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Coupled-cluster based R-matrix codes (CCRM): Recent developments[1] CHIRANJIB SUR, ANIL K. PRADHAN, The Ohio State University — We report the ongoing development of the new coupled-cluster R-matrix codes (CCRM) for treating electron-ion scattering and radiative processes within the framework of the relativistic coupled-cluster method (RCC), interfaced with the standard R-matrix methodology. The RCC method is size consistent and in principle equivalent to an all-order many-body perturbation theory. The RCC method is one of the most accurate many-body theories, and has been applied for several systems. This project should enable the study of electron-interactions with heavy atoms/ions, utilizing not only high speed computing platforms but also improved theoretical description of the relativistic and correlation effects for the target atoms/ions as treated extensively within the RCC method. Here we present a comprehensive outline of the newly developed theoretical method and a schematic representation of the new suite of CCRM codes. We begin with the flowchart and description of various stages involved in this development. We retain the notations and nomenclature of different stages as analogous to the standard R-matrix codes.

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