1. Record Nr. UNINA9910985630503321

| | |
|---|---|
| Autore | Maqbool Muhammad |
| Titolo | An Introduction to Non-Ionizing Radiation |
| Pubbl/distr/stampa | Sharjah : , : Bentham Science Publishers, , 2023<br>©2023 |
| ISBN | 9789815136890<br>9815136895 |
| Edizione | [1st ed.] |
| Descrizione fisica | 1 online resource (402 pages) |
| Soggetti | Nonionizing radiation<br>Electromagnetic fields |
| Lingua di pubblicazione | Inglese |
| Formato | Materiale a stampa |
| Livello bibliografico | Monografia |
| Nota di contenuto | Cover -- Title -- Copyright -- End User License Agreement -- Contents -- Foreword -- Preface -- Dedication -- List of Contributors -- Introduction and Classification of Radiation -- Muhammad Maqbool1,* -- INTRODUCTION -- Electromagnetic and Mechanical Waves -- Types of Radiation -- Bohr Atomic Model -- Excitation and De-excitation -- Ionization -- Ionizing and Non-ionizing Radiation -- The Energy of Radiation and the Human Body -- The Quantitative Difference Between Ionizing and Non-ionizing Radiation -- Ionization Produced by Electron or -rays -- Ionization by other Charged Particles and Neutrons -- Non-Ionizing Radiation -- Types and Sources of Non-ionizing Radiation -- CONCLUSION -- ACKNOWLEDGEMENTS -- REFERENCES -- Types of Non-Ionizing Radiation and its Interaction with Matter -- Bushra Intakhab1 and Muhammad Maqbool2,* -- INTRODUCTION -- Types of Non-Ionizing Radiation -- Static Fields -- Ultrasound -- Extremely Low Frequency (ELF) -- Radio Frequencies -- Microwave Frequencies -- Infrared -- Visible Spectrum -- Ultraviolet -- Sources of Non-Ionizing Radiation -- Natural Sources -- Artificial Sources -- Summary of Types of Non-ionizing Radiation -- Interaction of Nonionizing Radiation -- Mechanism of Interaction -- Static Field Interaction with Tissue -- Biological Health Effect of Static Fields -- Static Magnetic Field Interaction and Biological Effects -- Ultrasound |

