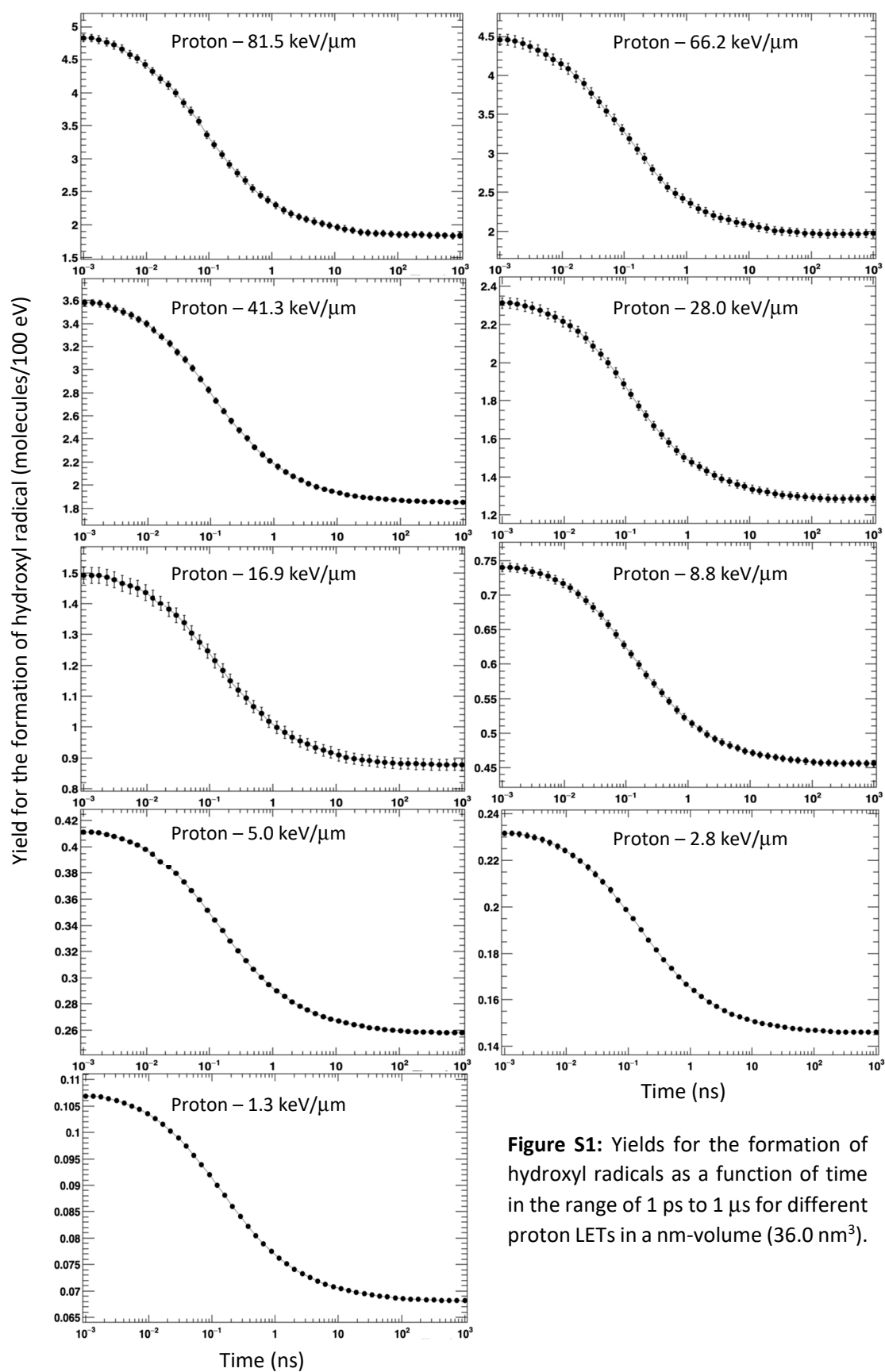# Supplemental Materials

Figure S1: Yields for the formation of hydroxyl radicals as a function of time in the range of 1 ps to 1 μs for different proton LETs in a nm-volume (36.0 nm³).
