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| Collana                 | Science and culture series. Astrophysics  |
| Altri autori (Persone)  | ShapiroMaurice M <1915-> (Maurice Mandel)<br>StanevTodor<br>WefelJ. P   |
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| Soggetti                | Cosmic rays<br>Nuclear astrophysics<br>Gamma rays<br>Electronic books.  |
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| Livello bibliografico   | Monografia  |
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| Nota di bibliografia    | Includes bibliographical references.  |
| Nota di contenuto       | CONTENTS; Preface M. M. Shapiro, T. Stanev & J. P. Wefel; Powerful Astrophysical Sources; Gamma Ray Bursts: Discoveries with Swift A , Wells; 1. Introduction; 2. Observations with Swift; 3. Models, progenitors and jets; 4. Afterglows; 5 . Short-hard gamma-ray bursts; References; Gamma Ray Burst Phenomenology in the Swift Era P. Meza'ros; 1. Challenges posed by new Swift observations; 2. Prompt gamma-ray emission; 3. Models of early afterglows in the Swift Era; 3.1. Prompt optical emission; 3.2. Steep X-ray decay; 3.3. Shallow X-ray decay; 3.4. X-ray flares; 3.5. High redshift afterglows<br>3.6. GRB-SN3.7. Short bursts; 3.8. Long-short classification; References; Modeling of Multiwavelength Spectra and Variability of 3C 66A in 2003-2004 M. Joshi & M. Bottcher; 1. Introduction; 2. Model description and model parameters; 3. Results and discussion; 4. Summary; References; High Energy Signatures of Post-Adiabatic |

Supernova Remnants I. 0. Telezhinsky & B. I. Hnatyk; 1. Introduction; 2. Hydrodynamic model of the transition stage; 2.1. Origin and dynamics of the thin shell during transition phase; 2.2. Hot gas parameters inside the shell; 2.3. Cold shell gas parameters

3. High energy signatures of transition stage 3.1. X-ray emission; 3.2.  $\gamma$ -ray emission from SNRs; 4. Conclusion; Acknowledgments; References; The Nature of Dark Matter P. L. Biermann & F. Munyaneza; 1. Dark Matter: Introduction; 2. Proposal; 2.1. Our recent work; 3. The tests; 3.1. Primordial magnetic fields; 3.2. Galaxies; 3.3. Dwarf spheroidal galaxies; 3.4. Lyman alpha forest; 3.5. The X-ray test; 4. Outlook; 5. Acknowledgements; References; Cosmic Rays; Particle Acceleration and Propagation in the Galaxy V. S. Ptuskin; 1. Introduction.; 2. Diffusion; 3. Supernova remnants

4. Knee and above Acknowledgments; References; Cosmic Rays from the Knee to the Second Knee: 10<sup>14</sup> TO 10<sup>18</sup> eV J. R. Horandel; 1. Introduction; 2. Galactic cosmic rays and the knee; 2.1. Sources; 2.2. Propagation; 2.3. Structures in the energy spectrum; 3. Measurement techniques; 3.1. A Heitler model for air showers; 3.1.1. Electromagnetic cascades; 3.1.2. Hadronic showers; 3.1.3. Number of muons; 3.1.4. Number of electrons; 3.1.5. Depth of the shower maximum; 3.1.6. Energy and mass of the primary particle; 4. Experimental results; 5. Conclusion and Outlook; References

Ultra High-energy Cosmic Rays: Origin and Propagation T. Stanev 1. Introduction; 1.1. The highest energy cosmic ray event; 2. Origin of UHECR; 2.1. Possible astrophysical sources of UHECR; 2.2. Top-down scenarios; 2.3. Hybrid models; 3. Propagation of UHECR; 3.1. Energy loss processes; 3.2. Modification of the proton spectrum in propagation. Numerical derivation of the GZK effect; 4. Production of Secondary Particles in Propagation; References; GRB as Sources of Ultra-High Energy Particles P. M&za'ros; 1. Introduction; 2. Cosmic rays from GRB; 3. GeV and TeV  $\gamma$ -ray emission from GRB

4. High energy neutrinos

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#### Sommario/riassunto

This book introduces young researchers to the exciting field of ultra-high energy astrophysics including charged particles, gamma rays and neutrinos. At ultra-high energy the radiation is produced by interactions of cosmic ray particles accelerated in explosive events such as supernovae or hypernovae, black holes or, possibly, the big bang. Through direct contact with senior scientists, now actively planning the next generation of experiments/models, the excitement and motivation for research at ultra-high energy was conveyed. The underpinning of these fields is a synthesis of knowledge and t

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