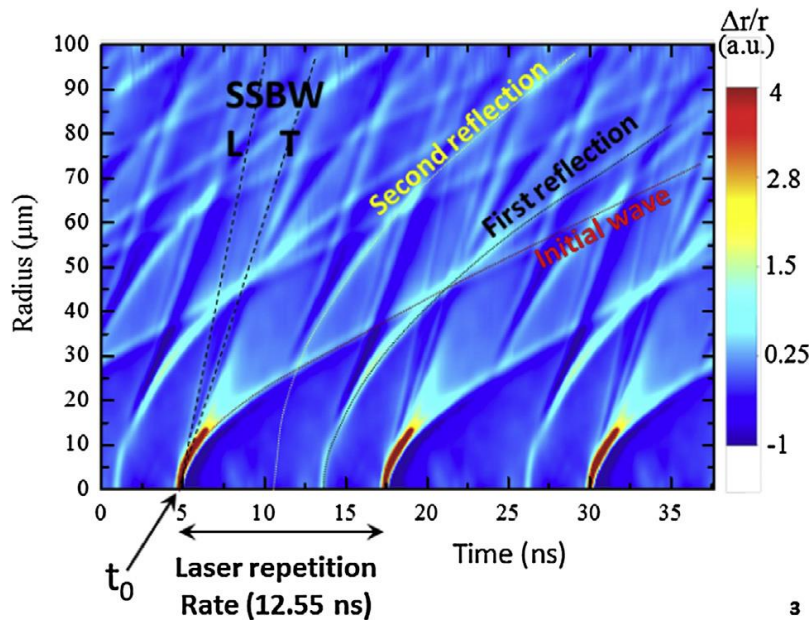


1. Diamond anvil measurements

Decremps, Ultrasonics 2015, measured sound propagation through a metal in a diamond anvil, the results are presented in the following figure. What is the speed of sound, and based on that, what is the metal?



2. Non-linear phononics

Calculate T_{nl} , T_{prop} , T_{disp} and T_{att} for a non-linear pulse traveling through 240 μm of sapphire ($C_{NL} = -18.5 \times 10^{11} \text{ N/m}^2$, $\mu/2 \cdot \rho = 6.3 \times 10^{-2} \text{ nm}^2/\text{ps}$).

3. Non-linear phononics

What is the minimum strain amplitude for non-linear behavior in sapphire (you can assume $z_0 = 25 \text{ nm}$)?

4. Ultrafast ultrasonics of mechanical contacts

Read the paper by Dehoux *et al.* (Ultrasonics 50, 2010, pp. 197- 201) and describe the main experimental methods and their main result.