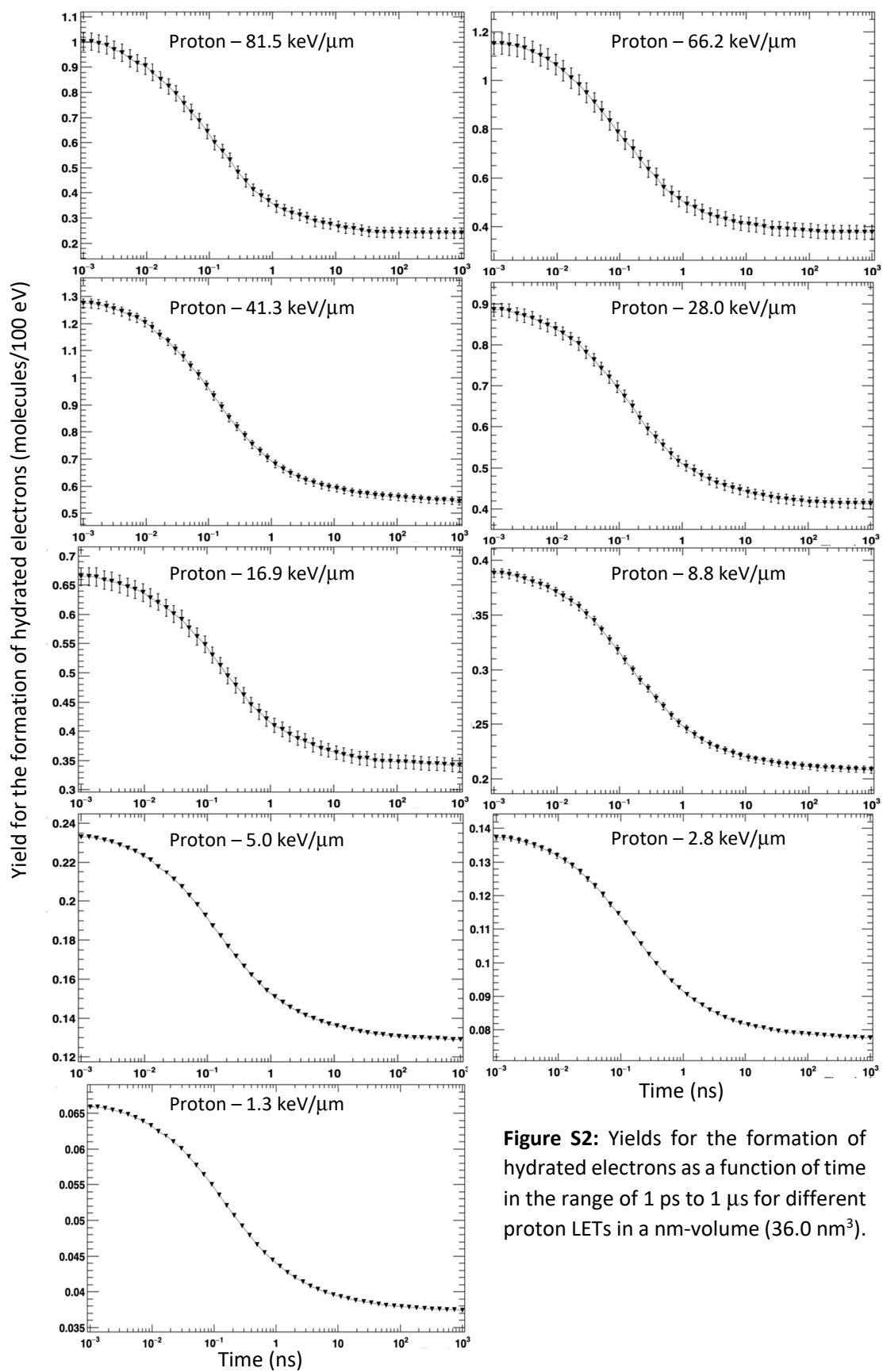
Figure S2: Yields for the formation of hydrated electrons as a function of time in the range of 1 ps to 1 μs for different proton LETs in a nm-volume (36.0 nm^3).
