

**The
53rd**

GRC INTERNATIONAL FRONTIER SEMINAR

**Title: Sound Velocities by Single-crystal Brillouin Spectroscopy
with Laser Heating and Variable q :
Design and Results on Olivine**

Speaker: Prof. Jay Bass

COMPRES and University of Illinois Urbana-Champaign, USA

Date: 6.1.2015 (Mon.) 16:30 – 18:30

Venue: Meeting Room #486, Science Research Bldg 1, Ehime Univ

Brillouin scattering is a light scattering technique for measuring sound velocities of minerals. We have developed a novel Brillouin spectroscopy system integrated with CO₂ laser heating and Raman spectroscopic capabilities (Jin Zhang, PhD thesis 2014). High-pressure laser heating experiments on water compressed in a diamond-anvil cell up to 2500 ± 150 K demonstrate the flexibility and performance of the system. Temperature is determined from the grey-body thermal radiation of heated samples. New single-crystal laser heating Brillouin measurements were made on San Carlos Olivine in the (111) plane at pressures up to ~ 13 GPa, and $T \sim 1300 \pm 200$ K. We obtain quantitative values for the thermal pressure in the diamond cell. Using KCl and KBr and pressure-transmitting media, we show that pressure gradients in the sample chamber are small at high P-T conditions based on observations of the olivine-wadsleyite transition. This system is also designed for continuously varying scattering angles from near forward scattering (0° scattering angle) up to near back scattering ($\sim 141^\circ$). Our results on the sound velocities of olivine at high pressure-temperature conditions have implications for the nature of the 410 km discontinuity and composition of the transition zone.