

CHAPTER 2

2.1) ENTROPY AND TEMPERATURE

- (a) $\sigma = \log g = \log C + (3N/2)\log U$.
 $(\partial\sigma/\partial U)_N = 1/\tau = (3N/2)(1/U)$, hence $U = 3N\tau/2$.
- (b) $(\partial^2\sigma/\partial U^2)_N = (3N/2)(-1/U^2) < 0$.

2.2) PARAMAGNETISM

States with spin excess $2s$ have the energy $U = -2smB$, hence $s = -U/2mB$. Insertion into (40) yields (41). From (41) obtain $(\partial\sigma/\partial U)_{N,B} = 1/\tau = -U/m^2B^2N$. Solve for U : $U = \langle U \rangle = -m^2B^2N/\tau = -MB$. Hence $M/Nm = mB/\tau$.

2.3) QUANTUM HARMONIC OSCILLATOR

- (a) From (1.55):

$$\begin{aligned}\sigma &= \log g = \log(N+n-1)! - \log n! - \log(N-1)! \\ &\approx \log(N+n)! - \log n! - \log N!\end{aligned}$$

Replacing $N-1$ by N is equivalent to neglecting a term $-\log[(N+n)/N]$, which for large N is small compared to the factorial terms. With the Stirling approximation:

$$\begin{aligned}\sigma &\approx (N+n) \log(N+n) - n \log n - N \log N \\ &= (N+n) \log[(N+n)/N] - n \log(n/N) \\ &= N[(1+n/N) \log(1+n/N) - (n/N) \log(n/N)].\end{aligned}$$

- (b) Set $n = U/\hbar\omega$ and $N\hbar\omega = U_0(N)$:

$$\sigma(U, N) = N[(1+U/U_0) \log(1+U/U_0) - (U/U_0) \log(U/U_0)].$$

Thermal Physics Kittel Solutions Manual

Salvador Mafé, Juan de la Rubia



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Thermal Physics Charles Kittel, Herbert Kroemer, 1980-01-15 CONGRATULATIONS TO HERBERT KROEMER 2000 NOBEL LAUREATE FOR PHYSICS For upper division courses in thermodynamics or statistical mechanics Kittel and Kroemer offers a modern approach to thermal physics that is based on the idea that all physical systems can be described in terms of their discrete quantum states rather than drawing on 19th century classical mechanics concepts An Introduction to Thermal Physics Daniel V. Schroeder, 2021 This is a textbook for the standard undergraduate level course in thermal physics sometimes called thermodynamics or statistical mechanics Originally published in 1999 it quickly gained market share and has now been the most widely used English language text for such courses as taught in physics departments for more than a decade Its clear and accessible writing style has also made it popular among graduate students and professionals who want to gain a better understanding of thermal physics The book explores applications to engineering chemistry biology geology atmospheric science astrophysics cosmology and everyday life It includes two appendices reference data an annotated bibliography a complete index and 486 homework problems *Sturge's Statistical and Thermal Physics, Second Edition* Jeffrey Olafsen, 2019-07-26 The original work by M D Sturge has been updated and expanded to include new chapters covering non equilibrium and biological systems This second edition reorganizes the material in a more natural manner into four parts that continue to assume no previous knowledge of thermodynamics The four divisions of the material introduce the subject inductively and rigorously beginning with key concepts of equilibrium thermodynamics such as heat temperature and entropy The second division focuses on the fundamentals of modern thermodynamics free energy chemical potential and the partition function The second half of the book is then designed with the flexibility to meet the needs of both the instructor and the students with a third section focused on the different types of gases ideal Fermi Dirac Bose Einstein Black Body Radiation and the Photon gases In the fourth and final division of the book modern thermostatistical applications are addressed semiconductors phase transitions transport processes and finally the new chapters on non equilibrium and biological systems Key Features Provides the most readable thorough introduction to statistical physics and thermodynamics with magnetic atomic and electrical systems addressed alongside development of fundamental topics at a non rigorous mathematical level Includes brand new chapters on biological and chemical systems and non equilibrium thermodynamics as well as extensive new examples from soft condensed matter and correction of typos from the prior edition Incorporates new numerical and simulation exercises throughout the book Adds more worked examples problems and exercises The Physics of Solids Eleftherios N. Economou, 2010-08-04 Solid State Physics emphasizes a few fundamental principles and extracts from them a wealth of information This approach also unifies an enormous and diverse subject which seems to consist of too many disjoint pieces The book starts with the absolutely minimum of formal tools emphasizes the basic principles and employs physical reasoning a little thinking and imagination to quote R Feynman to obtain results Continuous

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Introduction to Solid State Physics Charles Kittel, Paul McEuen, 2018 Kittel's Introduction to Solid State Physics Global Edition has been the standard solid state physics text for physics majors since the publication of its first edition over 60 years ago The emphasis in the book has always been on physics rather than formal mathematics This book is written with the goal that it is accessible to undergraduate students and consistently teachable With each new edition the author has attempted to add important new developments in the field without impacting its inherent content coverage This Global Edition offers the advantage of expanded end of chapter problem sets

Manual de Física Estadística Salvador Mafé, Juan de la Rubia, 2014-10-13 El objetivo de este texto es servir de apoyo al estudiante que sigue un curso b sico de F sica Estad stica til tambi n para profesores especialmente para los que se plantean qu contenidos escoger para el curso Se trata pues de un Manual de F sica Estad stica con un planteamiento y contenido adecuados a los fines docentes que se persiguen y que ha surgido en conexi n directa con la valoraci n de la docencia de los autores

Announcer American Association of Physics Teachers, 2001

Subject Guide to Books in Print, 1991

International Physics & Astronomy Directory, 1969 Intended as a comprehensive current source of professional information for the use of physicists and astronomers Faculty and brief biographical data listed under institutions which are arranged alphabetically Data about laboratories international organizations societies meetings financial support awards research and books and journals Faculty index Geographical index of universities and colleges

Whitaker's Cumulative Book List, 1980

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American Journal of Physics, 1999

Scientific and Technical Books in Print, 1972

The Publishers' Trade List Annual, 1967

Books in Print Supplement, 1988

Library Journal, 1969 Includes beginning Sept 15 1954 and on the 15th of each month Sept May a special section School library journal ISSN 0000 0035 called Junior libraries 1954 May 1961 Also issued separately

British Books in Print, 1985

Subject Index of Modern Books Acquired British Library, 1961

Scientific American, 1970 Monthly magazine devoted to topics of general scientific interest

Technical Books in Print, 1974

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