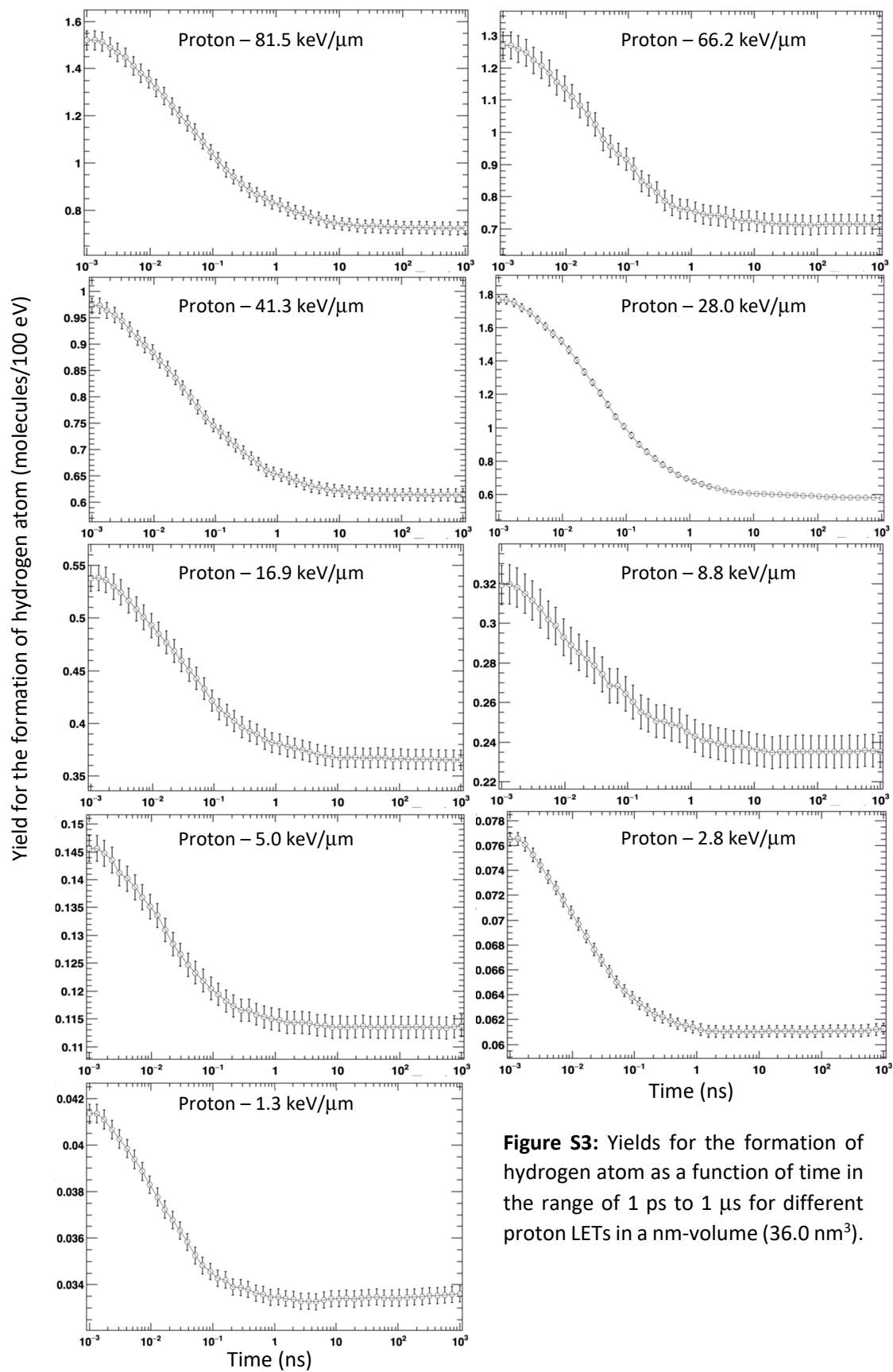
Figure S3: Yields for the formation of hydrogen atom as a function of time in the range of 1 ps to 1 µs for different proton LETs in a nm-volume (36.0 nm^3).
