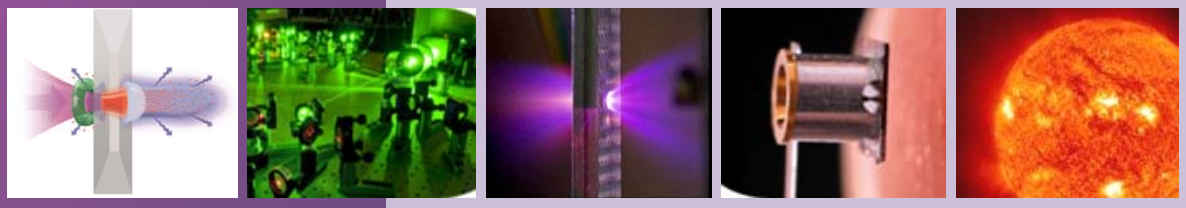
68th Scottish Universities Summer School in Physics

NATO Advanced Study Institute

Laser-Plasma Interactions and Applications

14 – 26 August 2011, University of Strathclyde, Glasgow, UK



Handbook

SUSSP68
Laser-Plasma Interactions and Applications

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Enquiries

General Organisation and Registration Enquiries

Michelle King
SUSSP68 School Secretary
Science & Technology Facilities Council
Central Laser Facility, RAL
Harwell Oxford, Didcot
OX11 0QX, UK
E-mail: sussp68@phys.strath.ac.uk

Prof. Paul McKenna
SUSSP68 School Director
University of Strathclyde
Department of Physics
107 Rottenrow
Glasgow
G4 0NG, UK
E-mail: sussp68@phys.strath.ac.uk

Organising Committee

Director: Prof. Paul McKenna, University of Strathclyde, UK

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SUSSP68 Laser-Plasma Interactions and Applications is sponsored by:

Disclaimer

SUSSP68 Laser-Plasma Interactions and Applications, the University of Strathclyde and their approved representatives cannot take responsibility for any accident, loss or damage to participants or to their property during the summer school. Participants are responsible for providing their own travel and medical insurance.

General Information

The 68th Scottish Universities Summer School in Physics (SUSSP68), on the topic of Laser-Plasma Interactions and Applications, will be held at the University of Strathclyde, Glasgow G4 0NG, Scotland, UK.

Travel Information

By Air

A wide range of airlines fly into Glasgow International Airport, including British Airways and Flyglobespan, which has many flights between Glasgow International Airport and Europe. Ryanair operates flights from Prestwick International Airport, which is around 30 miles from the city centre. Many airlines fly into Edinburgh Airport.

Getting into Glasgow from the airports

Glasgow International Airport is 10 miles from the city centre and is served by regular airport buses (bus number 500). The journey will take approximately 20 minutes at a cost of £4.50 (single). Alternatively, a taxi rank is located next to the bus stop. The journey time is similar, costing approximately £22.

Prestwick International Airport is around 30 miles from the city centre and has its own train station with trains running to Glasgow Central Station every half hour and taking approximately 45 minutes.

Edinburgh Airport is around 40 miles from Glasgow. Regular busses travel to/from Edinburgh Airport and Edinburgh Waverly Station by the Airlink 100 service every 10 minutes. Journey times are 25-30 minutes in normal traffic, at a cost of £3.50. A night bus, the N22 also runs between Waverly Station and Edinburgh Airport every 30 minutes at a cost of £3.00. Alternatively a taxi can easily be hired from the taxi rank located next to the bus stop. There are regular trains from Waverly and Haymarket stations to Glasgow. The total journey time from Edinburgh airport to Glasgow is approximately 1.5 hours (the train journey takes 50 minutes, with trains running every 15 minutes). The closest train stations to the University campus and SUSSP68 venue is the Queen's Street station and High Street station

By Train

There are direct GNER rail links from Edinburgh Waverly and London King's Cross to Glasgow Central Station. On some trains from London, you may need to change in Edinburgh. From London Euston Station, Virgin trains and the First Scotrail Caledonian Sleeper travel direct to Glasgow.

The direct journey from London to Glasgow takes around 4 to 5 hours. The journey from Edinburgh to Glasgow takes 50 minutes, with trains running every 15 minutes. The cost of travelling by train can be reduced by booking in advance – and by making the most of the savings offered by Student Railcard.

By Coach/Bus

National Express coaches travel between London and Glasgow's Buchanan Street Bus Station seven times a day. The average journey time is between 8.5 and 10 hours, depending on traffic conditions and the time of day. The budget coach service Megabus also makes journey between Glasgow and London twice a day and once at night.

By Road

From England and the south

Via the M6 and M74 (A74) motorways. Leave the M74 junction 4 to join the M73 junction 1. Leave the M73 junction 2 to join the M8 junction 8 westbound. Exit M8 junction 15 for the John Anderson Campus.

From Stirling and the north

Via the M9, M80 (A80) and M8 motorways. Traffic from Fife should follow signs for the Kincardine Bridge and then join the M876. Leave the M8 junction 15 for the John Anderson Campus.

From Edinburgh and the east

Via the M8 motorway. East Lothian and Northumberland traffic on the A1 should take the A720 Edinburgh City By-pass to join M8. Tyneside traffic should take the A69 Carlisle Road and join the M6 at Junction 44, the intersection with the A74 (M) northbound, then M73 and the M8. Leave the M8 junction 15 for the John Anderson Campus.

Parking

Because of its city centre location, there is no reserved parking on the John Anderson Campus. It may be possible to arrange parking in the University car park. If you would like to do this, please email sussp68@phys.strath.ac.uk.

City Travel

Glasgow's underground railway is fast and efficient. The nearest stop to the John Anderson Campus is Buchanan Street. There are also regular bus and train services in and around the city.

Useful Contacts

Rail

Contact GNER on 08457 48 49 50 or go to www.gner.co.uk. For details on the train services in the Glasgow area, go to www.firstscotrail.com.

Coach

Contact National Express on 08705 80 80 80 or go to www.nationalexpress.com. The number for Megabus is 0901 331 0031, or go to www.megabus.com.

