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Synthesis of magnetized heavy nuclei

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The properties and mass distribution of the ultramagnetized atomic nuclei which arise in heavy-ion collisions and magnetar crusts, during Type II supernova explosions and neutron star mergers are analyzed. For the magnetic field strength range of 0.1–10 teratesla, the Zeeman effect leads to a linear nuclear magnetic response that can be described in terms of magnetic susceptibility [1]. Binding energies increase for open shell and decrease for closed shell nuclei. A noticeable enhancement in the yield of corresponding explosive nucleosynthesis products with antimagic numbers is predicted for iron group and r-process nuclei. Magnetic enrichment in a sampleof 44Ti corroborate theobservational results and imply a significant increase in the quantity of the main titanium isotope, 48Ti, in the chemical composition of galaxies. The enhancement of small mass number nuclides in the r-process peak may be due to magnetic effects.
[1] Kondratyev, V.N.. Phys. Lett. B, 782 (2018) 167

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