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Introducing the interaction; Sketch of the nucleon-nucleon interaction; Theoretical many-body methods
The Brueckner-Bethe-Goldstone expansionThe variational method; The relativistic approach; The V low approach; Trying a link to QCD: the chiral symmetry approach; Neutron matter at very low density. An exercise in many-body theory; A single G-matrix problem; The ""exact"" EoS; Going to nuclear structure; The Thomas-Fermi approximation and implementations; The density functional method; Nuclear Physics and Neutron Star structure; The Neutron Star inner crust; The Neutron Star core and mass-radius relationship; Conclusions and outlook; Spin-isospin modes: Implications for astrophysics
IntroductionThe compression modes and incompressibility of nuclear matter; Spin-isospin excitations; GT strength in fp-shell nuclei; Determination of GT- strength; Determination of GT+ strength and its astrophysical implications; Conclusions and outlook; NUCLEAR STRUCTURE AND NUCLEAR ASTROPHYSICS WITH RADIOACTIVE BEAMS;
Nuclear-astrophysics experiments with relativistic radioactive beams; Introduction; Experiments with high-energy radioactive beams at GSI; Mass measurements; The dipole response of exotic nuclei; Future perspectives-NuSTAR at FAIR; The FAIR facility
The radioactive beam facilityExperiments with slowed-down and stopped beams; The low-energy branch; High-resolution in-flight spectroscopy (HISPEC); Decay spectroscopy (DESPEC); The advanced trapping system MATS; The laser-spectroscopy experiment LASPEC; Reactions with Relativistic Radioactive Beams (R3B); Experiments with stored and cooled beams; Isomeric beams, lifetimes, and masses (ILIMA); Reactions at internal targets in the NESR (EXL); Electron scattering with short-lived nuclei (ELISe); The Antiproton-Ion-Collider AIC; Conclusion
Nuclear structure studies at RIKEN: New measurements with in-flight fast radioactive beams

Sommario/riassunto

Physicists have devoted much effort to reproducing the conditions of the primordial universe in laboratory conditions in their quest to work out a comprehensive theory of the appearance and evolution of nuclear matter. Whether it be trying to recreate the predicted primordial state of high-energy density matter in which quarks and gluons are effectively deconfined - the so-called Quark Gluon Plasma (QGP) - or exploring the structure and reaction properties of very unstable nuclei in experiments using radioactive beams, they have striven to understand the events which characterized the Big Bang
