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# Is there a spontaneous ferroelectric phase transition in $0.83\text{PbMg}_{1/3}\text{Nb}_{2/3}\text{O}_3$ - $0.17\text{PbTiO}_3$ single crystal?

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**Abstract.** The macroscopic response of  $0.83\text{PbMg}_{1/3}\text{Nb}_{2/3}\text{O}_3$ - $0.17\text{PbTiO}_3$  (PMN-17PT) single crystals has been investigated in order to resolve existing controversy about the structural phase transition in the rhombohedral side of  $(1-x)\text{PbMg}_{1/3}\text{Nb}_{2/3}\text{O}_3$ - $x\text{PbTiO}_3$  phase diagram. The combination of nonlinear dielectric spectroscopy, temperature dependant polarization and strain hysteresis loop measurements and ultrasonic spectroscopy revealed that ferroelectric phase occurs spontaneously in PMN-17PT single crystals. The experimental techniques applied in this work probes the bulk sample and can unambiguously determine the existence of a spontaneous ferroelectric phase.

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