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## **Singlet-ground-state paramagnetic centers in CuO<sub>2</sub> layers as seen from Tm<sup>169</sup> NMR in TmBa<sub>2</sub>Cu<sub>3</sub>O<sub>6+x</sub> superconductors**

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### **Abstract**

The Tm<sup>169</sup> nuclear spin-lattice relaxation in oxygen-deficient TmBa<sub>2</sub>Cu<sub>3</sub>O<sub>6+x</sub> compounds, as quenched and room-temperature annealed, has been measured at low temperatures. The results are consistent with the existence of paramagnetic centers in the CuO<sub>2</sub> double layer, which have a nonmagnetic (singlet) ground state separated from an excited magnetic state by an energy gap of the order of 1 K. © 1995 The American Physical Society.

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