, & J.P. Schneeberger*
- Preliminary Studies for Uranium-233 Breeding Measurements in Thorium Oxide Assembly at the LOTUS Facility 219  
*T.K. Basu & P.A. Haldy*
- Fusion Reactor Blanket Neutronics 224  
*G. Shani, A. Tsechanski, A. Goldfeld, R. Ofek, U. German, & E. Aruchas*
- The Impact of the <sup>7</sup>Li(n,n'α)T Secondary Neutron Spectrum on the Tritium Breeding in <sup>7</sup>Li 230  
*R. Ofek, A. Tsechanski, & G. Shani*
- Integral Experiments with 14 MeV-Neutron Source into Multiplying Assemblies and Verification of Neutron Transport Code 235  
*V.A. Zagryadskii, D.V. Markovskii, V.M. Novikov, D.Yu. Chuvilin, & G.E. Shatalov*

#### **g) Nuclear Space Power Systems**

- Overview of CNES-CEA Joint Programme on Space Nuclear Brayton Systems 241  
*Z.P. Tilliette, F. Carré, E. Proust, S. Chaudourne, B. Vrillon, & P. Keirle*
- Characteristics of a Californium Isotope Power Source 247  
*G. Cripps & A.A. Harms*
- MICF — A High Gain Fusion Reactor for Power and Space Applications 250  
*T. Kammash*
- Nuclear Energy Systems for Space — FRG Experiences and Outlook 254  
*J. Gilles & R. Pruscek*

#### **h) Muon Catalyzed Fusion**

- Muon Catalyzed Fusion in Plasma State and High Intensity DT Fusion Neutron Source 261  
*H. Takahashi*
- Energy Gain of ICF-μ DT Symbiosis 267  
*A.A. Harms, G. Cripps, & B. Goel*
- Double Target Option for Pion Production for Muon Catalyzed Fusion 271  
*G.R. Shin & J. Rafelski*
- Muon Loss in Catalysed Fusion 276  
*L. Chatterjee*

Muonic Catalytic Fusion; Its Relationship to Accelerator-Breeder <i>V. Knapp &amp; T. Petković</i>	279
On the Requirements for a Competitive Cold Fusion Reactor <i>S. Taczanowski</i>	284
<b>i) Cold Fusion</b>	
Cold Fusion Results in BARC Experiments <i>P.K. Iyengar</i>	291
Search for the Upper Limit for the Stimulated D + D Nuclear Fusion in Metallic Deuteride <i>S. Blagus, M. Bogovac, D. Hodko, M. Krčmar, D. Miljanić, P. Tomáš, &amp; M. Vuković</i>	296
Investigations of Neutron Emission in a Cold Fusion Experiment in Palladium <i>M. Szustakowski, J. Farny, M. Muniak, A. Nowak, P. Parys, W. Skrzeczanowski, R. Socha, J. Teter, J. Wolski, J. Wołowski, &amp; E. Woryna</i>	299
Background Induced D-D Fusion <i>G. Shani, A. Brokman, C. Cohen, &amp; A. Grayevsky</i>	304
Review of the Current Theoretical Status of Cold Fusion <i>D. Harley, M. Gajda, &amp; J. Rafelski</i>	308
Nuclear Reaction Rates Between Hydrogen Isotopes in PdD <sub>x</sub> <i>S. Ichimaru, A. Nakano, S. Ogata, H. Iyetomi, &amp; T. Tajima</i>	314
Dynamical Screening of Potential by Mobile Deuteron, Branching Ratio of d(d,p)t and d(d,n)He <sup>3</sup> Reaction in PdD <sub>x</sub> and its Implication to d-d Muon Catalyzed Fusion <i>H. Takahashi</i>	318
Nuclear Fusion in Host Lattices Discussed by the Model of a Nondegenerate Positive Hydrogen Isotope Ion Gas <i>H. Hora, G.H. Miley, L. Cicchitelli, A. Scharmann, &amp; W. Scheid</i>	322
<b>Author Index</b>	327
<b>List of Participants</b>	329