

## Ultrasonic investigations near the $B$ -induced quantum critical point of the triangular antiferromagnet $\text{Cs}_2\text{CuCl}_4$

B. Wolf, P. T. Cong, N. Krüger, F. Ritter, W. Assmus, and M. Lang

Physikalisches Institut, Goethe Universität, SFB/TR 49, Frankfurt, Germany

The quantum magnet  $\text{Cs}_2\text{CuCl}_4$  represents the spatially anisotropic version of a quasi-twodimensional triangular spin-1/2 Heisenberg antiferromagnet with moderate magnetic coupling constants. Of particular interest here are the anomalous physical properties which result from the interplay of strong quantum fluctuations and geometric frustration. Due to a weak interlayer coupling, long-range antiferromagnetic order occurs at  $T_N = 0.62$  K and  $B = 0$ . The antiferromagnetic order can be suppressed to  $T_N = 0$  in a magnetic field  $B_c \sim 8.5$  T ( $B||a$ ), which constitutes a quantum-critical point (QCP). Anomalous physical properties at finite temperatures are expected to be observed at  $B_c$  due to quantum-critical fluctuations. Here we present a detailed investigation of the longitudinal elastic constants  $c_{11}$ ,  $c_{22}$  and  $c_{33}$  together with the ultrasonic attenuation near the  $B$ -induced QCP. Distinct anomalies were found at  $B_c$ , which are particularly strongly pronounced in the ultrasonic attenuation. In isothermal field sweeps performed at low temperatures  $0.3$  K  $\geq T \geq 0.032$  K and around  $B_c$ , the ultrasonic attenuation of the all three modes exhibits a pronounced double structure, indicating two anomalies of different origin. While one of them is very sharp, strongly temperature dependent and coinciding with  $T_N(B)$ , the other one is distinctly broader and located at slightly higher fields. Upon cooling both features merge and extrapolate to  $B_c$  for  $T = 0$ .