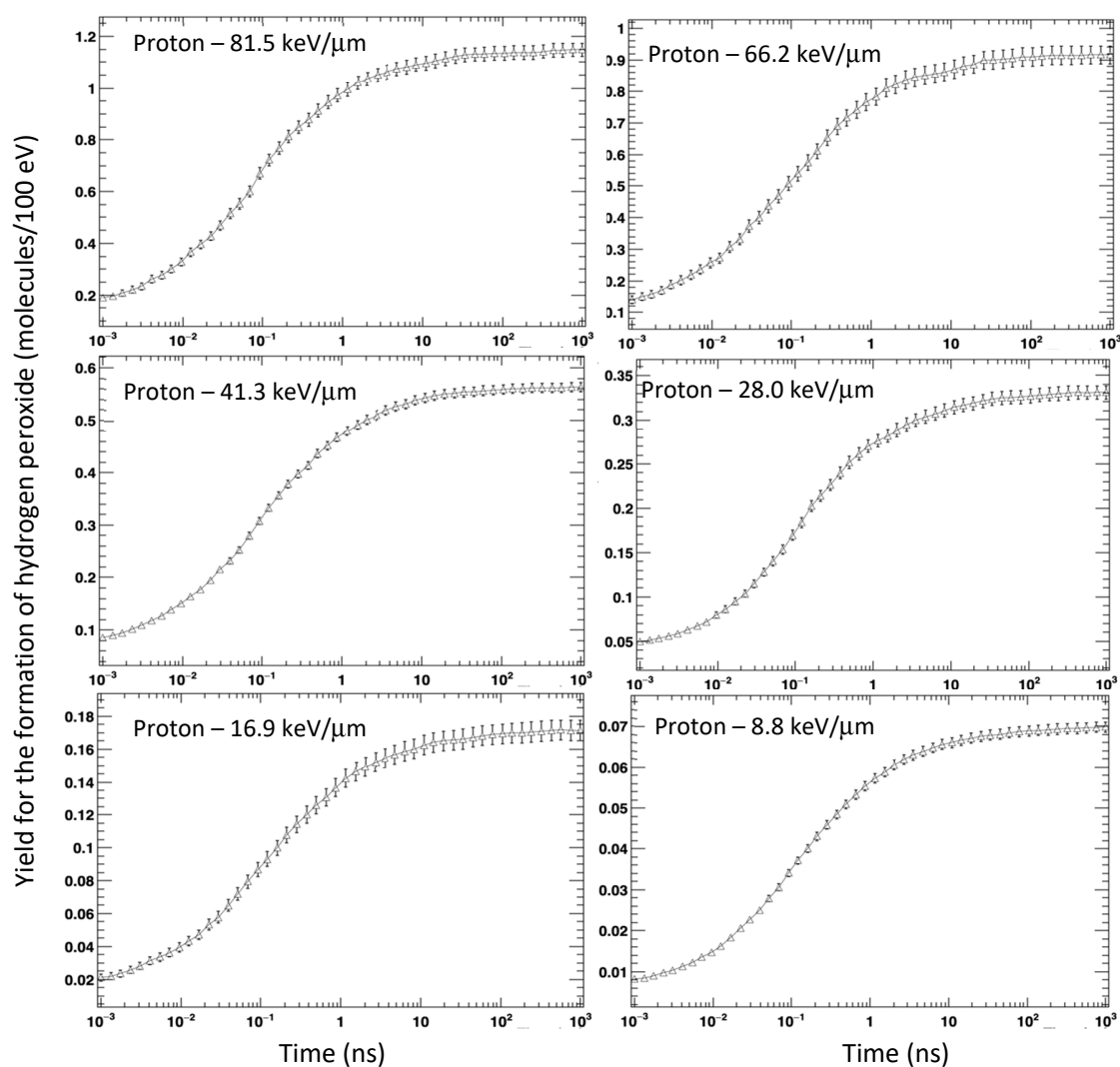
Figure S4: Yields for the formation of hydrogen peroxide as a function of time in the range of 1 ps to 1 μs for different proton LETs in a nm-volume (36.0 nm^3).