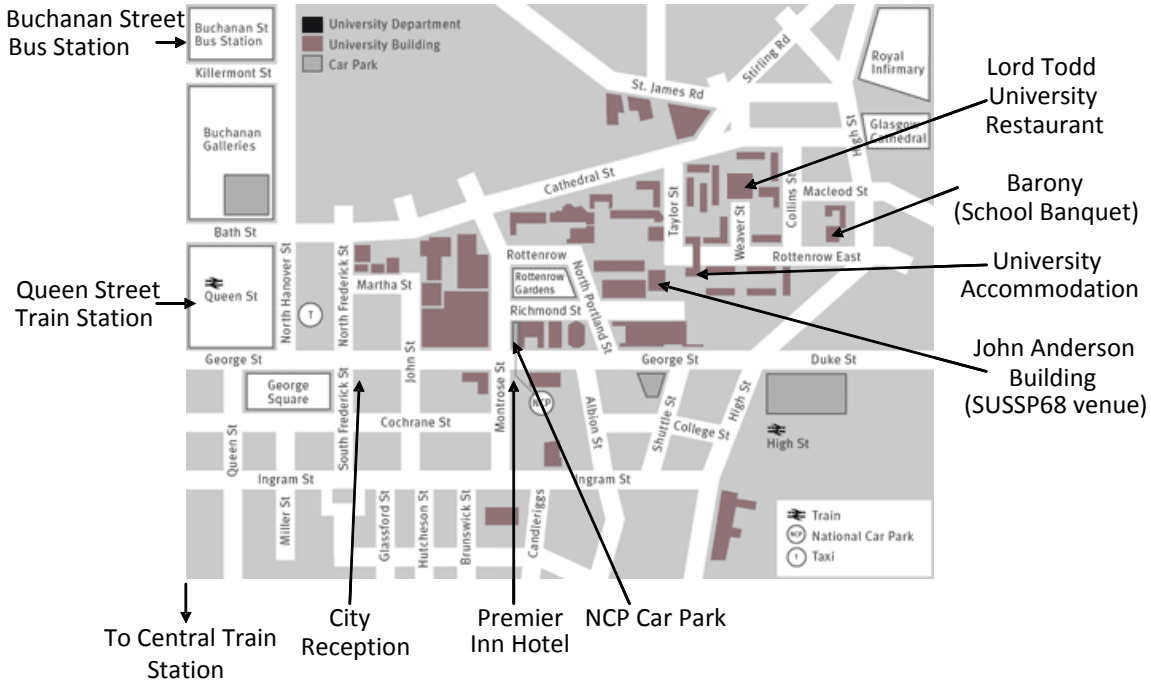
Bus

Call Glasgow Travel Centre on 0141 226 4826

Taxis

To book licensed taxis, call 0141 429 7070 or go to www.glasgowtaxisltd.co.uk.

University of Strathclyde Campus Map



Download a John Anderson Campus map as a PDF.

Registration

The summer school lectures, poster sessions and exhibitions will be held in the John Anderson building at the University of Strathclyde in Glasgow. Registration on Sunday 14 August will take place from 15:00 to 19:00 in the foyer area at the level 4 entrance to the John Anderson building. Lecturers arriving after Sunday 14 August should register at the school office in room JA3.27 (level 3 of the John Anderson building), opposite the lecture theatre (JA3.25)

On arrival you will receive a welcome pack containing the programme, a list of registered participants and a lapel badge. Please wear your badge at all times as this will allow you entry to the summer school sessions, the Lord Todd restaurant for meals, the school social programmes and help with security. It will also enable you to identify fellow delegates.

Location Overview

Lectures	John Anderson (JA) Building Room 3.25
Poster Sessions	JA3.26/3.27 (level 3)
Exhibition	JA3.26/3.27 (level 3)
Tea and Coffee	Foyer outside JA3.25 lecture theatre
School Reception, Monday 15 August 2011	City Chambers, Civic Reception
Lunch and Evening Meals	Lord Todd University Restaurant
Public Lecture Wednesday 17 August 2011	John Anderson (JA) Building Room 3.25
School Banquet, Wednesday 24 August 2011	Barony

Facilities

Public Telephones
There are no public phones available on site beside the phone in the rooms for those staying at Chancellors Hall. These phones will be charged to your personal account if used.

Cloakroom
There will be coat rails available inside the lecture theatre.

Messages
A message board will be placed near the registration desk. Participants should check regularly for messages, regarding information about excursions, social events and lectures.

Cash Facilities
There is a cash point and shops on George Street which is about a 5 minute walk from the school venue.

Internet Access
WiFi will be available in the school venue, but not the accommodation rooms. Please ask at the registration desk for a username and password.

Accommodation

Accommodation for students is included with the registration fee. Students will be staying at Chancellor's Hall (or an alternative similar hall nearby), on-site at the University of Strathclyde, please see the map on page 7 for details.

Meals

Breakfast
Breakfast for those staying in the University accommodation will be served in the Lord Todd University Restaurant.

Refreshments and Lunch
Refreshments will be served outside the lecture theatre (JA3.25) and lunch will be served in the Lord Todd University Restaurant.

Evening Meals
Apart from school banquet on Wednesday 24 August 2011, all evening meals will be served in Lord Todd University Restaurant.

Participants with special dietary requirements are asked to notify the summer school organisers prior to their arrival, if they have not already done so when registering. Those with special dietary requirements other than vegetarian are asked to make themselves known to the catering team. It will not be possible to provide an alternative menu unless prior notification has been received. Unfortunately we cannot provide for a kosher diet.

Nut Allergies – Unfortunately we cannot provide assurances that food has not been cross-contaminated with traces of nuts during ingredient processing at manufacture's site, and during food preparation and on-site. For this reason, we are unable to provide guarantees that any food served is free from nuts or trace elements.

Please email sussp68@phys.strath.ac.uk if you have any questions.

Programme

The programme below is subject to change. Please consult the notice board for the final programme.

Sunday 14 August		
15:00 - 18:00	Arrival and registration at Level 4, John Anderson building	
18:00 - 19:00	Dinner at Lord Todd restaurant	

Monday 15 August		
09:00 - 09:30	Welcome and opening remarks	P. McKenna
09:30 - 10:30	Lecture: General introduction to laser-plasma interactions	B. Bingham
10:30 - 11:00	Tea/Coffee	
11:00 - 12:15	Lecture: Theory of laser-underdense plasma interactions 1	L. Silva
12:15 - 14.00	Lunch at Lord Todd restaurant	
14:00 - 15:15	Lecture: Laser-solid interactions	P. McKenna / A. Andreev
15:15 - 15:45	Tea/Coffee	
15:45 - 17:00	Lecture: Shock wave and equation of state 1	S. Eliezer
17:00 - 18:00	Free time / Private study	
18:00 - 19:00	Dinner at Lord Todd restaurant	
20:00 - 21:00	Reception at City Hall, George Square	

Tuesday 16 August		
09:00 - 09:15	Welcome and orientation	
09:15 - 10:30	Lecture: Theory of laser-underdense plasma interactions 2	L. Silva
10:30 - 11:00	Tea/Coffee	
11:00 - 12:15	Lecture: Fast electron generation and transport in dense plasma	P. McKenna
12:15 - 14.00	Lunch at Lord Todd restaurant	
14:00 - 15:15	Lecture: Shock wave and equation of state 2	S. Eliezer
15:15 - 15:45	Tea/Coffee	
15:45 - 17:00	Lecture: Introduction to ICF implosion hydroynamics and Ignition 1	J. Pasley
17:00 - 18:00	Free time / Private study	
18:00 - 19:00	Dinner at Lord Todd restaurant	

