

Undergraduate Lecture Notes in Physics

Enzo De Sanctis
Stefano Monti
Marco Ripani

Energy from Nuclear Fission

An Introduction

 Springer

<http://www.springer.com/in/book/9783319306490>

**A BOOK FOR UNDERGRADUATES IN PHYSICS,
NUCLEAR ENGINEERING, AND OTHER SCIENCE
SUBJECTS.**

**FURTHER, MATHEMATICS IS KEPT AT A LEVEL
THAT CAN BE EASILY FOLLOWED BY A WIDER
AUDIENCE.**

AUTHORS:

- **Enzo De Sanctis**, INFN-Frascati, and Leader SIF-Energy Group.
- **Stefano Monti**, IAEA-Vienna. Team leader (Fast Reactor Technology Development)
- **Marco Ripani**, INFN-Genova. Leader of the INFN-Energy Project

THE PURPOSE OF THE BOOK

- PROVIDES THE PHYSICS BASIS TO LEAD THE READER INTO A DETAILED PRESENTATION OF NUCLEAR FISSION AND THE RELEVANT TOPICS IN NUCLEAR ENERGY.
- DISCUSSES NUCLEAR ENERGY ISSUES OF GREAT SCIENTIFIC IMPORTANCE AND ALSO OF GREAT PUBLIC INTEREST.
- PRESENTS THE TECHNICAL/SCIENTIFIC ASPECTS AS WELL AS THE MEDICAL AND POLICY ASPECTS.
- WRITTEN IN A CLEAR AND EASY TO FOLLOW STYLE.
- IT SERVES AS A READABLE AND RELIABLE SOURCE OF INFORMATION FOR ANYONE WHO WANTS TO HAVE A WELL-BALANCED OPINION ABOUT EXPLOITATION OF NUCLEAR FISSION IN POWER PRODUCTION.

CONTENTS OF THE BOOK

THE BOOK IS DIVIDED INTO TWO PARTS;

- THE **FIRST PART (140 PAGES)** ENCOMPASSES THE BASICS OF NUCLEAR FORCES AND PROPERTIES OF NUCLEI, NUCLEAR COLLISIONS, NUCLEAR STABILITY, RADIOACTIVITY, AND PROVIDES A DETAILED DISCUSSION OF THE FISSION PROCESS AND RELEVANT TOPICS IN ITS APPLICATION TO ENERGY PRODUCTION.
- THE **SECOND PART (108 PAGES)** COVERS THE BASIC TECHNICAL ASPECTS OF NUCLEAR FISSION REACTORS, NUCLEAR FUEL CYCLE AND RESOURCES, REACTOR SAFETY AND REGULATION, SECURITY AND SAFEGUARDS, AND SPENT FUEL AND RADIOACTIVE WASTE MANAGEMENT.

THE BOOK ALSO CONTAINS A QUALITATIVE DESCRIPTION OF THE PHENOMENA ASSOCIATED WITH THE **PASSAGE OF CHARGED PARTICLES AND RADIATION THROUGH MATTER**, A DISCUSSION OF THE **BIOLOGICAL EFFECTS OF NUCLEAR RADIATION AND OF RADIATION PROTECTION**, AND A **SUMMARY OF THE TEN MOST RELEVANT ACCIDENTS** OCCURRED TO NUCLEAR INSTALLATIONS, SOME OF WHICH HAVE HAD A SIGNIFICANT IMPACT ON THE DEVELOPMENT AND DEPLOYMENT OF NUCLEAR POWER.

CONTENTS OF THE BOOK (ctn'd)

THE ADDITION OF **64 SOLVED PROBLEMS**, STRATEGICALLY PLACED THROUGHOUT THE TEXT, AND THE COLLECTIONS OF **63 PROBLEMS (WITH ANSWER)** AT THE END OF THE CHAPTERS HELP TO BETTER UNDERSTAND THE SCIENTIFIC AND TECHNICAL TOPICS PRESENTED IN THE TEXT, AND ALLOW APPRECIATING THE QUANTITATIVE ASPECTS OF VARIOUS PHENOMENA AND PROCESSES.

MANY ILLUSTRATIONS AND GRAPHS EFFECTIVELY SUPPLEMENT THE TEXT AND HELP VISUALIZING SPECIFIC ISSUES.

A **GLOSSARY** AT THE END OF THE BOOK (238 ENTRIES) PROVIDES A HANDY REFERENCE TO THE TERMINOLOGY USED IN NUCLEAR PHYSICS AND NUCLEAR ENERGY.

SUGGESTIONS FOR FURTHER READINGS

THE SUBJECT MATTER IS BROAD AND SOMEWHAT HETEROGENEOUS AND OBVIOUSLY DOES NOT ALLOW GOING DEEP INTO THE SUBTLETIES OF EACH SINGLE TOPIC. HOWEVER, THE AIM IS TO PROVIDE AN AS COMPLETE AS POSSIBLE OVERVIEW OF THE MANY ASPECTS AND ISSUES INVOLVED IN THE DEPLOYMENT OF NUCLEAR POWER.

IN TOPICS RANGING FROM THE FUNDAMENTAL PHYSICAL PRINCIPLES TO THE MUCH-DEBATED CHALLENGES OF SAFETY AND CLOSURE OF THE NUCLEAR CYCLE, WHENEVER POSSIBLE, **AUTHORITATIVE SOURCES OF INFORMATION ARE USED (TYPICALLY INTERNATIONAL AGENCIES AND INSTITUTIONS), THEREBY STIMULATING THE READER TO EXPAND HIS/HER KNOWLEDGE ON EACH TOPIC BY LOOKING AT THE SUGGESTED REFERENCES, OR BY SEARCHING FURTHER TECHNICAL LITERATURE ON THE WEB.**

From the Review of Prof. Helmy Sherif, Editor of ULNP

Professor Emeritus of Physics University of Alberta, Edmonton, AB, Canada

...

The authors have succeeded in writing a fine text. They approach the subject in a clear and easy to follow style. They kept the mathematics at a level that will be easily followed by wider circles of readers. In my opinion, the text will appeal to a wider audience and definitely be a welcome contribution to the education of students and others about a subject that has been controversial and misunderstood for many years.

....

Regarding the readership for this book, I expect it will include students in their early years of undergraduate studies in physics and other science subjects. It will also be of value to students in the nuclear engineering and medical physics fields. Physics teachers in high school will probably want to use parts of it in their classes. In the public arena, it will attract many readers who may have wondered for a long time if they will ever be able to learn about these issues

I WOULD VERY MUCH APPRECIATE IF YOU CAN PASS THIS INFORMATION TO FRIENDS AND COLLEAGUES WHO MAY BE INTERESTED AND FORWARD IT TO THE EDITOR OF THE BULLETIN OF YOUR NATIONAL PHYSICS SOCIETY WITH THE IDEA TO ASK SOMEONE FOR A BOOK REVIEW IN THE BULLETIN.

I WILL BE HAPPY TO SEND A PDF COPY OF THE BOOK TO THOSE OF YOU WHO ARE INTERESTED.