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The influence of small scale magnetic field on the polar cap X-ray luminosity of old radio pulsars

The influence of small-scale magnetic field on the polar cap heating by reverse positrons is considered. The reverse positron current is calculated in the framework of two models: rapid (J. Arons, E.T.Scharlemann (1979)) and gradually screening (A.K.Harding,A.G.Muslimov (2001), Yu.E.Lyubarskii (1992)). To calculate the electron-positron pairs production rate we take into account only the curvature radiation of primary electrons and its absorption in magnetic field. We use the polar cap model with steady space charge limited electron flow. It is shown that the rapid screening model is in the better agrement with observations of old (age > 10^6 years) radio pulsars. The second model usually leads to too strong heating and too large X-ray luminosities.
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