Wednesday 17 August		
09:00 - 09:15	Welcome and orientation	
09:15 - 10:30	Lecture: Introduction to ICF implosion hydroynamics and Ignition 2	J. Pasley
10:30 - 11:00	Tea/Coffee	
11:00 - 12:15	Lecture: Electron acceleration 1	G. Shvets
12:15 - 13.45	Lunch at Lord Todd restaurant	
13:45 - 15:00	Lecture: Indirect drive physics at the ignition scale 1	M. Rosen
15:15 - 15:45	Tea/Coffee	
15:45 - 16:15	Guest talk: An introduction to EPSRC	C. O'Reilly
16:15 - 18:00	Free time / Private study	
18:00 - 19:00	Public Lecture: LIFE – fusion energy soon enough to make a difference	M. Dunne
19:00 - 19:30	Reception	
19:30 - 20:30	Dinner at Lord Todd / Speaker's dinner	

Thursday 18 August		
09:00 - 09:15	Welcome and orientation	
09:15 - 10:30	Lecture: Electron acceleration 2	G. Shvets
10:30 - 11:00	Tea/Coffee	
11:00 - 12:15	Lecture: Indirect drive physics at the ignition scale 2	M. Rosen
12:15 - 14.00	Lunch at Lord Todd and poster set-up	
14:00 - 15:15	Lecture: Fast Ignition and shock ignition 1	S. Atzeni
15:15 - 15:45	Tea/Coffee and poster set-up	
15:45 - 16:45	Lecture: Direct drive physics / or start of poster session	V. Goncharov
16:45 - 18:30	Poster session 1	
18:30 - 19:30	Dinner at Lord Todd restaurant	

Friday 19 August		
09:00 - 09:15	Welcome and orientation	
09:15 - 10:30	Lecture: Targetry	M. Tolley
10:30 - 11:00	Tea/Coffee	
11:00 - 12:15	Lecture: Fast Ignition and shock ignition 2	S. Atzeni
12:15 - 14.00	Lunch at Lord Todd and poster set-up	
14:00 - 15:00	Guest Lecture: Developments in high power laser technology	J. Collier
15:00 - 15:30	Tea/Coffee and poster set-up	
15.30 - 16.45	Lecture: Plasma wave acceleration schemes	V. Malka
16.45 - 18:30	Poster session 2	
18:30 - 19:30	Dinner at Lord Todd restaurant	

Saturday 20 August		
09:00 - 09:15	Welcome and orientation	
09:15 - 10:30	Laboratory Astrophysics using High energy Density Photon and Particle Beams.	B Bingham
10:30 - 11:00	Tea/Coffee	
11:00 - 12:15	Lecture: Applications of laser-plasma accelerators	V. Malka
12:30 - 19:30	Excursion to Edinburgh / Fringe Festival (Bus departs 12:30)	
20:00 - 21:00	Dinner at Lord Todd restaurant	

Sunday 21 August	
09:00 - 19:00	Excursion to Stirling castle and Loch Katerine (Bus departs 09:00)
20:00 - 21:00	Dinner at Lord Todd restaurant

Monday 22 August		
09:00 - 09:15	Welcome and orientation	
09:15 - 10:30	Lecture: Laser plasma interactions in ICF	B. Kruer
10:30 - 11:00	Tea/Coffee	
11:00 - 12:15	Guest Lecture: Diagnostic techniques and the ORION project	T. Goldsack
12:15 - 14.00	Lunch at Lord Todd restaurant	
14:00 - 15:15	Lecture: Excitation and ionisation in high energy density plasmas 1	S. Rose
15:15 - 15:45	Tea/Coffee	
15:45 - 17:00	Lecture: Ion acceleration - TNSA	M. Roth
17:00 - 18:00	Free time / Private study	
18:00 - 19:00	Dinner at Lord Todd restaurant	

Tuesday 23 August		
09:00 - 09:15	Welcome and orientation	
09:15 - 10:30	Lecture: Excitation and ionisation in high energy density plasmas 2	S. Rose
10:30 - 11:00	Tea/Coffee	
11:00 - 12:15	Lecture: Photon sources - Harmonic generation 1	M. Zepf
12:15 - 14.00	Lunch at Lord Todd restaurant	
14:00 - 15:15	Lecture: Laser plasma coupling in Ignition-scale hohlraums	B. Kruer
15:15 - 15:45	Tea/Coffee	
15:45 - 17:00	Lecture: Applications of laser-accelerated ion beams	M. Roth
17:00 - 18:00	Free time / Private study	
18:00 - 19:00	Dinner at Lord Todd restaurant	

Wednesday 24 August		
09:00 - 09:15	Welcome and orientation	
09:15 - 10:30	Lecture: Photon sources - Harmonic generation 2	M. Zepf
10:30 - 11:00	Tea/Coffee	
11:00 - 12:15	Lecture: Modelling techniques: Rad-Hydro approach	A.P.L. Robinson
12:15 - 13.45	Lunch at Lord Todd restaurant	
13:45 - 15:00	Lecture: Photon (Undulator and Betatron) sources	D. Jaroszynski
15:00-18:00	Free time / Private study	
19:00 - 21:30	School banquet and whisky tasting at The Barony	

Thursday 25 August		
09:00 - 09:15	Welcome and orientation	
09:15 - 10:30	Lecture: Modelling techniques: PIC and hybrid-PIC	A.P.L. Robinson
10:30 - 11:00	Tea/Coffee	
11:00 - 12:15	Lecture: Diagnostic techniques: X-ray/Photon diagnostics	D. Neely
12:15 - 14.00	Lunch at Lord Todd restaurant	
14:00 - 15:15	Lecture: Radiation Pressure Acceleration of Ions	A.P.L. Robinson
15:15 - 15:45	Tea/Coffee	
15:45 - 17:00	Knowledge Transfer (KT/KE) and Commercialisation	D. Jaroszynski
17:00 - 18:00	Free time / Private study	
18:00 - 19:00	Dinner at Lord Todd restaurant	

Friday 26 August		
09:00 - 09:15	Welcome and orientation	
09:15 - 10:30	Lecture: Applications to security	D. Neely
10:30 - 11:00	Tea/Coffee	
11:00 - 12:15	Closing remarks and evaluation	P.McKenna
12:15 - 14.00	Lunch at Lord Todd restaurant	
14:00	Departure	

School Banquet, Wednesday 24 August 2011

The school banquet will be held in the Barony. Please note that the banquet is included in the school participant's fee. Additional tickets are available upon request at a cost of £49.50 per person.

