The muoniated ethyl radical was studied in supercritical carbon dioxide. The Hyperfine coupling constants were measured over a range of temperatures from 305 K to 475 K, with the density of CO$_2$ being held constant at 0.25, 0.42 and 0.7 (g/cm$^3$). The system was modeled with DFT calculations at UB3LYP level and with 6-311++g(2df,p) basis set for optimization, frequency calculations and for single point calculations. There is a decrease in the hyperfine coupling constants as a function of density. This can be attributed to the interaction between the CO$_2$ molecule and the p-orbital of the ethyl radical generated from the addition of muonium. This effect also has an effect on the values associated with the hyperfine coupling constants associated with the $\alpha$-proton and $\beta$-proton.

Fig. 1: reaction scheme for addition of muonium to ethane.