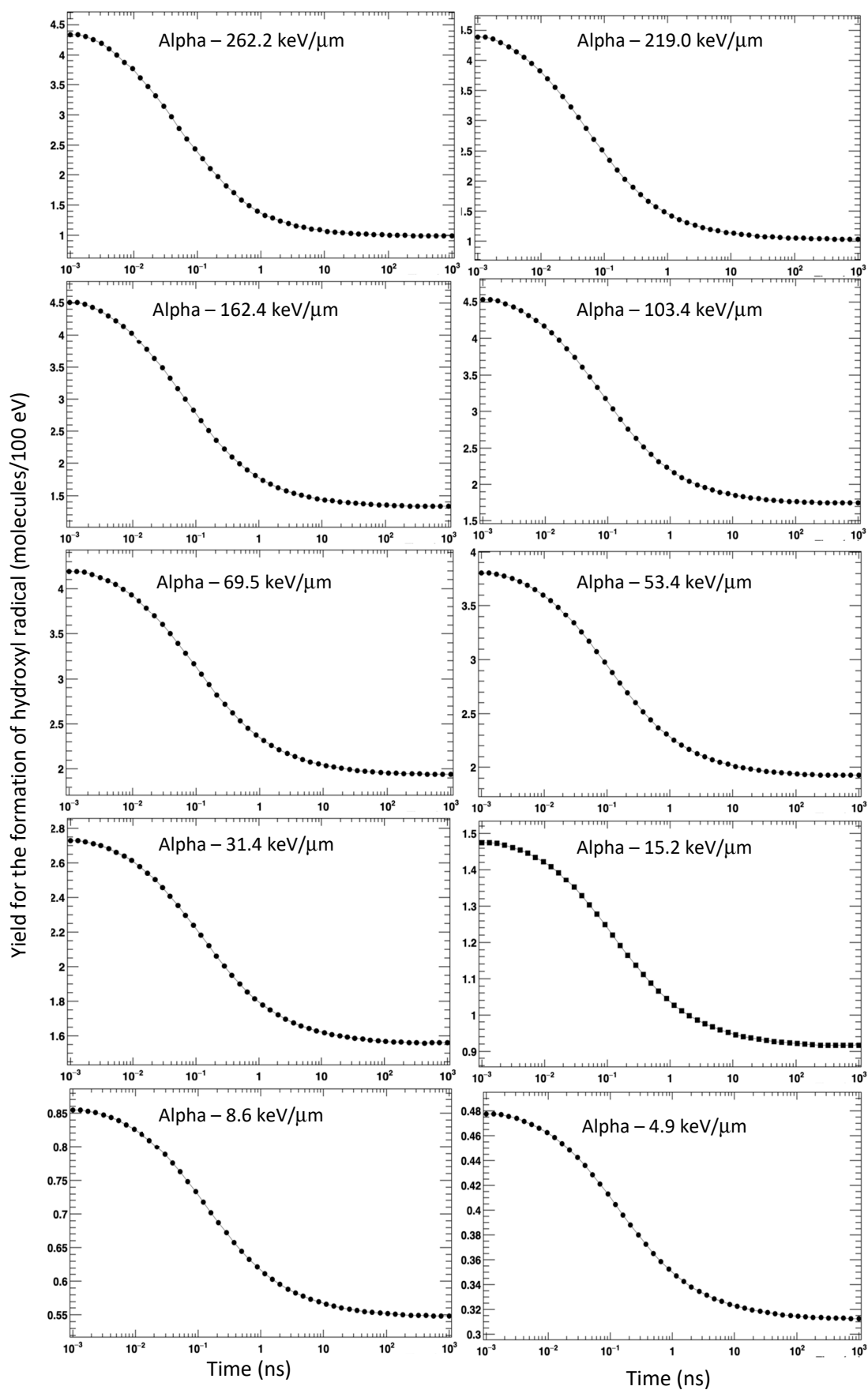
Figure S5: Yields for the formation of hydroxyl radicals as a function of time in the range of 1 ps to 1 μs by alpha particle at different LETs in a nm-volume (36.0 nm³).
