A hydrogenic molecular atmosphere of the neutron star 1E1207.4-5209

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A model of a hydrogenic content in the atmosphere of the isolated neutron star 1E1207.4-5209 is proposed. It is based on the assumption that the main component in the atmosphere is the exotic molecular ion H_3^{2+}, which is the most stable hydrogenic ion at $B > 10^{13}$ G. The magnetic field distribution is assumed to be of a dipole type varying from $(4 \pm 2) \times 10^{14}$ G to $\approx 10^{11}$ G. The density of H_3^{2+} is the highest in the domain of strongest magnetic fields while the density of electrons is the highest in the domain of weakest magnetic fields. Photoionization $H_3^{2+} \rightarrow e + 3p$ and photodissociation $H_3^{2+} \rightarrow H + 2p$ at $(4 \pm 2) \times 10^{14}$ G, and the lowest electronic cyclotron transition energies at 10^{11} G correspond to two absorption features at 0.7 keV and 1.4 keV, respectively. These features were discovered by the *Chandra* observatory (Sanwal et al. 2002) and confirmed by the *XMM-Newton* (Bignami et al. 2003). The model predicts another absorption feature at 80-150 eV which corresponds to photodissociation $H_3^{2+} \rightarrow H_2^{+} + p$.