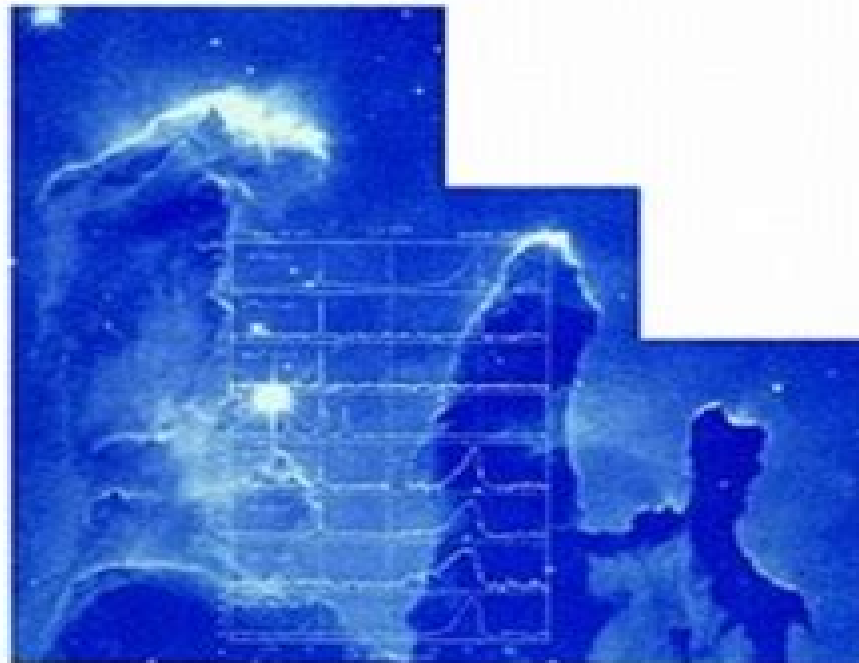


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Molecules In Astrophysics Probes And Processes

**Bernard Barbier,Hervé Martin,Jacques
Reisse**



Molecules In Astrophysics Probes And Processes:

Molecules in Astrophysics: Probes and Processes International Astronomical Union. Symposium, 1997 Molecules are found in a large variety of astronomical environments ranging from comets in the solar system to galaxies at high redshift This book brings together astronomers physicists and chemists to discuss the use of molecules as probes of astrophysical parameters explore their role in the evolution of astronomical objects and study the basic chemical processes that occur in space *Molecules in Astrophysics: Probes and Processes* International Astronomical Union. Symposium, 1997-04-30

Proceedings of the 178th Symposium of the International Astronomical Union held in Leiden The Netherlands July 1 5 1996

Molecules in Astrophysics: Probes and Processes Ewine F. van Dishoeck, 1997-04-30 Molecules are found in a large variety of astronomical environments ranging from comets in the solar system to galaxies at high redshift This book brings together astronomers physicists and chemists to discuss the use of molecules as probes of astrophysical parameters explore their role in the evolution of astronomical objects and study the basic chemical processes that occur in space The enormous progress in observational techniques is illustrated by studies of the physics and chemistry on scales comparable to the protosolar nebulae around high and low mass forming stars and planetary systems Elegant new experimental techniques for the measurement of gas phase reactions at low temperatures the analysis of spectra and the investigation of surface adsorbates on interplanetary dust particles and meteorites are presented the importance of accurate quantum chemical calculations is emphasized Present knowledge of the composition of dust grains and polycyclic aromatic hydrocarbons is summarized Other topics include models and observations of jets and outflows photon and X ray dominated regions masers in and outside our galaxy the comet D Shoemaker Levy collision with Jupiter the envelopes and photospheres of late type stars including brown dwarfs diffuse and translucent clouds and external galaxies ranging from the nearby Magellanic Clouds to distant quasar absorption line systems and starburst galaxies at the edge of the Universe *The Molecular Astrophysics of Stars and Galaxies* T. W. Hartquist, David A. Williams, 1998 This book provides a comprehensive survey of modern molecular astrophysics It includes an introduction to molecular spectroscopy and then addresses the main areas of current molecular astrophysics including galaxy formation star forming regions mass loss from young as well as highly evolved stars and supernovae starburst galaxies plus the tori and discs near the central engines of active galactic nuclei All chapters have been written by invited authors who are acknowledged experts in their fields The thorough editorial process has ensured a uniformly high standard of exposition and a coherent style The book is unique in giving a detailed view of its wide ranging subject It will provide the standard introduction for research students in molecular astrophysics The book will be read by research astronomers and astrophysicists who wish to broaden the basis of their knowledge or are moving their activities into this burgeoning field It will enable chemists to learn the astrophysics most related to chemistry as well as instruct physicists about the molecular processes most important in astronomy The Origin of Stars and Planetary Systems Charles

