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Experimental realization of the zero temperature Random Field Ising Model : the condensation of ^{4}He in aerogels[1] GEOFFROY AUBRY, LAURENT GUYON, MATHIEU MELICH, PANAYOTIS SPATHIS, Institut Néel, CNRS/UJF, Grenoble, FRA, FLORENCE DESPETIS, Laboratoire Charles Coulomb, CNRS/UM2, Montpellier, FRA, PIERRE-ETIENNE WOLF, Institut Néel, CNRS/UJF, Grenoble, FRA — Although widely studied, the effect of disorder on a first order phase transition is still highly debated. Numerical simulations of the $T = 0$ Random Field Ising Model show that magnetization evolves by avalanches, the average size of which diverges below a critical disorder (Sethna et al., PRL 70 3347 (1993)). Nevertheless, experimental evidence is scarce up to now (Berger et al., PRL 85, 4176 (2000)). In the case of the liquid gas transition in disordered porous media, the same theoretical concepts can be applied (Detcheverry et al., PRE 72 051506 (2005)). We have studied experimentally this phase transition using ^{4}He in silica aerogels. Optical and thermodynamical measurements show that the condensation is an out of equilibrium process. We clearly observe two filling regimes separated by a critical temperature T^* : below T^*, filling is discontinuous (macro avalanche) whereas above T^* it becomes continuous (micro avalanches). In addition, we have developed a speckle interferometry technique to detect single avalanches. We argue that our results support the disorder induced phase transition.

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