Abstract Submitted
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Plastic flow of polycrystalline materials JAMES LANGER[1], University of California, Santa Barbara — Leo Kadanoff had a long interest in fluid flows, especially fingering instabilities. This interest was one example of his insatiable curiosity about simple, fundamentally important, and often multidisciplinary phenomena. Here is an example of another class of such phenomena that I had hoped to show him this year. The experts in polycrystalline solid mechanics have insisted for decades that their central problem – dislocation-mediated strain hardening – is intrinsically unsolvable. I think they're wrong. My colleagues and I have made progress recently in theories of both amorphous and polycrystalline plasticity by introducing an effective disorder temperature as a dynamical variable in our equations of motion. In this way, we have been able to describe how the densities of flow defects or dislocations evolve in response to external forcing, and thus to develop theories that promise to become as predictive, and full of surprises, as the laws of fluid flow.

[1]For Kadanoff session

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