

**REPORT ON THE COURSE ON  
« ATOMS AND PLASMAS IN SUPER-INTENSE LASER FIELDS »**

D. Batani and C.J. Joachain

## **1. Introduction**

This course, whose purpose was to introduce young researchers to the physics of super-intense laser fields interacting with matter, took place at the Ettore Majorana Centre for Scientific Culture in Erice, Sicily, from July 14 to July 24, 2011. It was the fifth of its kind. The first two courses, organized in the summer of 2000 and 2003, were part of the activities of the ESF programme «FEMTO». The third course was organized in the summer of 2006 within the framework of the COST Action project «ULTRA». The fourth course in the summer of 2009 and the present one were organized within the framework of the ESF programme «SILMI», which started in May 2009 and will end in May 2014. The next course on this subject is planned to take place at the Ettore Majorana Centre for Scientific Culture in Erice from July 21 to July 31, 2013.

## **2. Scientific Report**

The course covered all the main aspects of the scientific area of high-intensity laser interactions with matter: atoms, molecules, clusters, solids and plasmas. The lectures included the basic concepts required for the study of atoms in intense laser fields, followed by detailed discussions of the metrology of short laser pulses, of scaling laws in strong field physics, of high harmonic generation and of the solution of the time-dependent Schrödinger equation describing atoms and molecules in intense laser fields. The physics

of high-intensity laser interactions with clusters was also studied.. Another important subject discussed during the course was the interaction of plasmas with very strong laser fields. The basic aspects of this subject were discussed, as well as important applications such as the acceleration of electrons and ions using super-intense lasers, the physics of warm dense matter and high-energy density and the generation of X-rays by laser-produced plasmas. The physics of inertial confinement controlled nuclear fusion was the subject of several lectures in which the most recent developments in this area (in particular the fast ignition approach and the related problems of instabilities and fast electron transport in fusion targets) were discussed and compared with recent progress made in the alternative approach to fusion using magnetic confinement.

The lecturers succeeded in giving pedagogical talks explaining the essential aspects of their research area, while at the same time describing the most recent theoretical and experimental developments

### **3. Financial Report.**

#### **GROSS BALANCE OF ERICE SCHOOL**

MONEY which we have already received

ESF 49.500 €  
Fees 10.000 €

Tot: 59.500€

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MONEY which we have already paid

46.000 € money already paid to the Erice Center  
500 € grant for best posters  
2.135 € dinner  
710 € bus to S.Vito  
1.360 € travels to lecturers (already paid)

Tot: already paid 50.705 €

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MONEY to be paid still

10.000 € registration fees to Erice Center (in total we had 56 students = 56.000 euro corresponding to 46.000 euros already paid and those still to be paid)

9.801 € travels to lecturers (to be paid)

2.500 € for CD production and mailing

2.500 € web site

2.600 € secretary expenses

Tot. still to be paid 27.401,00€

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In Total

EXPENSES: 78.106 €

(of which 11.161 € for travels and 56.000€ for registration fees for a total of 56 students)

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MONEY WHICH WE NEED TO RECEIVE FROM ESF TO CLOSE THE BUDGET: 18606 €

#### 4. Detailed expenses tables

##### Lecturers

Name Speakers/Directors, Town-Country	VIAGGIO
1. ATZENI Stefano Roma, Italy Italystefano.atzeni@uniroma1.it	200,00€ already reimbursed
2. BATANI Dimitri Course director + Speaker Milan, Italy Dimitri.Batani@mib.infn.it	244,50€
3. BERTOLOTTI Mario, Roma, Italy	200,00€
4. BIEGERT Jens Barcelona, Spain <a href="mailto:jens.biegert@icfo.es">jens.biegert@icfo.es</a>	300,00€
4. CORMIER Eric Bordeaux, France Franceeric.cormier@celia.u-bordeaux1.fr	745,00€
5. DI MAURO Louis Columbus, Ohio USA dimauro.6@osu.edu	1.041,00€
6. FREEMAN Richard Columbus, USA USAfreeman@physics.osu.edu	1.204,00€
7. JOACHAIN Charles Course director + Speaker Brussels, Belgium cjoacha@ulb.ac.be	442,00€
8. MALKA Victor Palaiseau, France victor.malka@ensta-paristech.fr	420,00€
9. MARTELLUCCI Sergio, School Director, Roma, Italy smart@uniroma2.it	200,00€
10. MAZON D. Cadarache, France Didier.Mazon@jet.uk	418,00€

11. MULSER Peter, Darmstadt, Germany Peter.Mulser@physik.tu-darmstadt.de	228,00€
12. NISHIMURA Hiroaki, Osaka, Japan nishimu@ile.osaka-u.ac.jp	2.557,00€
13. PASSONI Matteo, Milan, Italy matteo.passoni@polimi.it	226,00€
14. SCRINZI Armin, Munich, Germany armin.scrinzi@lmu.de	202,00€
15. TISCH John, London, U.K. tikhon@celia.u-bordeaux1.fr	418,00€
16. TIKHONCHUK Vladimir, Bordeaux, France tikhon@celia.u-bordeaux1.fr	401,00€
TOTALE VIAGGI	9.446,50€

