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EVOLUTION OF STARS: THE PHOTOSPHERIC ABUNDANCE CONNECTION

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Evolution Of Stars The Photospheric Abundance Connection

Christopher G. Tinney



Evolution Of Stars The Photospheric Abundance Connection:

Evolution of Stars G. Michaud, A. Tutukov, 1991-03-14 G MICHAUD Dipartement de Physique Universiti de Montrial c P 6128 succursale A Montrial Que H3C 317 Canada The aim of IAU Symposium 145 was to use the photospheric abundances of the chemical elements to give us some hint of the past evolution and of the current structure of stars At the invitation on the Bulgarian Academy of Sciences it brought together one hundred and fifty one scientists from 21 countries to Zlatni Pjasaci Golden Sands Bulgaria for a five day meeting The processes discussed included accretion mass loss mass exchange convection turbulence meridional circulation and diffusion in addition to nuclear reactions Observationally spectroscopy was involved New telescopes and instruments have considerably extended the scope of spectroscopy over the last few years Space telescopes such as IUE have allowed the development of far UV spectroscopy The access to the infrared has proven critical for probing cool stars Large ground based telescopes have allowed fainter objects to be observed especially when they are equipped with more efficient detectors such as CCDs and Reticons The co adding of digitalized photographic plates has extended their usefulness It has become possible to make high resolution high signal to noise observations of objects that could only be observed at low resolution in former days Weak lines can now be measured with accuracy allowing the precise determination of the abundances of elements as rare as lithium and the determination of precise limits to isotopic ratios

Evolution of Stars International Astronomical Union. Symposium, 1991-02-28 Proceedings of the 145th Symposium of the International Astronomical Union held in Zlatni Pjasaci Golden Sands Bulgaria August 27-31 1990

Evolution of Massive Stars D. Vanbeveren, W. van Rensbergen, C. de Loore, 2012-12-06 Massive stars occupy an exceptional place in general astrophysics They trigger many if not all of the important processes in galactic evolution whereas due to their intrinsic brightness they offer the only until now possibility to study the stellar content and stellar behaviour in distant galaxies The last say 25 years massive stars have been the subject of numerous meetings discussing the influence of massive stars on population synthesis the number distribution of different types of massive stars the LBV phenomenon WR stars X ray binaries stellar winds in massive stars chemical peculiarities in massive stars supernova explosions of massive stars and the important SN1987A event the influence of massive stars and chemical evolution of galaxies It is clear that without a theory of stellar evolution the study of these topics loses a lot of its significance Massive star evolution therefore got a chance in these meetings but rarely as a prime subject The state of the art the physical processes and the uncertainties in stellar evolution were barely touched Even more the influence of close binaries in all these massive star meetings slowly disappeared the last say 13 years without any scientific justification although a significant fraction of stars occurs in close binaries with periods small enough so that both components will interact during their evolution Denying the binaries or not discussing their influence on results and conclusions makes the latter very uncertain or even completely unreliable

Origin And Evolution Of The Elements - Proceedings Of The International Symposium Shigeru Kubono, Toshitaka