J. Lada, N.D. Kylafis, 2012-12-06 A few years after the publication of *The Physics of Star Formation and Early Stellar Evolution* we received a request from the publisher for an up dated second edition of this popular reference book As originally intended the volume had proved to be a useful text book for graduate astronomy courses and seminars which dealt with topics related to stellar origins The book was based on a series of lectures delivered by a distinguished group of leading researchers at a NATO Advanced Study Institute ASI held in May 1990 on the island of Crete Greece The primary goal of the ASI was in fact to produce a book which would simultaneously provide a broad and systematic overview of as well as a rigorous introduction to the fundamental physics and astronomy at the heart of modern research in star formation and early stellar evolution However by 1995 concern had arisen among those who used the text as a reference for graduate seminars and courses that the book would need to be updated to stay abreast of the discoveries and progress in this rapidly evolving field After some discussion we concluded that a new edition of the book was warranted and that the goal of producing a new edition would be best accomplished by organizing a second ASI in Crete to review the progress in star formation research

Dust and Molecules in Evolved Stars I. Cherchneff, T.J. Millar, 2013-11-11 Dust and molecules are found in a large variety of astrophysical environments in particular in the circumstellar material ejected by evolved stars This book brings together the leading astronomers and astrophysicists in the field of molecular astrophysics and stellar physics to discuss the important issues of dust and molecular formation the role of solids in circumstellar environments molecules as probes of circumstellar parameters the stellar contribution to the enrichment of the Galaxy and the latest observational data in various wavelength domains in particular in the infrared with results from the Infrared Space Observatory The astrophysical scenarios include late type stars novae Wolf Rayet stars Luminous Blue Variables and supernovae Audience Researchers and graduate students in the fields of stellar physics stellar evolution and astrochemistry

Laboratory Astrophysics and Space Research P. Ehrenfreund, C. Krafft, H. Kochan, Valerio Pirronello, 2012-12-06 The book presents the most recent developments of laboratory studies in astrophysics and space research The individual chapters review laboratory investigations under simulated space conditions studies for the design of successful space experiments or for supporting the interpretation of astronomical and space mission recorded data Related theoretical models numerical simulations and in situ observations demonstrate the necessity of experimental work on the Earth's surface The expertise of the contributing scientists covers a broad spectrum and is included in general overviews from fundamental science to recent space technology The book intends to serve as a reference for researchers and graduate students on the most recent activities and results in laboratory astrophysics and to give reviews of their applications in astronomy planetology cosmochemistry space research and Solar System exploration

Formation and Evolution of Solids in Space J. Mayo Greenberg, Aigen Li, 2012-12-06 Interstellar dust meteorites interplanetary dust particles IDPs the zodiacal light comets comet dust Where do they come from what are they made of how do they evolve and finally are there connections between them These are the questions discussed in this volume

by some of the world's outstanding experts in their respective fields. The techniques used for studying the small solid objects of space are thoroughly discussed. Some of the methods involve a synthetic approach using the laboratory to create analog environments and materials which are believed to resemble those in space. Others use direct laboratory methods with state-of-the-art analytical tools to study the material of the objects themselves: meteorites, IDPs, and others apply the latest in astronomical facilities to provide quantitative data on the material properties of the solids which can only be deduced from remote observations. These are compared with the laboratory results. In one instance there was a possibility to study a solar system body in situ and that was the case of comet Halley and some of the results of these studies obtained from space laboratories launched to meet it are discussed here. Finally there are theoretical papers which are aimed at bridging the results of observational and laboratory methods. This book is recommended to senior scientists as well as graduate students who wish to pursue research in interstellar and solar system astronomy and their connections. **Asymptotic Giant**