Exhibition

An exhibition by industrial sponsors will be held during the poster sessions on Thursday 18 and Friday 19 August 2011.

Presenters' Instructions

Lectures are typically 1 hour 15 minutes, which includes time for discussion (e.g. 1 hour lecture plus 15 minute discussion / tutorial time). Please allow enough time for questions and discussion. Guest speaker's talks are typically 1 hour. The only acceptable formats are PowerPoint and pdf. Speakers can use their own laptops, but should ensure compatability with the projector prior to their lecture. A laptop will be available for presentations. Speakers wishing to use this should upload their talks in advance. The lecture theatre is equipped with the following audio-visual equipment:

- Data projector
- PC/Laptop with PowerPoint facilities
- Laser pointer

The lecture theatre is reasonably large, and speakers should use minimum 15-point font size in PowerPoint slides to ensure legibility.
Speakers wishing to use additional audio-visual equipment or intending to present from a Macintosh computer are asked to email sussp68@phys.strath.ac.uk before the summer school.

Lecture notes

Speakers are requested to send a copy of their slides in advance of the school so that these can be prepared for distribution to the students.

Proceedings Text Book

The proceedings/lecture notes of the school will be published by Canopus Books / Springer as a high quality textbook and all participants will receive a complimentary copy.

Instructions for Industrial Sponsors

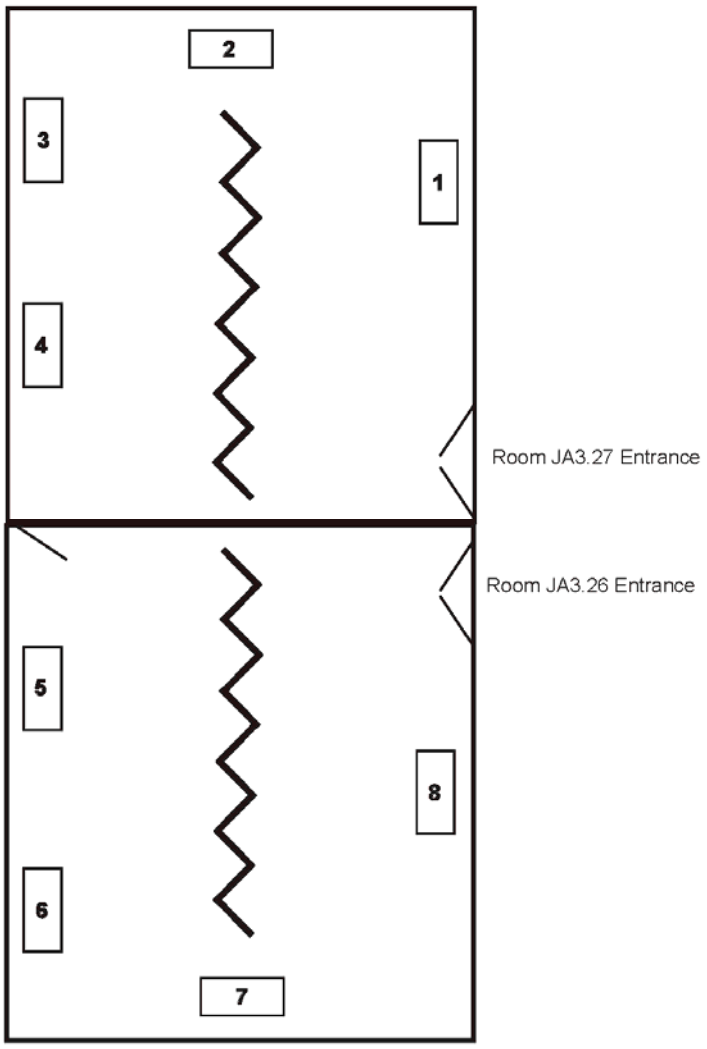
The exhibition for industrial sponsors will take place on Thursday 18 and Friday 19 August at 16:30 – 18:30 in the John Anderson building, room JA3.26/3.27 (level 3).

Industrial sponsors will be able to set up their stands on Thursday 18 August from 12:00 – 16:00. When you arrive at the John Anderson building you will need to register. You will be allocated a

stand number. Please set up your exhibition at the table which matches your number, as shown in the layout plan of the room (below).

You will be provided with a 4m long by 1m wide table (table cloth won't be provided), electrical socket and poster board space behind the table. Please could you confirm by email to sussp68@strath.ac.uk if you require any poster boards for the exhibition. Poster boards measure 2m high by 1m wide, and will be available for use from 12:00 on Thursday 18 August.

Layout Plan for Industrial Sponsors and Poster Sessions



Poster Presentations

The poster sessions will take place on Thursday 18 and Friday 19 August from 16:30 – 18:30 in the John Anderson building, room JA3.26/3.27 (level 3). Each poster presentation has been assigned to one of the two sessions, as detailed in the following pages. Authors are asked to put their poster up either during the lunch or afternoon coffee breaks prior to the appropriate session and should be next to their poster during the session to discuss their work with other summer school participants. Please find below a list of the poster presentations for both sessions. Please note your allocated number and mount your poster on the corresponding board. Thank you.

The poster boards are 1.8 m high by 0.9 m wide and therefore posters should be no larger than A0 and of a portrait style. All posters are required to fit within these dimensions. Fixing material will be provided.

Poster Session 1 – Thursday 18 August 2011

1	**Name:** Diaw Abdourahmane
	Title: Kinetic effects of the expansion of a plasma with a bi-Maxwellian electron distribution into a vacuum
	Authors: A. Diaw, P. Mora

Abstract: The expansion of a collisionless plasma slab into a vacuum with initially hot and cold Maxwellian electron populations is studied with a one dimensional kinetic model. Whereas hot electrons always loose energy to expanding ions, cold electrons can either gain or loose energy depending on initial temperature, density ratio, and time. When cold electrons density is not too large, they experience initially a temperature increase which may be as large as a factor of a few tens. Later on, as expected, the cold electrons eventually loose energy to the expansion. A simple kinetic calculation is developed to explain this phenomena. It is demonstrated that the energy gain is due to an adiabatic compression of the cold electron population by the electric field associated with the rarefaction wave.

2	**Name:** Florian Abicht
	Title: Proton imaging of magnetic fields induced by ultrashort laser pulses
	Authors: F. Abicht

Abstract: To accelerate protons up to energies of several MeV, different target types and pulse parameters are used. The study of the acceleration process is important for and standing fundamental physics and delivers possibilities to manipulate the beam characteristics for future applications. The generation of magnetic fields can play a key role within this acceleration process. The presented prolife will they, how proton imaging can be used to investigate the temporal and spatial evolution of these magnetic fields.

