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## Very Unusual Magnetic Properties in Multi-walled Carbon Mats

PIEDER BEELI, GUO-MENG ZHAO, Department of Physics and Astronomy, CSULA — We report magnetic measurements up to 1100 K on a multi-walled carbon nanotube mat sample using a Quantum Design vibrating sample magnetometer. In an ultra-low field (H = -0.02 Oe), we find a very large paramagnetic susceptibility (up to 12.7% of  $1/4\pi$ ) at 1100 K and a very large diamagnetic susceptibility (at least 8.4% of  $-1/4\pi$ ) at 482 K. A small magnetic field (2.1 Oe) completely suppresses the diamagnetic susceptibility at 482 K and reduces the paramagnetic susceptibility at 1100 K by a factor of over 20. We rule out explanations based on magnetic contaminants, instrument artifacts, and the orbital diamagnetism. The magnetic data are inconsistent with any known physical phenomena except for granular superconductivity. The present results suggest the existence of an unknown new physical phenomenon or superconductivity with an ultra-high transition temperature.

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