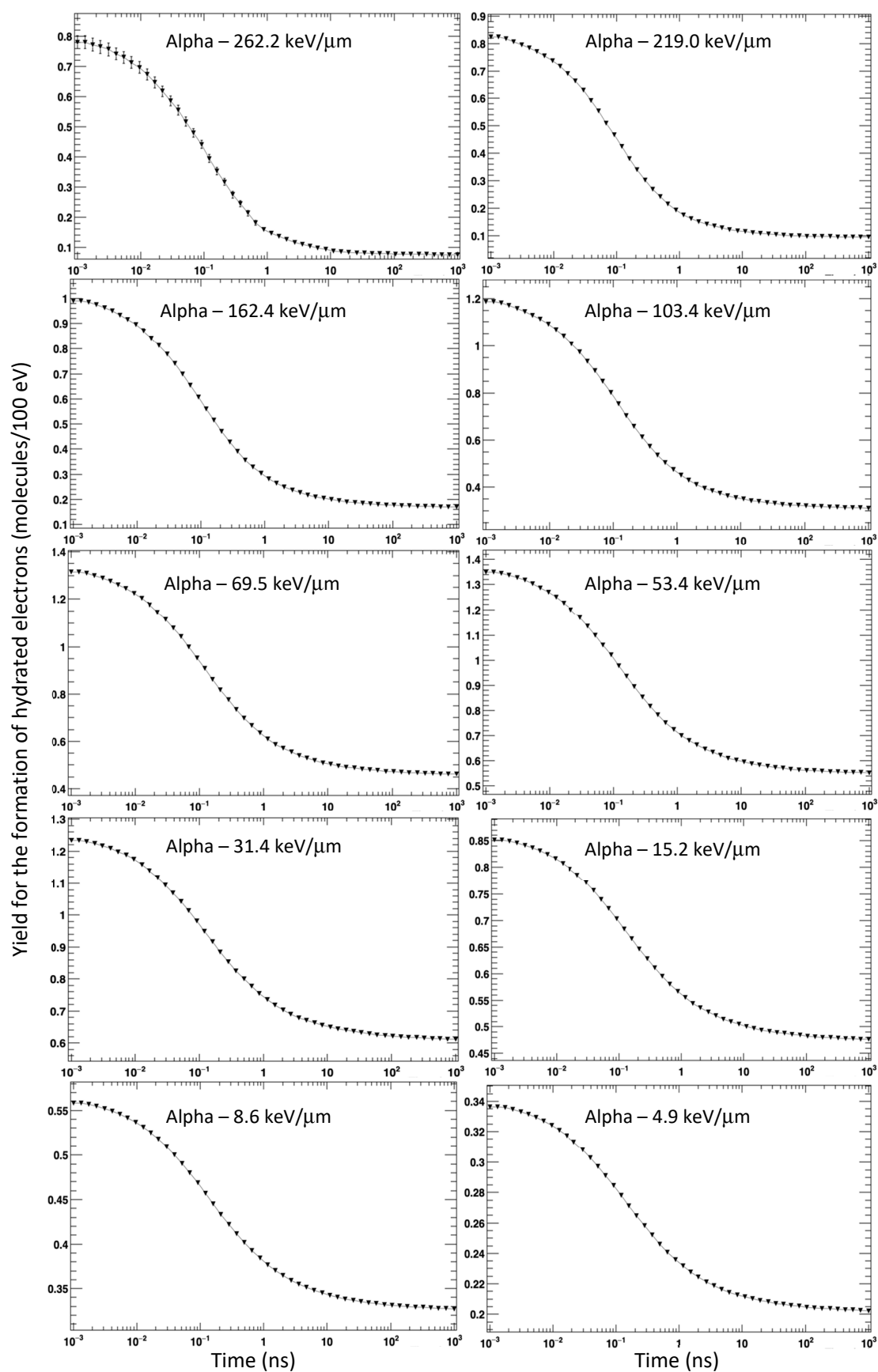
Figure S6: Yields for the formation of hydrated electrons as a function of time in the range of 1 ps to 1 μs by alpha particle at different LETs in a nm-volume (36.0 nm³).
