

The influence of positronium photoionization rate on the polar cap X-ray luminosity of radio pulsars

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The influence of positronium photoionization rate on the polar cap X-ray luminosity of old radio pulsars is considered. It is assumed that polar cap is heated only by reverse positrons, accelerated in pulsar diode. It is supposed that pulsar diode is in stationary state with lower plate on star surface (polar cap model), occupies all pulsar tube crosssection and operates in regime of steady space charge limited electron flow. The influence of small scale magnetic field on electric field inside pulsar diode is taken into account. The reverse positron current is calculated in the framework of two models: rapid [1] and gradually screening [2,3]. 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. It is assumed that part of electro-positron pairs may be created in bound state (positronium). And later such positroniums are photoionized by thermal photons from polar cap.

References

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