We report the results of $\mu$SR study of thiospinel CuCrZrS$_4$, which shows intriguing magnetic properties, such as ferromagnetic, $T_C \approx 60$ K, and re-entrant spin-glass, $T_f \approx 10$ K, behavior [1], and a large negative magnetoresistance [2].

In the first magnetic phase between $T_f$ and $T_C$, no oscillations are shown in the time spectrum. When we apply a stretched exponential form to analysis of the zero-field spectrum, the exponent $\beta$ is found to be decreased from $\beta \sim 1$ above $T_C$ to $\beta \sim 0.5$ at $T_f$. In a longitudinal magnetic field dependence of the spectrum, a residual relaxation is observed even at high magnetic fields. These results indicate a development of unhomogeneous and dynamical internal fields due to short-range and/or partial ferromagnetic ordering below $T_C$. Around $T_f$, the relaxation rate of the muon depolarization is increased rapidly with the decrease of the temperature, implying a slowing down of fluctuating moments. We will discuss frustrate and/or competitive correlation of ferro- and antiferromagnetic interactions in this compound from the microscopic viewpoint.

Fig. 1: Temperature dependence of the ZF-$\mu$SR spectra.