3	**Name:** Wameedh Adress
	Title: Control of HHG conditions in atomic media
	Authors: W. Adress, M. Zepf

Abstract: HHG from gaseous media is typically peformed at modest intensites below 10^15 Wcm^-2. However in terms of achieving shorter wavelengths and exploiting the high ionsation potiential available from ions higher intensities are desirable. We present feasibility studies taking the deleterious effects of propagation in highly ionising media and the effect of ponderomotive acceleration of the electron along the laser axis into account.

4	**Name:** Hamad Ahmed
	Title: Laser driven ion acoustic soliton in tenous plasma
	Authors: H. Ahmed, L. Romagnani, D. Doria, E. Ianni, R. Prasad, M. Cerchez, A.L. Lindemann, K. Quinn, O. Willi, I. Kourakis, M. Borghesi

Abstract: The observation and characterization of collisionless shock waves generated in laser plasma interaction is presented. The shock waves are generated by long pulse (~1ns), intense laser-solid interaction and are observed to propagate in a tenuous, non magnetized plasma. These nonlinear entities are detected and characterized by employing a proton imaging technique. This technique allowed the simultaneous detection of propagation velocity, width of the shock front and electrostatic field associated with the shock with high spatial and temporal resolution. Ion Acoustic Solitons were observed under certain conditions, and the variation of their velocity and width as a function of the ambient parameters was characterized.

5	**Name:** Romeo Banici
	Title: Spectral combination of ultrashort laser pulses
	Authors: R. Banici, D. Ursescu

Abstract: In a proof-of-principle experiment, it is demonstrated that two long pulses of 330 fs can be overlapped in a collinear way, to produce a shorter pulse, of 190 fs, due to spectral properties of the pulses. As a consequence, it is shown that the power for the combined pulse obtained is up to a factor of 1.7 larger than the sum of the peak powers of each individual pulse. The spectral phase of the combined pulse was characterized with a tenth of a wavelength accuracy, using spectral interferometry. A way to implement the method at parallel CPA laser facilities, using no transmission optics, is indicated.

6	**Name:** Victor Baranov
	Title: Electron bunch compression and acceleration in the laser wakefield
	Authors: N.E. Andreev, V.E. Baranov

Abstract: The compression and acceleration of an external electron bunch into the laser wakefield is studied using 3D modelling and compared to analytical predictions. It is shown, for a laser propagating in a plasma channel, that the nonlinear laser pulse dynamics together with the finite laser spot size influence the electron bunch compression and acceleration due to the reduction of the laser pulse group velocity. The transverse bunch dynamics and loading effect determine the final bunch charge and density and restrict the compressed sizes of the trapped and accelerated electron bunch. The dynamics of the electron bunch are illustrated with a set of parameters where the accelerated bunch acquires an energy of the order of 2 GeV, and 1% energy spread with sub-micron sizes.

7	**Name:** Alexei Bashinov
	Title: Role of radiation back reaction force in the interaction of charged particles with relativistically intense laser field
	Authors: A.V. Bashinov, A.V. Kim

Abstract: We consider electron dynamics in a relativistically intense plane electromagnetic wave when the electron produced by ionization appears in different phases of the field. We show that a number of effects attributed to the radiation back reaction force can be observed even below the radiation dominant regime.

8	**Name:** Stefan Bedacht
	Title: Cryogenic targets for laser and particle beams
	Authors: S. Bedacht, G. Schaumann, J. Menzel, M. Roth, D.H.H. Hoffmann

Abstract: In laser plasma interaction experiments target geometry plays an important role. Micrometre thin cryogenic targets could allow for achieving proton energies up to hundreds of MeV by exploiting new acceleration schemes different from TNSA. Besides ion acceleration, cryogenic deuterium targets have proven to be a viable tool for probing energy loss of heavy-ion beams in plasma.

9	**Name:** Michael Bloom
	Title: The electron self-trapping threshold in a laser wakefield accelerator
	Authors: S.P.D. Mangles, G. Genoud, M.S. Bloom, M. Burza, Z. Najmudin, A. Persson, K. Svensson, A.G.R. Thomas, C.-G. Wahlstrom

Abstract: Laser-wakefield-accelerators (LWFA) might have the technological potential to supersede conventional-radio-frequency-accelerators and also bring about a new generation of compact-tabletop-accelerators. The electron self-trapping-threshold is of vital importance for their design and operation. We present a simple analytical model, in good agreement with our observed measurements, allowing prediction of self-trapping for future experiments.

10	**Name:** Sergey Bochkarev
	Title: Ultrashort laser pulse absorption with effects of spatial dispersion and nonlocal energy transport
	Authors: S.G. Bochkarev, A.V. Brantov, V.Yu. Bychenkov, W. Rozmus

Abstract: Ultrashort laser pulse absorption and plasma heating at the sharp plasma-vacuum interface have been studied by using advanced models for all-range plasma permittivity and nonlocal heat transport. The electron response includes both collisional and collisionless dissipative effects. We showed that nonlocal electron heat transport comes into play after electrons heat up to temperatures on the order of 1 keV and to several times less temperatures for low dense targets (airgels).

11	**Name:** Ceri Brenner
	Title: Experimental studies of laser driven ion acceleration
	Authors: C. Brenner

Abstract: The laser driven ion acceleration scheme has the potential to deliver a compact, high quality source of radiation, making it a very applicable mechanism for use in industry and medicine where conventional accelerator systems are not preferable due to their inherent size and capital cost. However, in order to tailor these laser accelerated ion beams to make them appropriate for the applications, properties of the beams such as the total proton flux for example, need to both tunable and reproducible. Presented here are experimental studies conducted in order to investigate ways in which one might optimise and control the laser driven ion acceleration mechanism.

12	**Name:** Rémi Capdessus
	Title: Radiation losses modelling for the dynamics of charged particles
	Authors: R. Capdessus

Abstract: Evolution in laser technologies has allowed to create ultrastrong electromagnetics fields with ultra high laser intensities. For intensities higher than 10^{22} W/cm² it is necessary to take into account radiation losses of charged particles, in order to have a better description of the dynamics of the process. We have implemented radiation back reaction in the motion equation of charged particles in the PICLS code which is a 3D relativistic Particle-In-Cell (PIC) code. The limits of this model will discussed. First applications of our model to laser-plasma interaction at ultra high laser intensities and to the dynamics of collisionless shocks in the context of gamma ray burst, in astrophysics will be presented.

13	**Name:** Anthony Carr
	Title: Charged particle motion in an intense laser beam
	Authors: A. Carr, D. Burton

Abstract: The exploitation of high-power lasers to directly accelerate charged particles has been a source of interest over many years. We investigate the dynamics of a charged particle in a background electromagnetic field modelling a laser beam, and explore the effect the laser beam has on the particle's total energy.

