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Evidence for Highly Correlated Electron Behavior in Dy under Extreme Compression Resulting in Strongly Enhanced Magnet Interactions[1] JAMES SCHILLING, JINHYUK LIM, Washington University in St. Louis, GILBERTO FABBRIS, Argonne National Lab/Washington University in St. Louis, DANIEL HASKEL, Argonne National Lab — Most lanthanide metals have stable, highly localized $4f$ magnetic moments, the magnetic ordering temperature T_o following standard de Gennes scaling. Under extreme pressure, however, the $4f$state of some lanthanides appears to become unstable, as evidenced by: (i) a volume collapse at a critical pressure P_{vc}, usually accompanied by a structural transition from high to low symmetry, (ii) strong deviations from de Gennes scaling in the pressure dependence of T_o, in particular, for Dy a dramatic increase in T_o above P_{vc}, (iii) very strong magnetic pair breaking by lanthanide impurities in a superconducting host. Here we discuss possible origins for these anomalous findings in light of our recent electrical resistivity and synchrotron spectroscopy experiments on selected lanthanides and their dilute magnetic alloys in a superconducting Y host.

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