

Collaboration between CTU in Prague and Università degli Studi di Milano - Bicocca

SILMI Reference Number 3018

Purpose of the visit:

The main purpose of this short visit is to further broaden existing collaboration between the *Czech Technical University in Prague* (Prof. Milan Kalal) and *University of Milan* (Prof. Dimitri Batani) in the field of high power laser applications. Several special topics will be dealt with: (i) Consultations to *complex interferometry* (CI) and its application to laser produced plasma diagnostics (*plasma density* and spontaneously generated *magnetic field* profiles). Reading lecture about principles of CI and *Abel inversion* algorithms and practical demonstration of special software for analysis of complex interferograms; (ii) Presentation of special Fresnel biprism based Nomarski interferometer *compact* design suitable for recording of complex interferograms and its application to measurement of spatial profiles of *deuterium clusters* and related Coulomb explosions (accompanied by production of fusion neutrons) after irradiation of these clusters by high intensity femtosecond lasers; (iii) Reading lecture about possible application of stimulated Brillouin scattering (SBS) based phase conjugating mirrors (PCM) for self-navigation of laser drivers on injected pellets. This technique removes any need for mechanical adjustment of *final optics* in inertial fusion energy (IFE) technology. This way much higher number of less energetic laser drivers can be employed resulting in easier construction of these drivers from the point of the necessary repetition rate (5-10 Hz) required by IFE applications. Discussions of HiPER relevant issues as contained in appropriate WPs as well as in connection with conclusions coming from the *7th Direct Drive and Fast Ignition Workshop* recently held in Prague in May 3-6, 2009.



Description of the work carried out during the visit:

1. Presented *lecture* about optical diagnostics of laser produced plasma using *complex interferometry* including the special Fresnel biprism based Nomarski interferometer *compact* design suitable for recording of complex interferograms (3 hours)
2. Presented *lecture* about self-navigation of laser drivers on IFE targets using stimulated Brillouin scattering (SBS) phase conjugating mirrors (PCM) (1.5 hours)
3. Presented *lecture* about FFT based algorithms for Abel inversion transformation (1.5 hours)

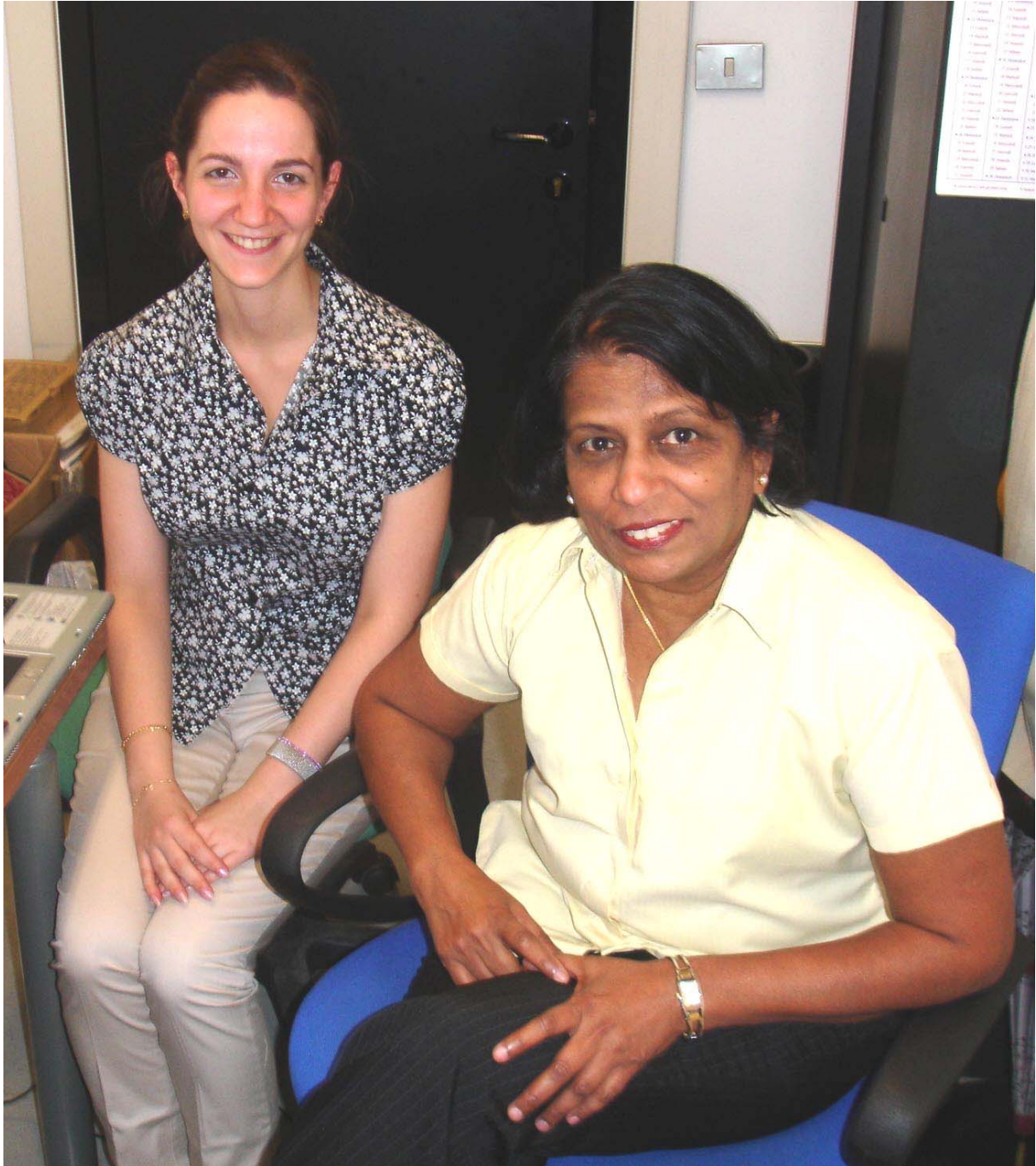


Description of the main results obtained:

1. Consultations to methodology of complex interferogram analysis using custom software (it will be used in bachelor thesis of UMB student Chiara Liberatore)
2. Discussions related to preparation of experiments for measurements of magnetic fields spontaneously generated in laser produced plasma (in cooperation with colleagues from University of Szeged - Hungary)

Future collaboration with host institution:

1. Agreement was made for visit of UMB student Chiara Liberatore to Prague (middle of August) for further consultations connected to her bachelor thesis
2. Invitation received for another visit of Prof. Milan Kalal to UMB during the last quarter of 2009 (~10 days)

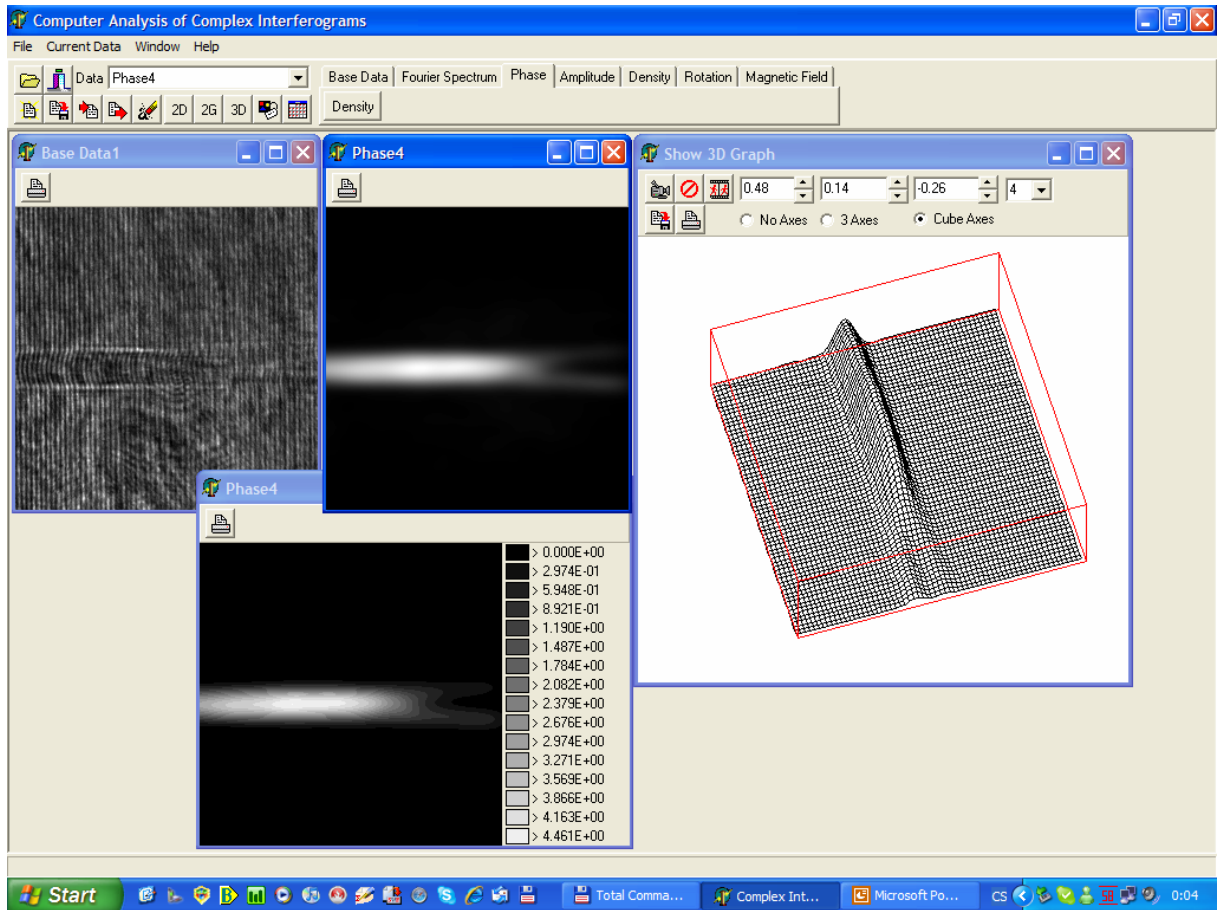


Projected publications/articles resulting or to result from your grant:

1. Submission of one bachelor thesis (UMB student Chiara Liberatore)

Other comments:

This visit was preceded by participation of UBM student Chiara Liberatore (supervisor Prof. Dimitri Batani) in experiments carried out during December 2008 in University of Szeged (Hungary) together with Miss Michaela Martinkova, MSc (graduate student of Prof. Milan Kalal) with the goal to learn basics of *complex interferometry* diagnostics of laser produced plasmas (example of the *spark in the air analysis* from these experiments is shown below).



Travel Expenses:

1. Air Ticket	3492 + 1000 + 400 = 4892 CZK = 188.5 EUR
2. Accommodation	60.0 EUR
3. Bus Milan (Airport to City)	7.5 EUR
4. Bus Milan (City to Airport)	7.0 EUR
5. Taxi Milan (City to Hotel)	20.0 EUR
6. Taxi Milan (Hotel to City)	25.0 EUR

Total Travel 308.0 EUR

Daily Allowance:

85 EUR per day x 4 340.0 EUR

TOTAL EXPENSES for reimbursement:..... 648.0 EUR



Prague, June 28, 2009