14	**Name:** David Carroll
	Title: Lattice structure effects on fast electron transport in dense targets
	Authors: D.C. Carroll, A.P.L. Robinson, M.N. Quinn, D. Neely, M.P. Desjarlais, X.H. Yuan, C.M. Brenner, M. Burza, M. Coury, P. Gallegos, R.J. Gray, K. Lancaster, Y.T. Li, X.X. Lin, O. Tresca, C.-G. Wahlström, P. McKenna

Abstract: Proton emission from a foil target is used to infer the physics of electron transport. It is found that filamentation is correlated to the degree of ion ordering, or lattice structure, of the target material. Simulations show that the low temperature resistivity of the target material plays a significant role in filamentation growth.

15	**Name:** Witold Cayzac
	Title: Investigation of the energy loss of ions in a coupled hydrogen plasma
	Authors: W. Cayzac, S. Bedacht, A. Blazevic, A. Frank, L. Hallo, G. Malka, M. Roth, G. Schaumann, T. Schlegel, V.T. Tikhonchuk

Abstract: The energy loss of ions in a cold and dense, coupled hydrogen plasma generated from a thin cryogenic target is investigated. Simulations are made at CELIA to design experiments with the PHELIX laser and the UNILAC accelerator of GSI for measuring the stopping power of carbon ions in a deuterium plasma.

16	**Name:** Shao-wei Chou
	Title: Electron acceleration with control injection
	Authors: S.-W. Chou, T. Mehrling, M. Heigoldt, K. Khrennikov, J. Wenz, A. Popp, S. Karsch

Abstract: Laser-driven-wakefield electron accelerators have shown electron beams with energies of up to 1 GeV. Electron from self-injection regime is usually non-monoenergetic and fluctuated what is not suitable for further application. We demonstrate a way of electron injction control with the shock front which generated from transverse discharge in gas cell. In preliminary experiment which shows more monoenergetic features than self-injection.

17	**Name:** Ozgur Culfa
	Title: Diagnosing fast electron beam currents in fast ignition relevant regimes
	Authors: O. Culfa

Abstract: An important uncertainty in intense laser-target interactions is the current of the relativistic electron beam. KK (hollow atom) vacancies occur for current densities sufficiently high to create a second vacancy in the K-shell (single K vacancies cause K-alpha emission). By observing KK transitions it is possible to measure this current.

18	**Name:** Paul Cummings
	Title: A computational investigation of synchrotron radiation generation in laser-wakefield acceleration (LWFA) experiments
	Authors: P.G. Cummings, A.G.R. Thomas
Abstract: Recent experimental results indicate that a comatic aberration can alter the synchrotron radiation spectrum generated by a LWFA device. Consequently, the impact of comas on the performance of LWFA devices was studied using particle-in-cell (PIC) methods. The relationships between the aberration strength and electron beam parameters are presented. Additionally, a novel method for simulating synchrotron radiation generation in PIC-based models, involving the generation of particle-like "macrophotons," is derived. Results from the validation of the macrophoton model are presented and discussed.	

19	**Name:** Rachel Dance
	Title: Fast electron beam characteristics using x-ray spectroscopic methods
	Authors: R.J. Dance et al.
Abstract: There is need to determine fast electron beam parameters such beam current and divergence within a solid target. Our approach is to image K-shell spectral lines emitted from buried layer targets. I will present measurements taken of electron beam divergence primarily using a 2D imaging crystal and toroidal geometry spectrometer.	

20	**Name:** Christopher Davie
	Title: Symmetry issues in shock ignited inertial fusion energy
	Authors: C. Davie
Abstract: Shock ignition is an IFE scheme where compression is decoupled from heating, requiring lower overall energy and producing higher gain than conventional ignition. We show simulation results of the symmetry of shock reflection in spherical geometry using the ZEUS2D radiation hydrodynamics code and comment on the robustness of shock reflection.	

21	**Name:** Olivier Delmas
	Title: Optimisation of XUV lasers in the double grazing incidence pumping scheme
	Authors: O. Delmas, O. Guilbaud, K. Cassou, S. Kazamias, M. Pittman, B. Cros, D. Ros
Abstract: The stability of XUV laser emission is optimised by using a Double Grazing Incidence Pumping configuration, where a prepulse is created directly into the pump laser amplification system in order to achieve two pulses within the same laser beam. An improved reproduceability of the XUV laser is expected.	

22	**Name:** Jan Dostal
	Title: Synchronization of the PALS laser system
	Authors: J. Dostal, R. Dudzak, J. Huynh, M. Pfeifer , J. Skala, J. Ullschmied
Abstract: The PALS laser facility focuses its research on the field of the laser generated plasma, plasma jets, ablation, particle acceleration, etc. The diagnostic methods are the essential tools for the understanding of the physical priciples of mentioned phenomenas. The short pulse shadowgraphy (SPS) is one of the diagnostic method which helps to improve the actual state. The presumption for the implementation of the SPS is synchronization of the PALS laser with an exteternal laser source. This poster presents principles and the current state of the synchronization of the PALS laser with the Ti:Sapphire laser Micra.	

23	**Name:** Steffen Faik
	Title: Dynamics of metastable states in volumetrically heated foils
	Authors: S. Faik, A. Tauschwitz, J. Maruhn, I. Iosilevskiy
Abstract: The lifetime of the superheated liquid state within the expansion of volumetrically heated foils was calculated. An equation-of-state model for homogeneous mixtures of elements based on the model QEOS was developed. The calculations were done in order to plan an experiment with a novel ion-beam target scheme.	

24	**Name:** John Farmer
	Title: Influence of noise on the Raman process
	Authors: J.P. Farmer, B. Ersfeld, R.A. Cairns, D.A. Jaroszynski
Abstract: Raman scattering is of interest across a wide range of applications, ranging from the creation of ultra-intense laser pulses, to parasitic Raman scattering in fast ignition applications. We investigate how the use of a noisy pump laser can impact on the process of Raman amplification. Analytical solutions are compared to simulation, and potential applications identified.	

25	**Name:** Stephen Flood
	Title: Variational principles in non-linear electrodynamics
	Authors: S. Flood, D. Burton
Abstract: Variational principles as a method for studying non-linear electrodynamical systems are a well-studied area of physics. A Lagrangian is considered for a general non-linear electrodynamical system with charged dust, from which field equations, the Lorentz force equation and a stress tensor are derived.	