## Students

Family/first name, Town - Country	Grant	Travel
1. ALBANI Giorgia M.Sc. student Milano Bicocca giorgia.albani@gmail.com	Full	
2. AL TARAZI Saad H N M.Sc. student Gaza, Palestine SAIDTARAZI@ICEAGE.CA	Full	113€
3. ANTICI Patrizio PostDoc Istituto Nazionale Di Fisica Nucleare, Frascati, Italy patrizio.antici@uniroma1.it	No Grant	
4. AYUB Khawar Sr. Scientist, PINSTECH, Islamabad, Pakistan kpieas84@yahoo.com	Full	
5. BARNA Angela Ph.D. Student Szeged, Hungary barna.angi@gmail.com	Full	
6. BENOCCI Roberto Permanent Staff, Milano Italy	Full	
7. BLEINER Davide Post Doc University of Bern, Switzerland bleiner@iap.unibe.ch	Half	
8. BONNET Thomas, Bordeaux France bonnet@cenbg.in2p3.fr	No Grant	
9. BORGAUX Anne-Claire Ph.D. Student LULI Palaiseau, France anne- claire.bourgau@polytechnique.edu	Full	
10. BOYKO Olha, M.Sc. Student Jan Dlugosz University in Czestochowa boyko.olha@gmail.com	Full	
11. CIAPPONI Luigi Milano, Italy M.Sc. student Politecnico di Milano luigi.ciapponi@mail.polimi.it	Full	
12. CZARNECKA Agata Warsaw, Poland agata.czarna@ipplm.pl	Full	406€
13. DE ANGELIS Riccardo Researcher ENEA Centro Ricerche Frascati <a href="mailto:riccardo.deangelis@enea.it">riccardo.deangelis@enea.it</a>	No Grant	
14. DE DONATO Daniela M.Sc. student Milan, Italy dddaniela1977@gmail.com	Full	187€
15. DINU Victor Ioan Corneliu, (Prof. Viorica Florescu) Bucharest, Romania victordinu@yahoo.com	Full	
16. ELKINA Nina Arnold Sommerfeld Center LMU Munich <a href="mailto:Nina.Elkina@physik.uni-muenchen.de">Nina.Elkina@physik.uni-muenchen.de</a>	No Grant	

