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Gigahertz ultrasonic interferometry at high pressure and temperature: Geophysical implications

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High-frequency acoustic interferometry is widely used to penetrate a medium and measure the reflection signature, which can reveal details about the inner structure of the medium. It's a very helpful and one of the most accurate techniques for determination elastic properties of different materials being capable to measure sound wave velocities in very small samples under high pressures. The ultrasonic interferometry system operating at 0.6-2.1 gigahertz (GHz) frequencies was developed in the Bavarian Geoinstitute of the University of Bayreuth for in situ high pressure and temperature experiments. High pressures are reached by using diamond anvil cell, and a Pt-resistive heater allows reaching high temperatures. The experimental setup is equipped with a laser system, which allows measuring a shift of ruby fluorescence line at every given temperature.