



MAFIA - the seminar you can't refuse

Studying Crystal Acoustics Using Lasers – Recent Progress

Hanuš Seiner

Institute of Thermomechanics, Czech Academy of Sciences

April 7, 2026

12:00–13:00

in T212

Fakulta jaderná a fyzikálně inženýrská ČVUT, Trojanova 13, 12000 Praha

Abstract: Laser-ultrasonic (LU) methods are experimental techniques utilizing laser beams for generation and detection of ultrasonic waves and vibrations. These methods, thus, enable characterization of mechanical properties of solids without mechanically touching them. During the past two decades, several unique LU experimental arrangements have been developed at the Institute of Thermomechanics, among which LU measurements of anisotropic acoustic properties of single crystals have achieved particular recognition. The lecture will present two our recent advancements in this direction: reaching Weyl's asymptotic behavior in resonant ultrasound spectroscopy, and detecting ultra-transient oscillations in transient-grating experiments. Both these advancements have close relations to mathematical foundations of elastodynamics. In the former, we observe statistics of several hundreds of experimentally obtained eigenvalues and eigenvectors of an operator representing a freely vibrating single crystal; in the latter, we obtain a direct visualization of Green's function for a hyperbolic differential operator representing elastodynamics of a free surface.