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This volume discusses primarily the characteristics of reactions induced by unstable nuclei and aims to guide future directions in this area of research. In addition, the present status of research in related fields is reviewed. The topics discussed can be broadly classified into: fusion and transfer reactions with stable nuclei, fission and molecular resonance, structure of unstable nuclei, reactions with unstable nuclei, synthesis of superheavy elements and heavy-ion fusion with neutron-rich beams. Contents: Heavy-Ion Fusion at Subbarrier Energies: Progress and Questions (R R Betts) Angular Momentum in Heavy Ion Subbarrier Interaction (C Signorini) High Precision Fusion Excitation Function Measurements: What Can We Learn from Them? (J R Leigh et al.) Transfer Reactions for 160 + 144,152Sm near the Coulomb Barrier (Y Sugiyama et al.) Recent Theoretical Developments in the Study of Subbarrier Fusion (A B Balantekin) Direct Reaction Approach to Heavy Ion Scattering and Fusion at Energies Near Coulomb Barrier (T Udagawa) Roles of Multi-Step Transfer in Fusion Process Induced by Heavy Ion Reactions (B Imanishi et al.) RIKEN Accelerator Research Facility (RARF) (Y Yano) Bimodal Nature of Nuclear Fission (H Nakahara et al.) Systematics of Isotope Production Rates: Mass Excess Dependence of Fission Products (H Sato) semiclassical methods for the Multi-Dimensional Quantum Decay (A Iwamoto) Dynamics of Di-Nucleus Systems: Molecular Resonances (Y Abe) The Competition between Fission-Dissociation and Deep-Inelastic Reactions in the Medium Mass Systems (Y H Pu et al.) Coulomb Dissociation and Momentum Distributions for 11Li+9Li+n+n+Breakup Reactions (H Esbensen) Elastic Scattering and Fragmentation of Halo Nuclei (J J Kolata) Secondary Reactions of Neutron-Rich Nuclei at Intermediate Energies (S Shimouna) Life Time of Soft Dipole Excitation (H Sagawa et al.) Shell Structure of Exotic Unstable Nuclei (T Otsuka et al.) Properties of Unstable Nuclei Within the Relativistic Many-Body Theory (H Toki et al.) Barrier Distributions for Heavy-Ion Fusion (N Rowley et al.) Heavy-Ion Reactions with Neutron-Rich Beams (N Takigawa et al.) Heavy-Ion Fusion with Neutron-Rich Beams (T Fukuda) Study of a Decays Following 40Ar Bombardment on 238U (T Nomura et al.) Production of Superheavy Elements via Fusion: What is Limiting Us? (W Reisdorf) Readership: Nuclear physicists. keywords:

- Perspectives in Heavy Ion Physics - Toshio Fukuda - 1996
Dynamical Aspects of Nuclear Fission - -
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Dynamical Aspects of Nuclear Fission - J. Kliman - 2008
This proceedings volume is sixth in the series of international conferences covering the fission, quasi-fission, fusion-fission phenomena and synthesis of superheavy nuclei, mainly at low or near barrier energies. Both experimental and theoretical issues are covered. The topics are discussed by a group of participants, and an overview of the current activities in the field is given.

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Physics With High-intensity Hadron Accelerators - Proceedings Of The 18th Ins International Symposium - Nomura T. - 1990-12-14
This book contains the proceedings of the 10th Hellenic Relativity Conference, held in Greece in 2002. It includes several plenary lectures given by leading experts on brane-world cosmology, radiative space-times, detection of gravitational waves, gamma-ray bursts and quantum gravity. There are a large number of contributed papers, organized into three broad subject areas: cosmology and brane gravity, mathematical relativity and astrophysical relativity, and the detection of gravitational waves.

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Scientific Opportunities with a Rare-Isotope Facility in the United States - National Research Council - 2007-05-09
Over ten years ago, U.S. nuclear scientists proposed construction of a new rare isotope accelerator in the United States, which would enable experiments to elucidate the important questions in nuclear physics. To help assess this proposal, DOE and NSF asked the NRC to define the science agenda for a next-generation U.S. Facility for Rare Isotope Beams (FRIB). As the study began, DOE announced a substantial reduction in the scope of this facility and put off its initial operation date by several years. The study focused on an evaluation of the science that could be accomplished on a facility reduced in scope. This report provides a discussion of the key science drivers for a FRIB, an assessment of existing domestic and international rare isotope beams, an assessment of the current U.S. position about the FRIB, and a set of findings and conclusions about the scientific and policy context for such a facility.

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Radiochemistry and Nuclear Chemistry - Volume II - Sandor Nagy - 2009-08-24

Reactions. - -
equilibration. We had the most success in studying the decays of yrast isomers. Thus far, more than thirty new (nu) isotopes in the Z = 50 region were found and characterized. Making isotopic assignments for previously unknown (gamma)-ray cascades proves to be one of the biggest problems. Our assignments were based (a) on rare overlaps with radioactivity data, (b) on the relative yields with different beams, and (c) on observed cross-coincidences between (gamma) rays from light and heavy reaction partners. However, the primary products of deep inelastic collisions often are sufficiently excited for subsequent neutron evaporation, so (gamma)/(gamma) cross-coincidence results require careful interpretation.