Kajino,1993-08-19 This volume covers a variety of modern aspects of the observational experimental and theoretical studies on the origin evolution and distribution of the elements in the Universe The topics include Early Universe and Primordial Nucleosynthesis Evolution of Galaxies Nucleosynthesis in Novae and Supernovae Neutron Stars and Hadronic Matter and Nuclear Astrophysics *Physics, Formation and Evolution of Rotating Stars* Andre Maeder,2008-12-19 Rotation is ubiquitous at each step of stellar evolution from star formation to the final stages and it affects the course of evolution the timescales and nucleosynthesis Stellar rotation is also an essential prerequisite for the occurrence of Gamma Ray Bursts In this book the author thoroughly examines the basic mechanical and thermal effects of rotation their influence on mass loss by stellar winds the effects of differential rotation and its associated instabilities the relation with magnetic fields and the evolution of the internal and surface rotation Further he discusses the numerous observational signatures of rotational effects obtained from spectroscopy and interferometric observations as well as from chemical abundance determinations helioseismology and asteroseismology etc On an introductory level this book presents in a didactical way the basic concepts of stellar structure and evolution in track 1 chapters The other more specialized chapters form an advanced course on the graduate level and will further serve as a valuable reference work for professional astrophysicists **Cosmic Chemical Evolution** International Astronomical Union. Symposium,J.W. Truran,2002-03-31 The IAU Symposium papers collected in this volume address virtually all aspects of the problem of nucleosynthesis galactic chemical evolution and cosmic chemical evolution Discussions on theoretical models as well as observational studies are included Theoretical models of nucleosynthesis in the Big Bang in the first stellar generations and in stars and supernovae over the histories of our Galaxy and other galaxies provide a measure of element production over the lifetime of the Universe Observational studies of abundances in stars galaxies gas concentrations in galaxies and clusters of galaxies the intergalactic medium and gas clouds at high redshift are reviewed **Post-AGB Objects as a Phase of Stellar Evolution** R. Szczerba,S.K. Górny,2013-03-09 The term proto planetary nebulae PPNe in the context of the late stages of stellar evolution was created only slightly more than 20 years ago to express the belief that in the near future these objects will become planetary nebulae PNe The first proto planetary nebulae called also post Asymptotic Giant Branch or shortly post AGB objects AFGL 2688 and AFGL 618 were discovered in mid seventies in course of the Air Force Sky Survey Investigation of this phase of stellar evolution developed very rapidly in 1980 s after the IRAS mission when it became clear that proto planetary nebulae emit a significant part of their energy in the mid and far infrared Hundreds of new candidates have been proposed but the recognition of the real proto planetary nebulae is not a simple task and needs a substantial effort to exclude cases that represent different evolutionary stages High resolution spectroscopy of stellar atmospheres is of much importance in this respect Surprisingly only a small group of central stars the so called 21 11m emitters show chemical signatures of the 3 rd dredge up process Very recently a more detailed studies of mid infrared spectra from the Infrared Space Observatory ISO allow for a better

understanding of chemical composition and evolution of circumstellar material around these stars A new impetus in the field of proto planetary nebulae research was started in the 1990 s with high spatial resolution imaging in mid infrared and optical wavelength ranges **The Interplay Between Massive Star Formation, the ISM and Galaxy Evolution** D. Kunth,1996

An Introduction to Planetary Nebulae Jason J. Nishiyama,2018-05-25 In this book we will look at what planetary nebulae are where they come from and where they go We will discuss what mechanisms cause these beautiful markers of stellar demise as well as what causes them to form their variety of shapes How we measure various aspects of planetary nebulae such as what they are made of will also be explored Though we will give some aspects of planetary nebulae mathematical treatment the main points should be accessible to people with only a limited background in mathematics A short glossary of some of the more arcane astronomical terms is at the end of the book to help in understanding Included at the end of each chapter is an extensive bibliography to the peer reviewed research on these objects and I would encourage the reader interested in an even deeper understanding to read these articles Planetary Nebulae Harm J. Habing,Henny J.G.L.M. Lamers,2012-12-06 Planetary nebulae present a fascinating range of shapes and morphologies They are ideal laboratories for the study of different astrophysical processes atomic physics radiative transfer stellar winds shocks wind wind interaction and the interaction between stellar winds and the interstellar medium In addition planetary nebulae provide information about the late stages of stellar evolution In the last five years studies of planetary nebulae have progressed very rapidly and new phenomena and insights have been gained This is partly due to new observations e g from the Hubble Space Telescope the ISO satellite and new infrared and millimeter spectrographs and partly to the advancement of hydrodynamic simulations of the structures of planetary nebulae PN Many of these new results were reported at IAU Symposium 180 in Groningen the Netherlands on August 26 to 30 1996 This symposium was dedicated to one of the pioneers of PN research Stuart Pottasch These proceedings contain chapters on Introduction to PN with the basic parameters Distances of PN The central stars of PN The envelopes of PN The evolution from AGB to PN The evolution from PN to white dwarfs PN in the galactic context PN in extragalactic systems The future of PN research The book contains 29 reviews and more than 200 shorter contributions **Meteorites and the Early Solar System II** Dante S. Lauretta,Harry Y. McSween,2006-07-01 They range in size from microscopic particles to masses of many tons The geologic diversity of asteroids and other rocky bodies of the solar system are displayed in the enormous variety of textures and mineralogies observed in meteorites The composition chemistry and mineralogy of primitive meteorites collectively provide evidence for a wide variety of chemical and physical processes This book synthesizes our current understanding of the early solar system summarizing information about processes that occurred before its formation It will be valuable as a textbook for graduate education in planetary science and as a reference for meteoriticists and researchers in allied fields worldwide Nuclei in the Cosmos F Kappeler,K Wisshak,2020-11-26 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

