A computational study of Be$^{4+} + \text{H}(1s)$ and H(2s) collisions has been carried out. Two computational models have been employed: The Classical Trajectory Monte Carlo (CTMC) method and the numerical solution of the Time-Dependent Schrödinger Equation (GTDSE). The integral $n$ and $nl$ partial cross sections for H excitation and electron capture, obtained with both methods, will be compared for both systems.

In the case of H(2s), we will compare our results at two energies: 20 and 100 keV/u. It will be shown that the CTMC, with an improved hydrogenic initial distribution, provides excitation cross sections in good agreement with the numerical calculation for excitation to H($n$) with $n > 3$. The agreement between the corresponding $nl$ partial cross sections from both methods is less satisfactory at 100 keV/u. The electron capture cross sections calculated with the CTMC method do not depend on the initial distribution and show a reasonable agreement with the GTDSE ones, which supports the use of the CTMC method to calculate electron capture cross sections into highly excited levels and total cross sections.

Similarly, integral $n$ and $nl$ partial cross sections obtained with both methods for the case of Be$^{4+} + \text{H}(1s)$ will be shown. Classical total ionization cross sections will be also presented for both systems.