

1992

## Ultrasonic measurements in superconducting $UPt_3$

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Adenwalla, Shireen; Lin, S.-W.; Zhao, Z.; Ketterson, J. B.; Levy, M.; and Sarma, Bimal K., "Ultrasonic measurements in superconducting  $UPt_3$ " (1992). *Shireen Adenwalla Papers*. 23.

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MONDAY AFTERNOON, 2 NOVEMBER 1992

BAYOU III, 1:00 TO 3:50 P.M.

**Session 3pPA**

**Physical Acoustics: Acoustics in Nonconventional Superconductors**

Moises Levy, Cochair

*Physics Department, University of Wisconsin—Milwaukee, Milwaukee, Wisconsin 53201*

Bimal Sarma, Cochair

*Physics Department, University of Wisconsin—Milwaukee, Milwaukee, Wisconsin 53201*

**Chair's Introduction—1:00**

*Invited Papers*

**1:05**

**3pPA1. Ultrasonic measurements in superconducting  $UPt_3$ .** S. Adenwalla (Dept. of Phys. and Astron., Northwestern Univ., Evanston, IL 60208), S.-W. Lin (Univ. of Wisconsin—Milwaukee, Milwaukee, WI 53201), Z. Zhao, J. B. Ketterson (Northwestern Univ., Evanston, IL 60208), M. Levy, and Bimal K. Sarma (Univ. of Wisconsin—Milwaukee, Milwaukee, WI 53201)

Ultrasonic measurements on the heavy fermion superconductors have proved a useful tool in elucidating the nature of the superconducting state. Earlier measurements of sound attenuation in superconducting

UPt<sub>3</sub> showed power-law temperature dependences (rather than an exponential temperature dependence as expected for a BCS type superconductor), indicating the presence of nodes in the gap. Subsequent ultrasonic measurements have shown indications of phase transitions within the superconducting state. In particular, these ultrasonic velocity measurements show the presence of three superconducting phases in the mixed state. The size of the velocity jump can be related to the heat capacity jump. Further, using a thermodynamic analysis it is possible to deduce the order of the phase transition lines. [Work at NU supported by NSF, and the work at UWM supported by ONR.]

3p MON. PM