Branch Stars Harm J. Habing, Hans Olofsson, 2013-04-17 This book deals with stars during a short episode before they undergo a major and fatal transition. Soon the star will stop releasing nuclear energy; it will become a planetary nebula for a brief but poetic moment and then it will turn into a white dwarf and slowly fade out of sight. Just before this dramatic change begins the star has reached the highest luminosity and the largest diameter in its existence and while it is a star detectable in galaxies beyond the Local Group its structure contains already the inconspicuous white dwarf it will become. It is called an asymptotic giant branch star or AGB star. Over the last 30 odd years AGB stars have become a topic of their own although individual members of this class had already been studied for centuries without realizing what they were. In the early evolution so-called E-AGB phase the stars are a bit bluer than but otherwise very similar to what are now called red giant branch stars, RGB stars. It is only in the second half of their anyhow brief existence that AGB stars differ fundamentally from RGB stars. Chemistry as a Diagnostic of Star Formation National Research Council Canada, 2003 This publication contains

presentations, studies of fundamental chemical processes both in the lab and an exploration of the connections between chemistry and the unique problems of high mass star formation: the formation of hydrogen-deuterated molecules, molecular depletion, observations, accretion disks, interstellar dust, and the chemistry/physical conditions/structure of dark clouds. Includes indexes of subjects, authors, astronomical objects. **Lectures in Astrobiology** Bernard Barbier, Hervé Martin, Jacques

Reisse, 2006-01-13 This is the first of a divided two-part softcover edition of the Lectures in Astrobiology. Volume I containing the sections General Introduction, The Early Earth and Other Cosmic Habitats for Life, and Appendices including an extensive glossary on Astrobiology. Lectures in Astrobiology is the first comprehensive textbook at graduate level encompassing all aspects of the emerging field of astrobiology. Volume I of the Lectures in Astrobiology gathers a first set of extensive lectures that cover a broad range of topics from the formation of solar systems to the quest for the most primitive life forms that emerged on the Early Earth. Lectures in Astrobiology Muriel Gargaud, Bernard Barbier, Hervé Martin, Jacques

Reisse,2005-06-08 First comprehensive beginning graduate level book on the emergent science of astrobiology

Exobiology: Matter, Energy, and Information in the Origin and Evolution of Life in the Universe Julian Chela-Flores,François Raulin,2012-12-06 Leading researchers in the area of the origin evolution and distribution of life in the universe contributed to Exobiology Matter Energy and Information in the Origin and Evolution of Life in the Universe This volume provides a review of this interdisciplinary field In 50 chapters many aspects that contribute to exobiology are reviewed by 90 authors These include historical perspective of biological evolution cultural aspects of exobiology cosmic chemical and biological evolution molecular biology geochronology biogeochemistry biogeology and planetology Some of the current missions are discussed Other subjects in the frontier of exobiology are reviewed such as the search for planets outside the solar system and the possible manifestation of intelligence in those new potential environments The SETI research effort is well represented in this general overview of exobiology This book is the proceedings of the Fifth Trieste Conference on Chemical Evolution that took place in September 1997 The volume is dedicated to the memory of Nobel Laureate Abdus Salam who suggested the initiation of the Trieste conferences on chemical evolution and the origin of life Audience Graduate students and researchers in the many areas of basic earth and life sciences that contribute to the study of chemical evolution and the origin evolution and distribution of life in the universe

Dense Molecular Gas around Protostars and in Galactic Nuclei Willem A. Baan,Huib Jan van Langevelde,2005-12-05 The European Workshop on Astronomical Molecules was held at The Conference Building in Zwolle the Netherlands on 18 20 February 2004 The idea behind the workshop was to bring together astronomers studying similar processes in different astrophysical environments masers and dense molecular gas around young stars and galactic nuclei There is considerable overlap in physical and chemical phenomena between these environments with scales ranging from circumstellar to central regions of galaxies The workshop became a meeting place of observers and theorists as well as young and senior astronomers The venue of the meeting facilitated continuous stimulated discussions in a relaxed atmosphere throughout the meeting and after sessions in the hotspots of the cosy town of Zwolle This issue includes 12 reviews and 27 contributed papers presented in this Wo shop all of them were refereed by invited speakers or the editors The quality of the papers is outstanding The projects discussed here are often in an early stage and undoubtedly their progress has benefited greatly from the opportunity to discuss results with the experts in a wide range of areas Similarly we feel confident that the interaction of specialists with different backgrounds will initiate many new projects and collaborations The format of the meeting was special since all participants were given the opportunity to make an oral presentation and there were no posters In addition the schedule allowed sufficient room enough for off line presentations and discussions

