

Stellar CME activity - an important factor for evolution of 'Hot Jupiters'

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Atmospheric erosion due to CME-caused ion pick-up is investigated here for the case of short periodic gas giants (so-called "Hot Jupiters") orbiting close to a star. To study the effects of encountering CMEs produced on the magnetospheres and atmospheres of "Hot Jupiters", we model possible interaction of a dense CME plasma with the exoplanet HD209458b, which orbits a Sun-like star at a distance of about 0.045 AU. A numerical hydrodynamic model is applied for calculation of the upper atmospheric density and the hydrogen wind of HD209458b as a function of planetocentric distance. Taking into account the similarity between the host star of HD209458b and our Sun, we use for the study of the ion production and loss rate of H⁺ ions the parameters of solar CME plasma and apply a numerical test particle model. Tidal-locking of short periodic exoplanets at close orbital distances to their host stars should result in weaker intrinsic planetary magnetic moments, as compared to those of the fast rotating Jupiter type planets at much larger orbits. It is shown that in this case the encountering CME plasma can compress the magnetospheric standoff distance of short periodic "Hot Jupiters" down to the heights at which the ionization and pick-up of the planetary neutral atmosphere by the CMEs plasma flow takes place. Assuming for the host star of HD209458b the same CME occurrence rate as on the Sun, we estimate possible total mass loss rates of HD209458b due to its collisions with CMEs over the planet lifetime. It has been found that for different estimations of the value of a planetary magnetic moment, HD209458b could have lost over its lifetime the mass from 0.2 up

to several times of its present mass.