Waves' Interaction with Tissue -- Biological Health Effects of Ultrasound Waves -- Extremely Low-frequency (ELF) Interaction with Tissue -- Biological Health Effect of Extremely Low-Frequency Radiation -- Radiofrequency and Microwave Interaction with Tissue -- Biological Health Effects of Radiofrequency and Microwave -- Infrared and Visible Radiation Interaction with Tissue -- Biological Health Effects of Infrared and Visible Radiation.
Ultraviolet Radiation (UVR) Interaction with Tissue -- Biological Health Effects of UVR -- CONCLUSION -- REFERENCES -- Electromagnetic Fields and Radiation -- Md. Kamal Hossain1,* and Mohammad R. Haider1 -- INTRODUCTION -- ELECTROMAGNETIC FIELDS -- Electrostatics -- Coulomb's Law -- Electric Field -- Gauss's Law for Electric Fields -- Magneto-statics -- Ampere's Law -- Magnetic Field -- Gauss' Law for Magnetic Fields -- Electrodynamics -- Ampere-Maxwell Equations -- ELECTROMAGNETIC WAVES -- Maxwell's Equations -- Plane Electromagnetic Waves -- ELECTROMAGNETIC SPECTRUM -- Electromagnetic Radiation -- Non-Ionizing Electromagnetic Radiation -- Ionizing Electromagnetic Radiation -- SOURCE OF ELECTROMAGNETIC RADIATION -- Forms of Non-Ionizing Radiation -- Forms of Ionizing Radiation -- Extremely Low Frequency -- Radio Frequency -- Microwaves -- Infrared -- Visible Light -- Ultraviolet -- X-Rays -- Gamma-Rays -- CONCLUSION -- ACKNOWLEDGEMENT -- REFERENCES -- Ultraviolet Radiation: Benefits, Harms, and Protection -- Jabari Robinson1, Rahima Begum2 and Muhammad Maqbool2,* -- INTRODUCTION -- Types of UV Radiation -- Ultraviolet Radiation Type A (UVA) -- Ultraviolet Radiation Type B (UVB) -- Ultraviolet Radiation Type C (UVC) -- Extreme Ultraviolet Light (EUV) -- Interaction of Ultraviolet Radiation with Tissues -- Benefits and Uses of UV Radiation -- Vitamin D Production -- Impact of Vitamin D Levels on COVID-19 Mortality Rate -- Tanning -- UV Laser in the Eye Surgery -- Other Benefits of UV Radiation -- Ultraviolet Radiation Hazards -- Erythema (Sunburn) -- Premature Aging of the Skin -- Suppression of the Immune System (AIDS) -- Skin Cancer -- Non-melanoma Skin Cancers -- Basal Cell Carcinoma -- Squamous Cell Carcinoma -- Malignant Melanoma -- Ultraviolet Index and Skin Damage -- Personal Risk Factors -- Genetic Factors -- Skin color. Environmental Factors -- Environmental Factors -- Damage to the Eyes -- Cataracts Formation -- Photokeratitis and Photo Conjunctivitis -- Macular Degeneration and Pterygium -- Eye Skin Cancer -- Global Burden of Disease Assessment -- Protection from UV Radiation -- Factors Affecting UV Radiation Reaching the Ground -- Cover up with Clothing -- Wear a Hat and use Lip Balm -- Use Sunscreen -- Apply Broad-Spectrum Sunscreen -- Sun Protection Factor (SPF) -- Wear Sunglasses -- Tips about Sunglasses and UV Exposure -- Peripheral Vision, Contact Lenses, and UV Protection -- Children Receive more UV than Adults -- UV Devices and Engineering Controls -- Other Common UV Devices in Labs -- Administrative Controls -- Accident Investigations -- CONCLUSION -- REFERENCES -- Visible Light: Benefits and Harms -- Robert Heath1 and Muhammad Maqbool2,* -- INTRODUCTION -- What is Visible Light? -- INTRODUCTION TO THE ELECTROMAGNETIC SPECTRUM -- DAILY LIFE PHENOMENA BASED ON VISIBLE LIGHT -- How Do We See Objects Around Us? -- How We See Colors? -- Why Red Light can be seen from Far in Fog as Compared to Blue Light? -- COMMON USES AND BENEFITS OF VISIBLE LIGHT -- Astronomy -- Visible Laser Applications -- Digital Screens -- Sunlight -- Light Bulb -- Glow Sticks -- LEDs -- Firecrackers -- Television -- HARMFUL EFFECTS OF VISIBLE LIGHT ON THE HUMAN BODY -- Threats to the Eye -- Age-Related Macular Degeneration (AMD) -- Cataracts --

