Abstract Submitted
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Reaction Screening and Weak Interactions in Hot, Magnetized Astrophysical Plasmas[1] MICHAEL FAMIANO, Western Michigan Univ, BAHA BALANTEKIN, University of Wisconsin, TOSHITAKA KAJINO, National Astronomical Observatory of Japan, MOTOHIKO KUSAKABE, Beihang University, KANJI MORI, YUDONG LUO, National Astronomical Observatory of Japan — Effects from high temperatures and magnetic fields on astrophysical plasmas have been investigated. Coulomb screening and weak interaction rates are found to change significantly if the temperatures and magnetic fields are high enough. For high magnetic fields, the arrangement of electron transverse momentum into Landau levels will change the characteristic plasma screening length. High fields can result in increased β-decay rates. The results found here are compelling, as thermal and magnetic field effects can affect a large number of astrophysical sites. Effects studied will be presented, and results are applied to a number of representative nucleosynthesis models. In strong magnetic fields, changes in weak interaction rates, for example, can be significant. Deviations from an ideal Fermi gas can result in a significant reduction in the plasma screening length, producing an enhancement of charged-particle reaction rates. This can have significant effects on nucleosynthesis. In addition, galactic chemical evolution signatures of nucleosynthesis in high temperatures and magnetic fields will be presented. Available modifications to commonly-used nucleosynthesis codes will be presented.

[1]NASA, NSF, JSPS

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