

STRUCTURE
OF VACUUM AND ELEMENTARY
MATTER: FROM SUPERHEAVIES
VIA HYPERMATTER TO ANTIMATTER

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S u m m a r y

The extension of the Periodic system into various new areas is investigated. Experiments for the synthesis of superheavy elements and the predictions of magic numbers are reviewed. Different ways of nuclear decay are discussed like cluster radioactivity, cold fission, and cold multifragmentation, including the recent discovery of the triple fission of ^{252}Cf . Furtheron, the investigations on hypernuclei and the possible production of antimatter-clusters in heavy-ion collisions are reported. Various versions of the meson field theory serve as effective field theories at the basis of the modern nuclear structure and suggest a structure in the vacuum which might be important for the production of hyper- and antimatter. I also discuss the possibility of producing a new kind of nuclear systems by putting a few antibaryons inside ordinary nuclei. This leads to surprising results: in particular to cold compression of nuclear matter — in contrast to hot compression via nuclear shock waves (Rankine—Hugoniot). A perspective for future research is given.