# HyPhI Colloquium

Date: **5 Jan 2024, Friday**
Time: **16:00 Hrs (Tea / Coffee 15:45 Hrs)**
Venue: **TIFRH Auditorium**

Title: **Generation of high-energy mid-infrared and UV pulses for X-rays and attosecond science**

Speaker: **Dr. Krishna Murari Agarwal,** Staff Scientist SLAC National Accelerator Laboratory, Stanford University, USA

Abstract:

With the recent Nobel Prizes in Physics awarded in the field of lasers, demand for ultrafast intense laser research is at an all-time high due to their peak intensities reaching from several terawatt to petawatt regime. These laser pulses have opened the door for the study of previously inaccessible several natural phenomena that occur in the time scale of sub-femtosecond (fs) to attosecond (as) regime. Conventionally, coherent extreme ultraviolet (EUV) or X-rays generated by Free Electron Lasers (FELs) have been an important tool for the study of these exotic phenomena in nature. Recently, Stanford National Accelerator Laboratory (SLAC) upgraded its Linear Coherent Light Source (LCLS) from LCLS I to LCLS II ramping up its repetition rate from 120 Hz to 1 MHz. Photoinjector Deep-UV Laser is one of the crucial elements of such a facility. Due to its large infrastructure and high cost of operation, these facilities remain inaccessible to many researchers around the world. In the last decade, Ti: Sapphire-based chirped pulse amplifier lasers centred at 800 nm have been extensively used to generate coherent X-rays by driving the process of high-harmonic generation (HHG) in atoms. Recently, the pulse duration of these X-rays emitted has reached the world record of 43 as and energy of few hundreds of eV. However, it has been demonstrated that by driving the HHG process by long-wave mid-infrared laser, XUV pulses of several keVs can be achieved. Our group at CREOL has been trying to push the frontiers for the generation of the attosecond X-ray pulses in the multi-keV regime. The talk will be focussed on the development of few-cycle mid-infrared lasers for driving HHG in atoms for the generation of keV coherent X-rays and introduction to the recent upgrade to SLAC's Photoinjector Laser for the MHz operation of the LCLS II.