

Abstract Submitted
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Remarkable Rise in Electron-Ion Recombination of O II for Low Temperature Nebular Plasmas¹ SULTANA NAHAR, Ohio State U, ANIL PRADHAN, Ohio State U — Recombination is dominant in cooler nebular plasmas and recombination lines (RCL) of O II are commonly detected. Collisionally excited lines (CEL) are also common. But a longstanding discrepancy of lower and higher oxygen abundance exists predicted from the RCL and CEL respectively. This is a puzzle since existent atomic parameters for O II are known to be accurate. We have studied the low energy photoionization and low temperature recombination of O II using the unified method based on relativistic Breit-Pauli R-matrix method and close coupling approximation. We find that the fine structure effects in the low temperature region, studied for the first time, cause considerable enhancement in electron-ion recombination rates. The enhancement comes from the intense narrow resonances, allowed in fine structure but not in LS coupling approximation, in a small energy region right at the ionization threshold. Due to the small energy range that contains these resonances, experiment was unable to detect them. We will present detailed features and recombination rates at low temperature which are expected to narrow the gap of discrepancy in oxygen abundance in nebular plasmas.

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