Astrophysical and Laboratory Plasmas A.J. Willis,T.W. Hartquist,2013-03-09 Throughout his career Sir Robert Wilson has demonstrated that advances in a wide variety of fields in astrophysics and laboratory physics are achievable through the application of fundamental plasma spectroscopy His work has included optical studies that probed the nature of interstellar dust and first revealed the existence of O star winds vacuum ultraviolet and X ray diagnosis of fusion plasmas rocket ultraviolet and X ray observations of the Sun and the conception development and use of the International Ultraviolet Explorer IUE satellite which has contributed greatly to stellar interstellar and extragalactic astrophysics This volume contains reviews honouring Sir Robert and reflecting his interests

Elements and the Cosmos Bernard Ephraim Julius Pagel,1992-10-15 While there have been many books on cosmology and galactic and stellar evolution in which abundance analysis of astrophysical objects has played some part this book is the first one for several years where specialists in the various relevant fields discuss the basis and implications of the subject as a whole The major aim of the book is to bring together the results from high redshift studies and galactic studies in a coherent way and to cover relevant aspects of nuclear and atomic physics

The Analysis of Starlight John B. Hearnshaw,2014-03-17 First published in 1986 this is the story of the analysis of starlight by astronomical spectroscopy Beginning with Joseph Fraunhofer s discovery of spectral lines in the early nineteenth century this new edition continues the story through to the year 2000 In addition to the key discoveries it presents the cultural and social history of stellar astrophysics by introducing the leading astronomers and their struggles triumphs and disagreements Basic concepts in spectroscopy and spectral analysis are included so both observational and theoretical aspects are described in a non mathematical framework This new edition covers the final decades of the twentieth century with its major advances in stellar astrophysics the discovery of extrasolar planets new classes of stars and the observation of the ultraviolet spectra of stars from satellites The in depth coverage makes it essential reading for graduate students working in stellar spectroscopy professional and amateur astronomers and historians of science

Planetary Nebulae R. Weinberger,A. Acker,2012-12-06 Planetary nebulae are a keystone for the understanding of the evolution of stars for deep insights into the physical processes prevailing in highly excited dilute nebulae and for the chemical evolution in galaxies These objects displaying an intriguing morphology have a short lifetime of a few tens of thousands of years and have become one of the best studied classes of celestial sources However despite large and successful efforts from both the observational and theoretical side planetary nebulae still keep some of their secrets like the widely unknown distances and will undoubtedly also be objects of thorough investigations in the years to come

Astronomical and Astrophysical Objectives of Sub-Milliarcsecond Optical Astrometry Erik Høg,P. Kenneth Seidelmann,2013-12-01 Astrometry is on the

threshold of great changes due to the fact that this decade alone is witnessing an improvement of stellar positions equivalent to the total improvement of the previous two centuries The Hipparcos Satellite has concluded its observations and the catalog is in preparation Preliminary results assure that the Hipparcos catalog will provide positions parallaxes and annual proper motions for over 100 000 stars with accuracies of 1.5 milliarcseconds In addition the Tycho catalog will provide positions of about 30 milliarcseconds accuracy for over 1 million stars and annual proper motions with 3 milliarcsecond accuracy will subsequently be obtained by means of first epoch positions from the Astrographic Catalog Optical interferometers on the ground are beginning operation and these instruments can provide observational accuracies of approximately one milliarcsecond Also the traditional reference frame based on the Fundamental Catalog of bright stars is being replaced by the extragalactic reference frame based on radio sources with accuracies of one milliarcsecond Thus astrometry will change from a fundamental reference frame defined in terms of the dynamical reference frame of the solar system with accuracies of 100 milliarcseconds to a space fixed extragalactic reference frame with accuracies of one milliarcsecond Future astrometric observations should be in the 1-100 milliarcsecond accuracy range There are a number of concepts for future astrometric instruments in space Most of these can provide sub milliarcsecond astrometric accuracies

