

1. Record Nr.	UNINA9911020261103321
Autore	Reinhard P.-G (Paul-Gerhard), <1945->
Titolo	Introduction to cluster dynamics / / Paul-Gerhard Reinhard, Eric Suraud
Pubbl/distr/stampa	Weinheim ; ; [Cambridge], : Wiley-VCH, c2004
ISBN	9786611764715 9781281764713 128176471X 9783527602520 3527602526 9783527621019 3527621016
Descrizione fisica	1 online resource (342 p.)
Altri autori (Persone)	SuraudEric
Disciplina	539.7
Soggetti	Cluster theory (Nuclear physics)
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 (p. [297]-314) and index.
Nota di contenuto	Introduction to Cluster Dynamics; Preface; Contents; 1 About clusters; 1.1 Atoms,molecules andsolids; 1.1.1 Atoms; 1.1.2 Molecules; 1.1.3 The point of view of solid state physics; 1.2 Clusters between atom and bulk; 1.2.1 Clusters as scalable finite objects; 1.2.2 Varying cluster material; 1.3 Metal clusters; 1.3.1 Some specific properties; 1.3.2 Ontime scales; 1.3.3 Optical properties; 1.4 Conclusion; 2 From clusters to numbers: experimental aspects; 2.1 Production of clusters; 2.1.1 Cluster production in supersonic jets: a telling example; 2.1.2 More cluster sources 2.1.3 Which clusters for which physics2.2 Basic experimental tools; 2.2.1 Mass spectrometers; 2.2.2 Optical spectroscopy; 2.2.3 Photoelectron spectroscopy; 2.3 Examples of measurements; 2.3.1 Abundances; 2.3.2 Ionization potentials; 2.3.3 Static polarizabilities; 2.3.4 Optical response; 2.3.5 Vibrational spectra; 2.3.6 Conductivity; 2.3.7 Magnetic moments; 2.3.8 Photoelectron spectroscopy; 2.3.9 Heat capacity; 2.3.10 Dissociation energies; 2.3.11 Limit of stability; 2.3.12 Femtosecond spectroscopy; 2.4 Conclusion; 3 The cluster many-body problem: a theoretical perspective

3.1 Ions and electrons 3.1.1 An example of true cluster dynamics; 3.1.2 The full many-body problem; 3.1.3 Approximations for the ions as such; 3.2 Approximation chain for the ion-electron coupling; 3.2.1 Core and valence electrons; 3.2.2 Pseudo-potentials; 3.2.3 Jellium approach to the ionic background; 3.3 Approximation chain for electrons; 3.3.1 Exact calculations; 3.3.2 Ab initio approaches; 3.3.3 Density-functional theory; 3.3.4 Phenomenological electronic shell models; 3.3.5 Semiclassical approaches; 3.4 Putting things together; 3.4.1 Coupled ionic and electronic dynamics 3.4.2 Born-Oppenheimer MD 3.4.3 Structure optimization; 3.4.4 Modeling interfaces; 3.4.5 Approaches eliminating the electrons; 3.5 Conclusions; 4 Gross properties and trends; 4.1 Observables; 4.1.1 Excitation mechanisms; 4.1.2 Energies; 4.1.3 Shapes; 4.1.4 Emission; 4.1.5 Polarizability; 4.1.6 Conductivity; 4.1.7 Spectral analysis; 4.2 Structure; 4.2.1 Shells; 4.2.2 Shapes; 4.3 Optical response; 4.3.1 Mie plasmon, basic trends; 4.3.2 Basic features of the plasmon resonance; 4.3.3 Effects of deformation; 4.3.4 Other materials; 4.3.5 Widths; 4.4 Metal clusters and nuclei; 4.4.1 Bulk properties 4.4.2 Shell effects 4.4.3 Collective response; 4.4.4 Fission; 4.4.5 Cluster versus nuclear time scales; 4.5 Conclusions; 5 New frontiers in cluster dynamics; 5.1 Structure; 5.1.1 Fractal growth; 5.1.2 Hydroplets; 5.1.3 Heat capacity; 5.1.4 Static polarizability; 5.1.5 Magnetic properties; 5.2 Observables from linear response; 5.2.1 Optical absorption; 5.2.2 Beyond dipole modes; 5.2.3 Photoelectron spectroscopy; 5.3 Laser excitations in the semi-linear regime; 5.3.1 Electron emission; 5.3.2 Shaping clusters; 5.3.3 Ionic effects in laser pulses of varied length; 5.3.4 Pump and probe analysis 5.4 Excitation by particle impact

Sommario/riassunto

Clusters as mesoscopic particles represent an intermediate state of matter between single atoms and solid material. The tendency to miniaturise technical objects requires knowledge about systems which contain a "small" number of atoms or molecules only. This is all the more true for dynamical aspects, particularly in relation to the quick development of laser technology and femtosecond spectroscopy. Here, for the first time is a highly qualitative introduction to cluster physics. With its emphasis on cluster dynamics, this will be vital to everyone involved in this interdisciplinary subject.