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Magnetic effects in dense nuclear matter through Skyrme model

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Skyrme model is among the simplest extensions of chiral effective theory including anomaly. Within such framework we investigate how an external magnetic field deforms a Skyrmion while preserving its topological winding. A crystal constituted by multiple magnetically deformed Skyrmions provides us insights of the ground state of nuclear matter in strong magnetic field. We manifest such Skyrme crystal can realize the previously found π^0 domain wall structure as one special class of solution. Another class of solution with both charged and neutral pions is revealed by us, entitled “Normal Crystal”. For these two classes of baryonic structure, we establish their thermodynamics and phase diagram, demonstrating how they compete to take place as the ground state, underneath which is the topological transmutation between $\pi^3(S^3)$ and $\pi^1(S^1)$.

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