Damage to the Eyes -- Chronic Blue Light-Induced Retinal Injury -- Threats to the Skin -- STANDARDS FOR PROTECTION AGAINST VISIBLE LIGHT EXPOSURES -- HIERARCHY OF EXPOSURE CONTROLS -- Elimination and Substitution -- Engineering and Environmental Controls -- Administrative Controls -- Personal Protective Equipment (PPE) -- PROTECTIONS FROM THE HAZARDS OF VISIBLE LIGHT EXPOSURE -- Safe Practices - PPE Expanded -- Eyewear -- Face Shields -- Gloves.
Lab Coat -- Caution / Warning Signs Associated with Light Emitting Hazards -- Additional Information about the Effects of Visible Light -- CONCLUSION -- ACKNOWLEDGEMENT -- REFERENCES -- Laser and Safety from Laser Beams -- Hatem Aldeeb1 and Muhammad Maqbool2, * -- INTRODUCTION -- LASER PHYSICS -- Stimulated Emission -- Conditions for Stimulated Emission -- Gain Medium -- Population Inversion --  -- Metastable State -- Cavity and Lasing Action -- PROPERTIES AND CHARACTERISTICS OF LASER LIGHT -- Laser-tissue Interaction -- LASER CLASSIFICATION AND HAZARDS -- Laser Classification -- Class 1 -- Class 2 -- Class 3 -- Class 4 -- Laser Safety Standards -- Laser Hazard -- Hazard Associated with Laser Beam -- Eye Injury -- Skin Injury -- Non-Beam Hazards -- Fire Hazard -- Electrical Hazards -- Laser Generated Air Contaminants (LGAC) -- Compressed Gases -- Explosion Hazards -- Chemical Hazards -- Collateral Radiation -- Plasma Radiation -- Radiofrequency (RF) and Microwave (MW) -- Ionizing Radiation -- Noise -- Laser-Related Hazards in a Hospital Set up -- Fire Hazards -- Respiratory Hazard -- Electrical Hazard -- Laser Safety and Hazards Control -- Engineering Controls -- Protective Housing -- Interlock -- Automatically Activated Interlocks and Panel Control for Class 3B and Class 4 Lasers -- Additional Cautions about Controlling Class 3B Laser -- Additional Cautions about Controlling Class 4 Laser -- Laser Protective Barriers, and Curtains -- Laser Beam Path -- Warning Signs -- Administrative and Procedural Controls -- Standard Operating Procedures (SOPs) -- Personal Protective Equipment (PPE) -- Education, Training, and Program -- Types of Laser Safety Training -- Control of Laser Areas -- Minimum Requirements for Laser Control -- Warning Signs -- Beam Alignment -- Pre-Alignment Procedure -- During Alignment Procedure -- After Alignment Procedure.
Additional Guidelines for Alignment -- Inspection -- Regulatory Requirements -- Ten Golden Rules in Laser Safety -- CONCLUSION -- ACKNOWLEDGEMENTS -- REFERENCES -- Infrared Radiation: Benefits, Hazards, and Protections -- Muhammad Maqbool1,* -- INTRODUCTION -- Types of Infrared Radiation and its Penetration Ability -- Benefits and uses of Infrared Radiation -- Night Scope or Night Vision Device -- Thermography -- Infrared Therapy for Wound Healing and Pain Removal -- Infrared Contactless Thermometer -- Infrared Spectroscopy -- Infrared Radiation in Communication -- Hazards and Harmful Effects of Infrared Radiation -- Eye Damage -- Skin Damage -- Pre-Mature Skin Aging with IR Exposure -- Erythema ab igne -- Greenhouse Effect and Undesired Heating of the Atmosphere -- Protection from the Hazards of Infrared Radiation -- General Principles of Skin and Eye Protection -- Eye Protection -- Personal Protective Equipment (PPE) -- Goggle and Eyewear -- Face Shields -- Skin Protection -- Gloves and Coats -- Free Radicals and Singlet Oxygen Scavenging -- The use of Signs for IR Protection -- CONCLUSION -- ACKNOWLEDGEMENTS -- REFERENCES -- Microwaves and Radiofrequency Radiation: Benefits, Risks and Protection -- Ezequiel Gonzalez1 and Muhammad Maqbool1,* -- INTRODUCTION -- Background and Interaction with a Medium -- Benefits and Uses of

Microwaves Radiation -- Communication -- Medical -- Microwave Tomography -- Benefits and Uses of Radiofrequency Radiation -- Risks Associated with Radiofrequency and Microwave Radiation and Protection from Them -- Concerns about 5G Radiation -- Possible Effects of 5G Radiation -- 5G Mechanics and Effects -- Additional Information about 5G Radiation Concerns -- CONCLUSION -- ACKNOWLEDGMENTS -- REFERENCES -- Radiation from Mobile Phones and Cell Towers, Risks, and Protection.
SAR Mortazavi1, Kanu Megha2, Seyedeh Fatemeh Shams3, Sahar Mohammadi4 and SMJ Mortazavi3,*.

Sommario/riassunto

An Introduction to Non-Ionizing Radiation provides a comprehensive understanding of non-ionizing radiation (NIR), exploring its uses and potential risks. The information is presented in a simple and concise way to facilitate easy understanding of relevant concepts and applications. Chapters provide a summary and include relevant equations that explain NIR physics. Other features of the book include colorful illustrations and detailed reference lists. With a focus on safety and protection, the book also explains how to mitigate the adverse effects of non-ionizing radiation with the help of ANSI guidelines and regulations. An Introduction to Non-Ionizing Radiation comprises twelve chapters, each explaining various aspects of non-ionizing radiation, including: Fundamental concepts of non-ionizing radiation including types and sources Interaction with matter Electromagnetic fields The electromagnetic wave spectrum (UV, visible light, IR waves, microwaves and radio waves) Lasers Acoustic waves and ultrasound Regulations for non-ionizing radiation. Risk management of non-ionizing radiation The book is intended as a primer on non-ionizing radiation for a broad range of scholars and professionals in physics, engineering and clinical medicine.