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The three-dimensional Edwards-Anderson spin glass in an external magnetic field[1] DAVID YLLANES, Univ of Rome La Sapienza, JANUS COLLABORATION — Spin glasses are a longstanding model for the sluggish dynamics that appears at the glass transition. However, in order for spin glasses to be a faithful model for general glassy physics, we need to introduce an external magnetic field to eliminate their time-reversal symmetry. Unfortunately, little is known about the critical behavior of a spin glass in a field in three spatial dimensions. We have carried out a dynamical study combining equilibrium and non-equilibrium data. In particular, using the Janus computer, we have been able to simulate one thousand samples, each with half a million spins, along a time window spanning ten orders of magnitude for several magnetic fields and temperature protocols. Our main conclusion is that the system has a clearly identifiable dynamical transition, which we discuss in terms of different possibilities for the underlying physics (from a thermodynamical spin-glass transition to a mode-coupling crossover). In fact, we are able to make quantitative connections between the Edwards-Anderson spin glass and the physics of supercooled liquids. We also discuss ongoing work in equilibrium from parallel tempering simulations.

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