

1. Record Nr.	UNINA9910139026103321
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Titolo	Magnetic processes in astrophysics [[electronic resource]] : theory, simulations, experiments // Gunther Rudiger, Leonid L. Kitchatinov, and Rainer Hollerbach
Pubbl/distr/stampa	Weinheim, : Wiley-VCH Verlag GmbH & Co. KGaA, 2013
ISBN	3-527-64894-1 3-527-64892-5 3-527-64895-X
Edizione	[2nd ed.]
Descrizione fisica	1 online resource (358 p.)
Altri autori (Persone)	KitchatinovLeonid L HollerbachRainer
Disciplina	523.0188
Soggetti	Magnetics Astrophysics
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Magnetic Processes in Astrophysics; Contents; Preface; 1 Differential Rotation of Stars; 1.1 Solar Observations; 1.1.1 The Rotation Law; 1.1.2 Torsional Oscillations; 1.1.3 Meridional Flow; 1.2 Stellar Observations; 1.2.1 Rotational Evolution; 1.2.2 Differential Rotation; 1.3 The Reynolds Stress; 1.3.1 The Lambda Effect; 1.3.2 Eddy Viscosities; 1.4 The Meridional Flow; 1.4.1 Origin of the Meridional Flow; 1.4.2 The Differential Temperature; 1.4.3 Advection-Dominated Solar Dynamo; 1.5 The Sun; 1.5.1 Sun without Lambda Effect; 1.5.2 Sun without Baroclinic Flow; 1.5.3 Global Simulations 1.6 Individual Stars1.6.1 Two Most Stars; 1.6.2 Young Stars; 1.7 Dwarfs & Giants; 1.7.1 M Dwarfs; 1.7.2 F Stars; 1.7.3 Giants; 1.8 Differential Rotation along the Main Sequence; 2 Radiation Zones: Magnetic Stability and Rotation; 2.1 The Watson Problem; 2.1.1 The Stability Equations; 2.1.2 2D Approximation; 2.1.3 Stability Maps; 2.2 The Magnetic Tachocline; 2.2.1 A Planar Model; 2.2.2 Magnetic Field Confinement by Meridional Flow; 2.2.3 Tachocline Model in Spherical Geometry; 2.3 Stability of Toroidal Fields; 2.3.1 Equations; 2.3.2 Nonexistence of 2D Magnetic Instabilities; 2.3.3 No Diffusion

2.3.4 Growth Rates, Drift Rates and Radial Mixing
2.4 Stability of Thin Toroidal Field Belts; 2.4.1 Rigid Rotation; 2.4.2 Differential Rotation; 2.4.3 High Fourier Modes; 2.5 Helicity and Dynamo Action; 2.5.1 Helicity and Alpha Effect; 2.5.2 Dynamo Action; 2.6 Ap Star Magnetism; 2.7 The Shear-Hall Instability (SHI); 3 Quasi-linear Theory of Driven Turbulence; 3.1 The Turbulence Pressure; 3.2 The σ -Tensor; 3.2.1 Rotating Turbulence; 3.2.2 Nonrotating Turbulence but Helical Background Fields; 3.3 Kinetic Helicity and DIV-CURL Correlation; 3.4 Cross-Helicity; 3.4.1 Theory
3.4.2 Simulations and Observations
3.5 Shear Flow Electrodynamics; 3.5.1 Hydrodynamic Stability of Shear Flow; 3.5.2 The Magnetic-Diffusivity Tensor; 3.5.3 Dynamos without Stratification; 3.6 The Alpha Effect; 3.6.1 Helical-driven Turbulence; 3.6.2 Shear Flow; 3.6.3 Shear-Dynamos with Turbulence-Stratification; 3.6.4 Alpha Effect by Density Stratification; 3.7 The Current Helicity; 4 The Galactic Dynamo; 4.1 Magnetic Fields of Galaxies; 4.2 Interstellar Turbulence; 4.2.1 Hydrostatic Equilibrium and Interstellar Turbulence; 4.2.2 Alpha Effect by Supernova Explosions; 4.2.3 The Advection Problem
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5.4 Diffusive Kepler Disks

Sommario/riassunto

In this work the authors draw upon their expertise in geophysical and astrophysical MHD to explore the motion of electrically conducting fluids, the so-called dynamo effect, and describe the similarities and differences between different magnetized objects. They also explain why magnetic fields are crucial to the formation of the stars, and discuss promising experiments currently being designed to investigate some of the relevant physics in the laboratory. This interdisciplinary approach will appeal to a wide audience in physics, astrophysics and geophysics. This second edition covers such
