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Abstract for an Invited Paper
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Lars Onsager Prize Lecture: Statistical Dynamics of Disordered Systems

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The properties of many systems are strongly affected by quenched disorder that arose from their past history but is frozen on the time scales of interest. Although equilibrium phases and phase transitions in disordered materials can be very different from their counterparts in pure systems, the most striking phenomena involve non-equilibrium dynamics. The state of understanding of some of these will be reviewed including approach to equilibrium in spin glasses and the onset of motion in driven systems such as vortices in superconductors or earthquakes on geological faults. The potential for developing understanding of short-term evolutionary dynamics of microbial populations by taking advantage of the randomness of their past histories and the biological complexities will be discussed briefly.