



Contribution ID: 4

Type: **not specified**

Title: Spectroscopic Real Time Temperature Diagnostic for Laser Heated Thin Gold Foils

Wednesday 27 October 2021 12:00 (25 minutes)

In the past four years we have investigated gold ion acceleration at the Texas Petawatt laser (Austin, Texas with a pulse length of 110 fs) and the GSI PHELIX laser in Darmstadt (with a pulse length of 500 fs) [1,2] in the context of developing the novel ‘fission-fusion’ nuclear reaction mechanism [3]. In order to allow for efficient heavy-ion acceleration with kinetic cutoff-energies above 5 MeV/u (finally aiming at 7-10 MeV/u), targets were preheated in order to clean the surface by evaporating surface contaminants like hydrogen and carbon. This had varying effects on the cutoff energy of accelerated ions, suspected to correspond with laser pulse length. We have constructed a target preheating system and algorithm to accurately measure in real time the temperature of gold targets in vacuum at the Center for Advanced Laser Applications (Garching, laser pulse length 25 fs) to assess the relationship between target preheating and gold ion acceleration for a short pulse laser [4]. By heating the target (typical diameter 1.5 mm, thickness between 250 nm and 400 nm) with a 3 W cw 532 nm Nd:YAG laser and measuring the thermal infrared spectrum emitted from the target with a NIR spectrometer, the algorithm subsequently fitted Planck’s radiation law to the thermal spectrum, thus allowing to determine the target temperature. With this, gold targets were already successfully heated up close to their melting point (1064 °C).

Primary authors: Ms FITZPATRICK, Erin Grace (LMU Munich); GEULIG, Laura Desiree (LMU Munich)

Co-authors: Mr WEISER, Maximilian (LMU Munich); Dr LINDNER, Florian H. (LMU Munich); Prof. THIROLF, Peter G. (LMU Munich)

Presenters: Ms FITZPATRICK, Erin Grace (LMU Munich); GEULIG, Laura Desiree (LMU Munich)

Session Classification: High repetition rate techniques