



On the formation and loss of exospheres of short-periodic exoplanets

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The formation of planetary atmospheres and the subsequent thermal loss processes are investigated. We estimate an exosphere formation time which depends on the protoplanetary nebula conditions. In an undisturbed cosmic environment, the formation time for a planetary exosphere ranges between 30 and 180 Myr. This time can be seen as the starting point for atmospheric mass loss. Since the high-energy radiation from the host star is most intense during these early stages, the exosphere formation time is a crucial parameter for the atmospheric evolution of close-in exoplanets around G stars. For a Jupiter-mass planet at 0.02 AU and an exosphere formation time of 30 Myr, 23 % of these planets might be evaporated over 4 Gyr, while this value decreases to 5 % for an exosphere formation time of 180 Myr. The corresponding values for a Neptune-mass planet are 45 % and 17 %, respectively. We apply our approach to an initial mass distribution following an M^{-1} dependence and found that it is consistent with the observed mass distribution of close-in gas giants. Additionally, the influence of different star formation environments on the final mass distribution is discussed.