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A model of the energetic particle populations in the environment of Ganymede

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The energetics particles populations in Ganymede environment are studied using a model based on the use of Liouville theorem. The particle trajectories are computed back-in-time, starting from initial condition that cover the complete position/velocity phase for space, for electrons, protons oxygen and sulfur ions with energies from 10keV's to 100MeV's. Two types of magnetic configuration are used, a superposition model of the Ganymede centered dipolar field and the Jovian field, and a more realistic stretched model as described by Shawn et al (2001). Distribution function are then reconstructed using Liouville theorem. Three features are more specifically investigated: (1) the loss cones over the polar caps and the influence of magnetic mirror in the reduction of the moon absorption, (2) the ion and electron radiation belts, (3) 'cusp' of trapped particles at the interface between the Ganymede and Jovian field. The role of wave scattering in the possible enhancement of moon sweeping effect is also investigated. Finally, the model is used to estimate the radiation dose of a close orbiter (JGO). Compared to the expected flux in the ambient Jovian Belt, a decrease of the radiations doses by 50-70% is predicted for orbits at 200km, consistant with observations of Galileo during Ganymede flybys.