The Century of Space Science J.A. Bleeker,Johannes Geiss,M. Huber,2012-12-06 One of the most attractive features of the young discipline of Space Science is that many of the original pioneers and key players involved are still available to describe their field Hence at this point in history we are in a unique

position to gain first hand insight into the field and its development To this end The Century of Space Science a scholarly authoritative reference book presents a chapter by chapter retrospective of space science as studied in the 20th century The level is academic and focuses on key discoveries how these were arrived at their scientific consequences and how these discoveries advanced the thoughts of the key players involved With over 90 world class contributors such as James Van Allen Cornelis de Jager Eugene Parker Reimar L st and Ernst Stuhlinger and with a Foreword by Lodewijk Woltjer past ESO Director General this book will be immensely useful to readers in the fields of space science astronomy and the history of science Both academic institutions and researchers will find that this major reference work makes an invaluable addition to their collection

Comets II Michel C. Festou,H. Uwe Keller,Harold A. Weaver,2004-11-01 The study of comets is a field that has seen tremendous advances in recent years far surpassing the knowledge reflected in the original Comets volume published as part of the Space Science Series in 1982 This new volume with more than seventy contributing authors represents the first complete overview of comet science in more than a decade and contains the most extensive collection of knowledge yet assembled in the field Comets II situates comet science in the global context of astrophysics for the first time by beginning with a series of chapters that describe the connection between stars and planets It continues with a presentation of the formation and evolution of planetary systems enabling the reader to clearly see the key role played in our own solar system by the icy planetesimals that were the seeds of the giant planets and transneptunian objects The book presents the key results obtained during the 1990s in particular those collected during the apparition of the exceptional comets C Hyakutake and C Hale Bopp in 1996 1997 The latest results obtained from the in situ exploration of comets P Borrelly and P Wild 2 are also discussed in detail Each topic of is designed to be accessible to students or young researchers looking for basic yet detailed complete and accurate information on comet science With its emphasis on the origin of theories and the future of research Comets II will enable scientists to make connections across disciplinary boundaries and will set the stage for discovery and new understanding in the coming years

Organic Matter in the Universe

Sun Kwok,2011-12-27 Authored by an experienced writer and a well known researcher of stellar evolution interstellar matter and spectroscopy this unique treatise on the formation and observation of organic compounds in space includes a spectroscopy refresher as well as links to geological findings and finishes with the outlook for future astronomical facilities and solar system exploration missions A whole section on laboratory simulations includes the Miller Urey experiment and the ultraviolet photolysis of ices

The Chemical Evolution of Phosphorus Enrique Macia-Barber,2019-11-21 Here is a fascinating reader friendly exploration of the phosphorus enigma The volume attempts to answer the questions How did phosphorus atoms which are produced inside the inner cores of a handful of huge stars become concentrated in relatively high proportions in the organisms composing Earth s biosphere And how did these phosphate derivatives manage to be included in such a great variety of organic molecules playing essential biochemical roles in all known life forms Due to the

interdisciplinary nature of the topic the volume is arranged in three sections The first section introduces the fundamental concepts and notions of physics chemistry and biology necessary for the proper understanding of the topics discussed within an astronomical framework The author then focuses on the role of phosphorus and its compounds within the context of chemical evolution in galaxies considering its relevance in most essential biochemical functions as well as its peculiar chemistry under different physicochemical conditions The third section provides an overall perspective on the role of phosphorus and its compounds in current areas of research of solid state physics materials engineering nanotechnology or medicine

Astrobiology: Future Perspectives P. Ehrenfreund,W.M. Irvine,T. Owen,Luann Becker,Jen Blank,J.R. Brucato,Luigi Colangeli,Sylvie Derenne,Anne Dutrey,Didier Despois,Antonio Lazcano,Francois Robert,2006-03-05

Astrobiology a new exciting interdisciplinary research field seeks to unravel the origin and evolution of life wherever it might exist in the Universe The current view of the origin of life on Earth is that it is strongly connected to the origin and evolution of our planet and indeed of the Universe as a whole We are fortunate to be living in an era where centuries of speculation about the two ancient and fundamental problems the origin of life and its prevalence in the Universe are being replaced by experimental science The subject of Astrobiology can be approached from many different perspectives This book is focused on abiogenic organic matter from the viewpoint of astronomy and planetary science and considers its potential relevance to the origins of life on Earth and elsewhere Guided by the review papers in this book the concluding chapter aims to identify key questions to motivate future research and stimulate astrobiological applications of current and future research facilities and space missions Today s rich array of new spacecraft telescopes and dedicated scientists promises a steady flow of discoveries and insights that will ultimately lead us to the answers we seek

Astrochemistry: Recent Successes and Current Challenges (IAU S231) International Astronomical Union. Symposium,International Astronomical Union,2006-04-27
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