26	**Name:** Peta Foster
	Title: Radiation pressure acceleration on Astra Gemini
	Authors: P. Foster, D. Neely, F. Cameron, J. Green, S. Hawkes, D. Neville, A. Robinson, M. Streeter, C. Spindloe, P. McKenna, C.D.C. Carroll, O. Tresca, C. Brenner, P. Gallegos, M. Zepf, B. Dromey, K. Markey, S. Kar, R. Prassad, L. Romagni, S. Ter-Avetisyan, M. Borghesi, M. Yeung, T. Dzelzainis, D. Keifer, T. Marshall
Abstract: Radiation pressure acceleration has the potential to accelerate ions to velocities approaching the speed of light. We present the first experimental evidence of acceleration in the light-sail regime where a nm target exposed to laser radiation is pushed forward by the pressure exerted by the intense laser pulse.	

27	**Name:** Thomas Fox
	Title: Non-diffusive electron transport modelling for shock ignition of ICF targets
	Authors: T. Fox, A.P.L. Robinson, J. Pasley
Abstract: Shock ignition is potentially a more efficient variant of the inertial confinement scheme. Here we present the development of a kinetic model of electron transport using a Vlasov-Fokker-Planck approach, to better understand the laser-target energy coupling in shock ignition.	

28	**Name:** Yechiel Frank
	Title: X-ray spectral measurements and collisional radiative modeling of laser produced iron plasma
	Authors: E. Louzon, A. Feigel, Y. Frank, E. Raicher, M. Klapisch, P. Mandelbaum, I. Levy, G. Hurvitz, Y. Ehrlich, M. Frankel, S. Maman, Z. Henis
Abstract: X-ray spectra of laser produced iron plasma were recorded. The newest version of the atomic code HULLAC was used along side a radiation-hydrodynamics code to model the plasma and generate simulated spectra for comparison with the experimental one. Ionization stage, electron temperature and density were inferred from spectroscopic measurements. Good agreement was found between the parameters obtained from the radiation-hydrodynamics code and the detailed atomic code.	

29	**Name:** Evgeniy Govras
	Title: Optimization of thin two-species targets ion acceleration with short laser pulse
	Authors: E.A. Govras, V.Yu. Bychenkov
Abstract: In this work analytical and semi-analytical approach has been developed to search the optimal laser-target parameters which can provide the best quality of laser-triggered ion bunches. Optimal total charge and density distribution of light ions in two ion species foil were found for given target composition. Also we provide comparison of ion acceleration for two types of light ion impurity distributions: homogeneous allocation and localized layer.	

30	**Name:** David Grant
	Title: Characteristics of radiation from the Alpha-X undulator
	Authors: D. Grant
Abstract: Simulations and measurements of coherent and incoherent radiation from the Alpha-X undulator will be presented. The measurements will be compared with theoretical models.	

31	**Name:** Ross Gray
	Title: Influence of preformed plasma on Laser Energy coupling to fast electrons
	Authors: R.J. Gray, X.H. Yuan , D.C. Carroll, R. E. Evans, C.M. Brenner, M. Burza, M. Coury, K. Lancaster, X.X. Lin, Y.T. Li, D. Neely, M.N. Quinn, O. Tresca, C.-G. Wahlström, P. McKenna
Abstract: The dependence of laser absorption and energy coupling into fast electrons on the density scale length of the front surface preplasma in intense (1020 W/cm2) short-pulse, laser-foil interactions is investigated using a suite of diagnostic techniques. Two transitory regimes of absorption are found and, with the help of hydrodynamic and particle in cell simulations, the physical mechanisms which impose these regimes of absorption are revealed.	

32	**Name:** James Green
	Title: Laser-drive Terahertz radiation and its applications
	Authors: J. Green, D. Symes
Abstract: Ultra-intense lasers have the potential to generate unique, high powers of ultra-short bursts of Terahertz (0.3-30 THz) radiation through underdense and overdense laser-plasma interactions, as well as through direct conversion in electo-optic crystals. Unique Terahertz non-linear interactions and pump-probe experiments are envisioned as well as laser-plasma diagnostic capabilities.	

33	**Name:** Chris Harvey
	Title: Radiation reaction effects in laser-electron interactions
	Authors: C. Harvey
Abstract: Using our recently developed, fully covariant numerical formalism for solving the Landau Lifshitz equation, we consider how the radiation reaction alters the dynamics of an electron in a high-intensity laser field. Modelling our laser as a paraxial Gaussian beam, we look for scenarios where the radiation reaction is strongly manifest.	

34	**Name:** Amol Holkundkar
	Title: Wakefield generation in magnetized plasmsa
	Authors: A. Holkundkar, G. Brodin, M. Marklund
Abstract: We have considered wakefield generation in plasmas by electromagnetic pulses propagating perpendicular to a strong magnetic field, in the regime where the electron cyclotron frequency is equal to or larger than the plasma frequency. PIC-simulations reveal that for moderate magnetic field strengths previous results are re-produced, and the wakefield wavenumber spectrum has a clear peak at the inverse skin depth. However, when the cyclotron frequency is significantly larger than the plasma frequency, the wakefield spectrum becomes broad-band, and simultaneously the loss rate of the driving pulse is much enhanced. A set of equations for the scalar and vector potentials reproducing these results are derived, only using the assumption of a weakly nonlinear interaction.	

35	**Name:** Jaroslav Huynh
	Title: SOFIA iodine laser system as a driver for OPCPA
	Authors: J. Huynh, J. Dostal, M. Divoky, L. Kral, B. Kralikova, O. Novak, M. Smrz, P. Straka, H. Turčičová
Abstract: A unique hybrid iodine laser system was developed as a driver for a single shot OPCPA technique. A solid-state front-end is followed by gaseous iodine laser amplifiers. Frequency trippled iodine line (355 nm) is used as a pump for a two-stage OPA. The beams synchronization and the front-end automatic stabilization are discussed.	

36	**Name:** Konstantin Ivanov
	Title: Microstructurized melted metal target for x-ray source enhancement
	Authors: K.A. Ivanov, D.S. Uryupina, R.V. Volkov, A.V. Brantov, V.Yu. Bychenkov, M.V. Povarnitsyn, A.B. Savel'ev
Abstract: Appreciable enhance of hard x-ray yield from plasma, created onto the surface of melted metal target by sub-relativistic femtosecond laser pulse with a small prepulse, leading the main pulse over few nanoseconds, was observed. Optical shadowgraphy revealed the formation of dense microjets by the action of prepulse, emitted from the surface. Experimental results are discussed using 3D PIC and 1D hydrodynamic widerange EOS simulations.	

37	**Name:** Robert Jaeger
	Title: Target development and methrology for ion acceleration
	Authors: R. Jaeger, I. Alber, G. Schaumann, A. Ziegler, M. Roth
Abstract: This poster presents developments of selected target designs. This includes the specification, diagnostics and methrology to characterize targets regarding the surface & volume density (low density foams), surface roughness, etc. If the amount of the absorbed laser energy can be increased significantly by specific target surface modifications, it is possible to use laser systems providing lower energy but higher repetition rates, e.g. for ion acceleration.	

