Dynamic Frustration in PrAu$_2$(Si$_{1-x}$Ge$_x$)$_2$ 

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EUGENE GOREMYCHKIN, Argonne National Laboratory, BRIAN RAINFORD, University of Southampton, UK, ROBIN MACALUSO, University of Northern Colorado, D.T. ADROJA, Rutherford Appleton Laboratory, UK, MAREK KOZA, Institut Laue Langevin, France — We have recently proposed that frustration is dynamically induced in the spin glass, PrAu$_2$Si$_2$, a singlet ground state system, in which the interionic exchange is just sufficient to induce a magnetic moment. The degree of static disorder is far too small to produce spin glass freezing but dynamic fluctuations can destabilize the induced moments and frustrate the long-range magnetic correlations. We have studied the crystal field excitations in PrAu$_2$(Si$_{1-x}$Ge$_x$)$_2$, for which long-range order is stabilized at $x \approx 12\%$. The excitation energy is independent of $x$ but inhomogeneous broadening increases linearly for $x < 0.2$, i.e., long-range order is stabilized even though static disorder is increasing. Tuning the dynamic frustration with concentration or pressure could provide a test of the concept of “avoided criticality” in glassy systems.

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