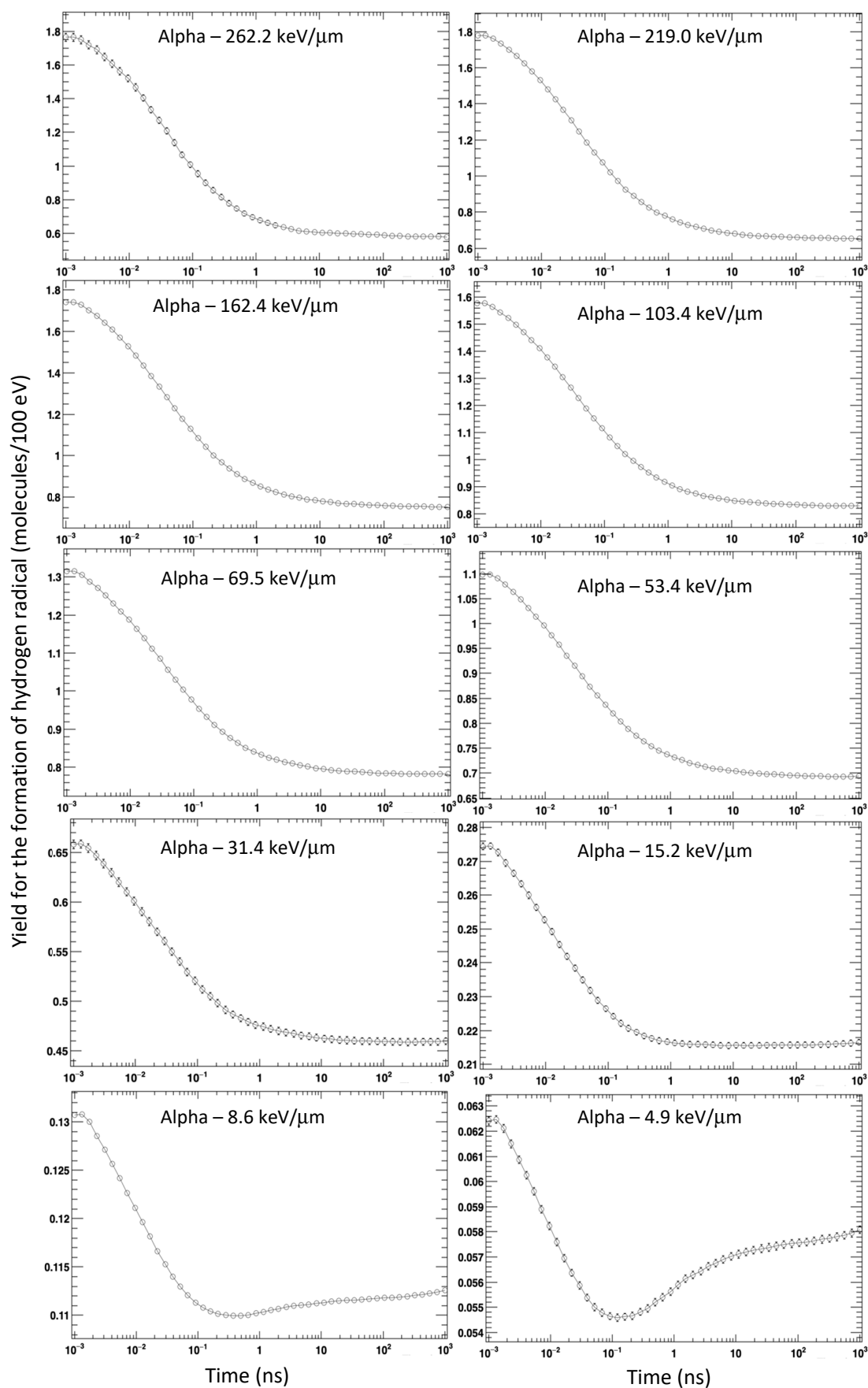
Figure S7: Yields for the formation of hydrogen radical as a function of time in the range of 1 ps to 1 µs by alpha particle at different LETs in a nm-volume (36.0 nm³).
