Radiative and Three-body Recombination in Cold and Ultracold Rydberg Plasmas

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Radiative recombination, three-body recombination and radiative cascade will be discussed. The usual detailed-balance relation used to calculate the rate of three-body collisional capture into Rydberg state n, ℓ from the rate of collisional ionization of Rydberg state n, ℓ is appropriate only when there is a Maxwellian velocity distribution of electrons in the continuum at temperature T. We shall present the recombination rate appropriate to arbitrary velocity distributions of electrons and the consequent detailed balance relation with the ionizatioin cross section. We shall also present a classical theory of radiative cascade and show that it is highly accurate over all ℓ states. A classical theory of radiative recombination will also be presented.