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The effect of magnetic field on the structure of strange quark stars

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Strange quark stars (SQS) are a possible type of compact objects, which remain after the end of the life of supermassive stars. After the first explosion of a massive star, if the density of matter in the core of the star increases to values above the nuclear saturation density, the quarks deconfine and a huge value of energy (1047 J) is released, leading to the second explosion that is super luminous and is called a Quark-Nova. The object, which remains after the Quark-Nova, would be a pure SQS. A promising candidate for the QN is Cassiopeia A.
The study of the SQS is an interesting subject for physicists and astrophysicists because they are systems of strange quark matter that can exist in extreme conditions (high enough density and temperature, and strong magnetic fields). Theoretical studies suggest that the magnetic field inside the compact objects (neutron stars and SQS) is ~1018 G. This strong magnetic field can affect the shape, mass, and radius of the compact objects. In the current work, we study the effect of the strong magnetic field on the equation of state and the structure of SQS. We show that the maximum gravitational mass of the SQS increases with increasing the magnetic field. In addition, the results show that the star has an oblate shape under the effect of the strong magnetic field.

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