Gamma-ray Spectroscopy of Neutron-rich Products of Heavy-Ion Collisions - - 1995
Thick-target (gamma)/(gamma) coincidence techniques are being used to explore the spectroscopy of otherwise hard-to-reach neutron-rich products of deep-inelastic heavy ion reactions. Extensive (gamma)/(gamma) coincidence measurements were performed at ATLAS using pulsed beams of 8.5e, 136xe, and 238u on lead-backed (up 122,124)Sn targets with energies 10-15% above the Coulomb barrier. Gamma-ray coincidence intensities were used to map out yield distributions with A and Z for even-even product nuclei around the target and around the projectile. The main features of the yield patterns are understandable in terms of N/Z equilibration. We had the most success in studying the decays of yrast isomers. Thus far, more than thirty new (nu) isotopes in the Z = 50 region were found and characterized. Making isotopic assignments for previously unknown (gamma)-ray cascades proves to be one of the biggest problems. Our assignments were based (a) on rare overlaps with radioactivity data, (b) on the relative yields with different beams, and (c) on observed cross-coincidences between (gamma) rays from light and heavy reaction partners. However, the primary products of deep inelastic collisions often are sufficiently excited for subsequent neutron evaporation, so (gamma)/(gamma) cross-coincidence results require careful interpretation.

Actinide Production in the Reaction of Heavy Ions WithCurium-248 - 1983

Chemical experiments were performed to examine the usefulness of heavy ion transfer reactions in producing new, neutron-rich actinide nuclides. A general quasi-elastic to deep-inelastic mechanism is proposed, and the utility of this method as opposed to other methods (e.g. complete fusion) is discussed. The relative merits of various techniques of actinide target synthesis are discussed. A description is given of a target system designed to remove the large amounts of heat generated by the passage of a heavy ion beam through matter, thereby maximizing the beam intensity which can be safely used in an experiment. Also described is a general separation scheme for the actinide elements from protactinium ($Z = 91$) to mendelevium ($Z = 101$), and fast specific procedures for plutonium, americium and berkelium. The cross sections for the production of several nuclides from the bombardment of 248Cm with 180, 86Kr and 136Xe projectiles at several energies near and below the Coulomb barrier are determined. The results are compared with yields from 48Ca and 238U bombardments of 248Cm. Simple extrapolation of the product yields into unknown regions of charge and mass indicates that the use of heavy ion transfer reactions to produce new, neutron-rich above-target species is limited. The substantial production of neutron-rich below-target species, however, indicates that with very heavy ions like 136Xe and 238U the new species 248Am, 249Am and 247Pu should be produced with large cross sections from a 248Cm target. A preliminary, unsuccessful attempt to isolate 247Pu is outlined. The failure is probably due to the half life of the decay, which is calculated to be less than 3 minutes. The absolute gamma ray intensities from 251Bk decay, necessary for calculating the 251Bk cross section, are also determined.

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The monograph describes the properties of the lightest nuclei with large excess of neutrons. The results of theoretical and experimental studies of neutron-rich isotopes with $1 \leq Z \leq 20$ are presented while also changes in the structure of nuclei when going away from the line of $\beta$-stability are discussed. Information presented is on the mass, radii of distribution of nuclear matter, energy levels for excited states of these nuclei, the...
interested in learning about hedge funds and their future. and the quantum properties of ground states. The position of the boundary of nucleon stability evolved. The effects associated with weakening and even the disappearing influence of standard magic numbers and the appearance of new ones are discussed. The results presented in the book will be useful in other fields of science as well, including astrophysics.

Light Exotic Nuclei Near The Boundary Of Neutron Stability - Yuri Erastovich Penionzhkevich - 2021-09-23

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The Second International Conference on Fission and Properties of Neutron-rich Nuclei continued the emphasis on fission models, fission processes, properties of neutron-rich nuclei and new directions. The responses to the conference were so extensive that 44 talks were presented in individual sessions and 35 more in two afternoons of parallel sessions. New insights and developments were discussed, including experimental and theoretical studies of ternary fission with correlated pairs with emission of a third nucleus such as helium-3, alpha particle, and beryllium-10; the structure of neutron-rich nuclei from spontaneous fission, heavy-ion-induced fission and knock-out reactions; comparisons of deep inelastic reactions and fission for production of neutron-rich nuclei; production of superheavy elements; including the discovery of element 114; experiments with radioactive beams; and proposals for new radioactive ion beam facilities.


