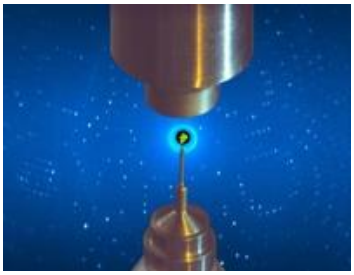

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Neutron Scattering Experiments and Multi-Scale Simulations Reveal Dynamical Properties of the Bacterial Cytoplasm Near Cell-Death Temperature

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Life on Earth exhibits an amazing adaptive capacity to a vast range of temperatures. While the molecular mechanisms underlying such adaptability are not yet fully understood, it has been proposed that the temperature of cellular death coincides with a catastrophic denaturation of the proteome. Here we combine incoherent quasi-elastic and elastic neutron scattering experiments with multi-scale molecular dynamics simulations to describe the dynamical features of the proteins in the *E. Coli* cytoplasm when approaching thermal denaturation, and to characterize distinct contributions to their pico- to nanosecond dynamics. Moreover, we test the validity of the Lindemann criterion —linking structural fluctuations and melting —in cell-like conditions. Our results allow us to rationalize the existence of a specific dynamical regime revealed by neutron scattering experiments to be a general signature around cell-death temperature.

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