The Bottom of the Main Sequence — And Beyond Christopher G. Tinney, 2013-06-29 The proceedings of this workshop should probably be prefaced with a few words on some of the more confusing jargon The phrases Very Low Mass star VLM star or simply VLM are now used fairly uniformly by astronomers studying the stars at the bottom of the hydrogen burning stellar main sequence unfortunately however there is no clear definition as to what constitutes a VLM star The reader should be warned that VLM stars are variously considered to be stars with masses less than 0.3 M_{\odot} masses 0.1 M_{\odot} less than 0.1 M_{\odot} spectra later than about M6.7 luminosities fainter than 0.15 M_{\odot} or luminosities fainter than $M_{\text{bol}} 12$ The important features of a VLM star however would seem to be 1 that it is about as faint as a star can be and 2 that it still remains a star ie it still burns hydrogen All of the above criteria therefore would seem to qualify an object as a VLM star and requiring a more stringent definition is probably quibbling

Stellar Atmospheres: Beyond Classical Models L. Crivellari, Ivan Hubeny, D. Hummer, 2012-12-06 The theory of stellar atmospheres is one of the most important branches of modern astrophysics It is first of all a major tool for understanding all aspects of stars As the physical properties of their outer layers can now be found with high precision firm conclusions can be drawn about the internal structure and evolution of stars Moreover improvements in our knowledge of the chemical composition of stars is shedding new light on the chemical evolution of galaxies and of the Universe as a whole Because the outer layers of stars are among the best understood astrophysical objects the theory of stellar atmospheres plays an important role in the study of many other types of objects These include planetary nebulae H II regions interstellar matter and objects of interest in high energy astrophysics such as accretion disks close binaries dwarf novae cataclysmic variables quasars active galactic nuclei pulsar magnetospheres and Seyfert galaxies

Finally as stars provide a laboratory in which plasmas can be studied under more extreme conditions than on earth the study of stellar atmospheres has strong connections with modern physics Astronomical observations provided a vital stimulus in the early stages of quantum theory and atomic physics even today topics such as low temperature dielectronic recombination develop hand in hand with the interpretation of stellar and nebular spectra Early work on MHD was similarly motivated Many such connections remain to be explored

Fundamental Stellar Properties: The Interaction Between Observation and Theory Timothy R. Bedding, Andrew J. Booth, John M. Davis, 2013-12-01 This Symposium began with a proposal for a meeting to honour Emeritus Professor Robert Hanbury Brown on the occasion of his 80th birthday He requested that any such meeting should be on a topic that would be of benefit to the Sydney University Stellar Interferometer SUSI program With SUSI and several other high angular resolution instruments either in operation or coming on line within the next decade and with advances in astrometry spectroscopy and in theoretical models of stellar atmospheres and interiors it appeared to be both appropriate and timely to hold a symposium on Fundamental Stellar Properties the Interaction between Observation and Theory The emphasis of the meeting was on the critical assessment of the quality accuracy and prospects for improvement of the observational data and theoretical models on the outstanding problems in stellar astrophysics and on the feasibility of achieving the observational and theoretical advances required for their solution Invited papers comprised the major part of the oral program and the speakers responded to the challenge issued by the Scientific Organising Committee to critically review the current status and prospects for their area of expertise The Symposium was opened by the Chancellor of the University of Sydney Emeritus Professor Dame Leonie Kramer who welcomed the 126 participants from 22 countries on behalf of the University The oral program included 52 invited reviews and papers and 10 contributed papers

Decoding **Evolution Of Stars The Photospheric Abundance Connection**: Revealing the Captivating Potential of Verbal Expression

In a time characterized by interconnectedness and an insatiable thirst for knowledge, the captivating potential of verbal expression has emerged as a formidable force. Its ability to evoke sentiments, stimulate introspection, and incite profound transformations is genuinely awe-inspiring. Within the pages of "**Evolution Of Stars The Photospheric Abundance Connection**," a mesmerizing literary creation penned by way of a celebrated wordsmith, readers attempt an enlightening odyssey, unraveling the intricate significance of language and its enduring effect on our lives. In this appraisal, we shall explore the book's central themes, evaluate its distinctive writing style, and gauge its pervasive influence on the hearts and minds of its readership.

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