17. FLOQUET Vincent Ph.D. Student CEA Venteuil, <a href="mailto:Francevincent.floquet@cea.fr">Francevincent.floquet@cea.fr</a>	Full	
18. FOLPINI Giulia Ph.D. Student Milano, Italy <a href="mailto:g.folpini@campus.unimib.it">g.folpini@campus.unimib.it</a>	Full	
19. GALASSI Sandro Permanent Staff, Milano Italy	Full	
20. GEMINI Laura M.Sc. student Politecnico di Milano Milano, Italy <a href="mailto:laura.gemini@gmail.com">laura.gemini@gmail.com</a>	Full	
21. GOH Siew Jean Ph.D. Student (Klaus Boller) Enschede, Netherlands <a href="mailto:s.j.goh@utwente.nl">s.j.goh@utwente.nl</a>	Half	
22. HORNY Vojtech, M.Sc. student (Prof. L. Drska or Prof. J. Limpouch) Czech Republic <a href="mailto:hornyvoj@fjfi.cvut.cz">hornyvoj@fjfi.cvut.cz</a>	Full	
23. HUSSAIN Shahid, PostDoc, Pakistanshahid92_pk@yahoo.com	Full	203€
24. HUTCHINSON Simon Ph.D. Student London, UK <a href="mailto:s.hutchinson10@imperial.ac.uk">s.hutchinson10@imperial.ac.uk</a>	No Grant	
25. KALINOWSKA Zofia Warsaw, Poland <a href="mailto:zosia@ifpilm.waw.pl">zosia@ifpilm.waw.pl</a>	Full	406€
26. KHAN Shabbir Ahmad, Permanent Staff, Islamabad, Pakistan <a href="mailto:sakhan@ncp.edu.pk">sakhan@ncp.edu.pk</a> <a href="mailto:shabbir.ahmad@ncp.edu.pk">shabbir.ahmad@ncp.edu.pk</a>	Full	
27. KIMURA Sachie PostDoc, Catania, Italy <a href="mailto:kimura@ins.infn.it">kimura@ins.infn.it</a>	Full	
28. LANCIA Livia PostDoc Prof. Atzeni, Roma, Italy <a href="mailto:livia.lancia@uniroma1.it">livia.lancia@uniroma1.it</a>	Full	
29. LECZ Zsolt Ph.D. Student Darmstadt, Germany <a href="mailto:lecz@gsi.de">lecz@gsi.de</a>	Full	
30. LEGUAY Pierre-Marie Ph.D. Student Talence, France <a href="mailto:leguay@celia.u-bordeaux1.fr">leguay@celia.u-bordeaux1.fr</a>	Full	
31. MARGARONE Daniele Ph.D. student Praga, Repubblica Ceca <a href="mailto:margaron@fzu.cz">margaron@fzu.cz</a>	Full	
32. MAROCCHINO Alberto PostDoc Roma, Italia <a href="mailto:alberto.marocchino@uniroma1.it">alberto.marocchino@uniroma1.it</a>	Full	
33. MARTINKOVA Michaela Ph.D. Student Czech Technical University Prague, Czech Republic <a href="mailto:martimi2@fjfi.cvut.cz">martimi2@fjfi.cvut.cz</a>	Full	
34. MENG Limin Ph.D. Student (Dr. Annie KLISNICK) Orsay, France <a href="mailto:limin.meng@u-psud.fr">limin.meng@u-psud.fr</a>	Full	
35. MERLO Gabriele Ph.D. Student Milano, Italy <a href="mailto:gabriele.merlo@mail.polimi.it">gabriele.merlo@mail.polimi.it</a>	Full	
36. MORACE Alessio Ph.D. Student Milano, Italy <a href="mailto:alessio.morace@gmail.com">alessio.morace@gmail.com</a>	No grant	
37. OKELL William Ph.D. Student (Prof. John Tisch) London, UK <a href="mailto:william.okell09@imperial.ac.uk">william.okell09@imperial.ac.uk</a>	Full	
38. PATRIA Chiara M.Sc. Student Milano, Italy <a href="mailto:chiarapatria@gmail.com">chiarapatria@gmail.com</a>	Full	210€
39. PEREGO Claudio Ph.D. Student Milano, Italy <a href="mailto:cl.perego@gmail.com">cl.perego@gmail.com</a>	Full	
40. PLOUMISTAKIS Ioannis PhD student, Prof. Stavros Moustazis <a href="mailto:jploumis@gmail.com">jploumis@gmail.com</a>	Full	
41. PROKUPEK Jan M.Sc. student Prague, Czech Republic <a href="mailto:prokupek@fzu.cz">prokupek@fzu.cz</a>	Full	
42. PUCELLA Gianluca, Frascati, Italy <a href="mailto:gianluca.pucella@enea.it">gianluca.pucella@enea.it</a>	No Grant	
43. RICO Mauricio M.Sc. student, Salamanca, Spain <a href="mailto:mrico@clpu.es">mrico@clpu.es</a>	No Grant	

44. ROSINSKI Marcin M.Sc. student, Warsaw, Poland marcin.rosinski@ipplm.pl	Full	
45. SHPOTYUK Yaroslav, Ph.D. Student Ukraine y_shpotyuk@mail.ru	Full	
46. SKOROMNIK Oleg PhD student (Prof. Keitel) Heidelberg, Germany ods@mpi-hd.mpg.de	No Grant	
47. TAO Yin Ph.D. Student (Prof. Dr.Klaus Boller) Enschede, Netherlands sy.tao-1@tnw.utwente.nl	Half	
48. TOSA Valer Permanent Staff, Romania tosa@itim-cj.ro	Half	
49. UCCELLO Andrea Ph.D. Student Milano, Italy andrea.uccello@mail.polimi.it	Full	
50. VASEASHTA Ashok USA avaseash@norwich.edu	Full	589,5€
51. VELASCO Gas Sofia Ph.D. Student LULI Paris, France velascogassofia@hotmail.com	Half	
52. VERSTEEGEN Maud Permanent Staff, Gradignan, France <a href="mailto:versteeg@cenbg.in2p3.fr">versteeg@cenbg.in2p3.fr</a>	No Grant	
53. VINCENTI Henri Ph.D. Student Dr. Fabien QUERECEA Saclay Gif-Sur-Yvette, France <a href="mailto:henri.vincenti@cea.fr">henri.vincenti@cea.fr</a>	Full	
54. VOLPE Luca Ph.D. Student, Milan, Italy luca.volpe@mib.infn.it	Full	
55. Von Veltheim Anton PhD Student, Dr. Horst Rottke, Berlin, Germany <a href="mailto:veltheim@mbi-berlin.de">veltheim@mbi-berlin.de</a>	Half	
56. XU Jiancai Ph.D. Student, Garching, Germany <a href="mailto:jiancai.xu@mpg.mpg.de">jiancai.xu@mpg.mpg.de</a>	Half	
TOTALE grant	42.500€	
Totale half grant	3.500€	
TOTAL full grant	39.000€	TOT. TRAVELS 2.114,50€
<b>TOTAL fee</b>	<b>10.000€</b>	