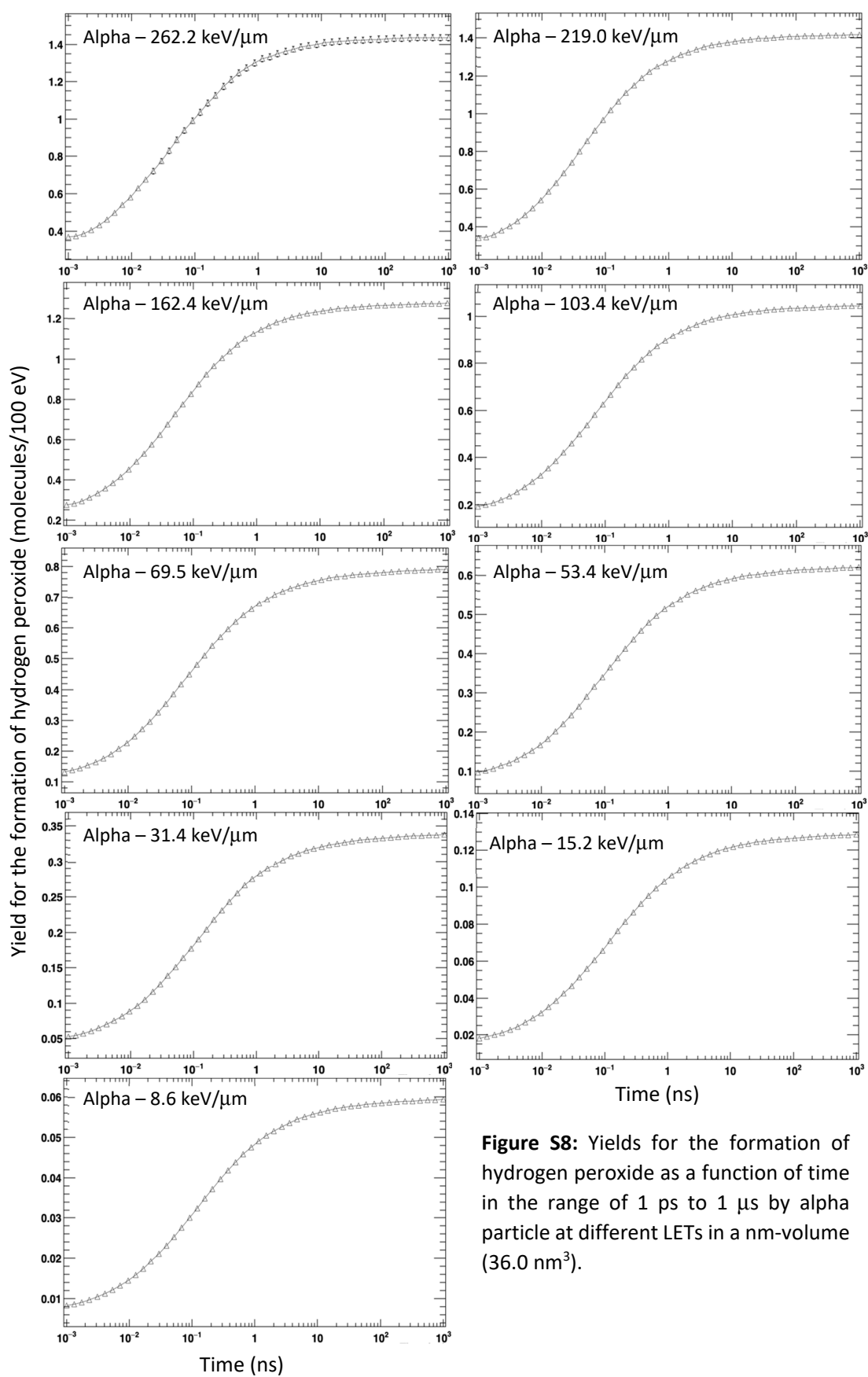
Figure S8: Yields for the formation of hydrogen peroxide as a function of time in the range of 1 ps to 1 µs by alpha particle at different LETs in a nm-volume (36.0 nm³).