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Heavy Ion Physics: Proceedings Of The VI International School-symposium - Kalpakchieva Rumiana - 1998-08-22

Hedge funds are perhaps the hottest topic in finance today, but little material of substance to date has been written on the topic. Most books focus on how to set up a hedge fund and the basic strategies, while few to none focus on what matters most: generating and understanding investment performance. This book takes an exclusive look at the latter, including an analysis of the areas that are most likely to generate strong investment returns — namely, the emerging markets of Brazil, Russia, India and China. The book will be invaluable to not only financial professionals, but anyone interested in learning about hedge funds and their future.

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Basic Concepts in Nuclear Physics: Theory, Experiments and Applications - José-Enrique Garcia-Ramos - 2016-05-17

This volume covers invited papers presented during the La Rábida 2015 International Scientific Meeting on Nuclear Physics, which can be considered heir of a well known series of triennial international summer schools on Nuclear Physics organized from 1982 till 2003 by the Basic Nuclear Physics group in the University of Sevilla. The La Rábida 2015 meeting offered to graduate students and young researchers a broad view of the field of Nuclear Physics. The first invited speaker presented the state-of-the-art of Relativistic Mean Field calculations. The second set of notes covers selected topics in gamma ray spectroscopy with exotic nuclei. The third speaker presented an introduction to the subject of severe accidents in nuclear power plants. In the fourth set of notes, the author illustrated how to use laser spectroscopy to determine very important observables of atomic nuclei. The fifth speaker devoted its notes to explain several aspects of neutrino physics. Finally, the sixth speaker presented an overview of nuclear medicine and radiodiagnostic. In addition to this, the inclusion of the posters and seminars presented by the students gives a fresh and ample perspective on the many different problems of interest nowadays for the Nuclear Physics community.

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Progress of Time-Dependent Nuclear Reaction Theory - Yoritaka Iwata - 2019-07-03

This book is a compilation of the latest theoretical methods for treating models in nuclear reactions. Initial chapters in this volume explain different aspects of time-dependent density functional theory, such as numerical calculations, density constrained models, multinucleon transfer reactions, and superfluid time dependent density functional theory. In...

The field of radioactive ion beam research has evolved over the last three decades, and several sizeable facilities are currently undergoing a major upgrade or are under construction. In Europe, these include ISOLDE - CERN (Switzerland), SPIRAL2 - GANIL (France), FAIR - GSI (Germany) and SPES (Italy) while RIBF - RIKEN (Japan), TRUMPF (Canada) and FRIB - MSU (USA) are the major undertakings elsewhere. These will create unprecedented opportunities to extend our knowledge in as yet unexplored regions of the nuclear chart, and address key questions in nuclear physics, fundamental interactions, and astrophysics, as well as linking to other fields of science including life science. This book presents material from the 201st International School of Physics Enrico Fermi, entitled: Nuclear Physics with Stable and Radioactive Ion Beams and held in Varenna, Italy, from 14 – 19 July 2017. The lectures and seminars of this school focused on structural and dynamic aspects from both a theoretical and experimental point of view, and among the recent advances discussed in the 14 full-length contributions included here are: advanced shell-model, density functional applications and symmetry-based methods, as well as cluster and reaction models. A dedicated session was organized to mark the 90th birthday of Professor R.A. Ricci, and focused on his pioneering work in nuclear structure. He was, in particular, one of the founders of heavy-ion induced reaction studies devoted to deepening knowledge of nuclear structure and dynamics. The International School of Physics Enrico Fermi has a worldwide reputation, and the book will be of interest to all those working in the field.

Reaction Mechanisms for Rare Isotope Beams - American Institute of Physics - 2005-10-20

The workshop focused on theoretical descriptions of the nuclear reactions that can be studied at present and future radioactive beam facilities, from low to relativistic energies. These facilities allow for the study of reactions with exotic nuclei that have never been accessible before, providing challenges for reaction theory as well as important input for nuclear astrophysics. Overview of the standard reaction formalisms was an important component of the meeting, keeping in mind the old issues that arose from reactions with stable nuclei which help us understand the challenges of applying existing approaches to radioactive beams.

Dynamics and Thermodynamics with Nuclear Degrees of Freedom - Philippe Chomaz - 2007-07-28

This volume is the outcome of a community-wide review of the field of nuclear physics, such as quantum molecular dynamics, cluster models in stable and unstable nuclei, chain structure theory in light nuclei, many-body systems and more. The volume is intended as a guidebook for graduate students and researchers to understand recent theories used in applied nuclear particle physics and astrophysics.

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Nuclei in the Cosmos - F Kappeler - 2020-11-25

Nuclei in the Cosmos, a volume of conference papers, gathers together astronomers, astrophysicists, and nuclear physicists for a thorough discussion of nucleosynthesis, its role in the evolution of the universe, and its intriguing possibilities as a diagnostic tool for stellar interiors. Nineteen invited papers provide a solid review of nucleosynthesis topics, and approximately another 70 papers bring you up-to-date on the forefront of research in this quickly-developing area.

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