38	**Name:** Axel Jochmann
	Title: Status of PHOENIX - A tunable short pulse X-Ray source at the HZDR
	Authors: A. Jochmann, J. Couperus, A. Debus, U. Lehnert, U. Schramm, T. Cowan, R. Sauerbrey, A. Iram
Abstract: The generation of ultrashort X-ray pulses via the Thomson backscattering mechanism is proposed for the study of the mechanism itself and for its later application in single-shot X-ray pump probe experiments. Here, an electron bunch with energies up to 35 MeV and charges up to 1 nC delivered by the radiation source ELBE will collide with a counter-propagating high power laser pulses (up to 3 J, 30 fs) from the DRACO Ti:Sapphire laser system. Our previous theoretical studies predicted that scattered photon energy as high as 27 keV within a picosecond pulse	

39	**Name:** Jinchuan Ju
	Title: X-ray radiation and electron acceleration by laser wakefield inside capillary tubes
	Authors: J. Ju, A. Dopp, K. Cassou, G. Genoud, F. Wojda, M. Burza, K. Svensson, O. Lundh, A. Persson, G. Maynard, C.-G. Wahlstrom, B. Cros
Abstract: Electrons acceleration by laser wakefield and associated betatron radiation are studied in long plasmas inside capillary tubes. Results of experiments preformed at the Lund Laser Centre (LLC), using the 10-Hz Ti-sapphire pulsed laser (800nm, ~40fs, ~650mJ) will be presented.	

40	**Name:** Elad Schleifer
	Title: Stability and instability of polarization in laser filamentation in air
	Authors: A.H. Sheinfux, G. Fibich, E. Schleifer, J. Papeer, B. Ilan, A.Zigler
Abstract: The main effects governing the laser filamentation are dynamical balance between kerr-focusing and plasma defocusing. The laser field's polarization along the filament has not been as extensively researched. A direct measurement of the polarization state inside the filament is near-impossible due to the high intensities (around $10^{15}Wcm^{-2}$) in the filament core. We are demonstrating a new approach for analysis of filament polarization state by examining the polarization dependent features of the damage marks created by high intensity filaments on the metal target (FLIPSS).	

Poster Session 2 – Friday 19 August 2011

1	**Name:** Ajay Kawshik
	Title: Clusters for high-intensity laser-matter interactions
	Authors: A. Kawshik
Abstract: Characterisation of Argon clusters produced during a super-sonic gas jet expansion and its interaction with high intensity laser pulses are presented here. Measurement of electrons accelerated during laser-cluster interactions and its x-ray emission are also discussed.	

2	**Name:** Yevgen Kravets
	Title: High energy laser pulse propagation in plasma. Photon acceleration and self–focusing effects
	Authors: Y. Kravets, A. Cairns, A. Noble, B. Ersfeld, R. Islam, G. Raj, D. Jaroszynski
Abstract: The interaction of intense electromagnetic fields with matter is currently an important area of research. In many cases the propagation of an intense laser pulse in plasma plays an important role. Here we present an analysis of pulse propagation using the ray tracing method, which includes relativistic and ponderomotive self-focussing, and photon-acceleration and deceleration. This work is relevant to the evolution of the laser pulse in laser plasma wakefield accelerators operating in the bubble regime.	

3	**Name:** Miroslav Krus
	Title: Electron laser wakefield acceleration at Ti:sapphire laser system at PALS
	Authors: M. Krus, D. Margaronne, J. Prokupek, J. Hrebicek
Abstract: We will present the first results of laser wakefield acceleration of electrons at PALS Ti:sapphire laser system which is operating at 800nm and delivering 40 fs, 1J pulses (25TW). We will demonstrate relativistic self-guiding of laser pulses focused on various gas jet targets (He, N2, Ar). The self-guided channel formation is measured by interferometry and Thomson scattering of probe pulse. The influence of channel presence and beam injection into acceleration phase on beam characteristics are investigated.	

4	**Name:** Bjorn Landgraf
	Title: High resolution 3D gas-jet characterization
	Authors: B. Landgraf, M. Schnell, A. Sävert, M. Kaluza, Ch. Spielmann
Abstract: We present a tomographic characterization of arbitrarily shaped gas jets employed for high-intensity laser-plasma interaction experiments. With a Mach-Zehnder interferometer we measured the phase shift for different directions through the gas jet. From the recorded interferograms we retrieved the 3- dimensional (3D) density distribution by tomographic reconstruction based on the filtered back projections (FBP).	

5	**Name:** Utaz Lawi
	Title: Improvement of wave and acceleration of electron in plasma
	Authors: U. Lawi
Abstract: My poster will present the possibility on how we can improvement of wave and acceleration of electron in plasma at external field, in which shows the wave are improve and charged particles would be accelerated through coupling wave.	

6	**Name:** Maxim Legkov
	Title: Electron-positron-photon plasma formation in the strong laser field
	Authors: M.V. Legkov, A.M. Fedotov
Abstract: Such significant QED process as electron-positron-photon cascade production in strong laser field is considered. The number of particles during the process is growing exponentially in time. This leads to vast formation of electron-positronphoton plasma in the focus of the laser beam. Such lower-order inverse processes as photon absorption and one-photon annihilation become important. The plasma absorbs an essential part of the energy of the laser field. This process imposes natural limits for both the cascade development and the maximal attainable intensity of the laser field.	

7	**Name:** David MacLellan
	Title: Reflectivity measurements of intense laser-plasma interactions
	Authors: D.A. MacLellan, M.J.V. Streeter, D.C Carroll, R. Prasad, S. Kar, H. Ahmed, D. Doria, K. Kakolee, M. Borghesi, P. McKenna

Abstract: Experimental evidence for critical density surface dynamics under the influence of intense laser-plasma interactions is reported. We describe the effects that pulse contrast, laser polarization and target composition have on the movement of the critical surface, diagnosed by Doppler shifting and spectral broadening and modulation of the back-reflected light from the critical surface.In addition to providing a measurement of laser absorption and deposition, it can also indicate the effect that the strong ponderomotive force has on the highly overdense plasma. It is hoped that these results may set the stage to confirm measurements of exotic ion acceleration mechanisms such as Radiation Pressure Acceleration (RPA) in the next generation of intense laser-solid experiments.

8	**Name:** Yury Malkov
	Title: Experimental characterization of plasma waves excited in gas-filled dielectric capillary tubes by intense femtosecond laser pulses
	Authors: V. Eremin, Yu. Malkov, V. Korolikhin, A. Kiselev, S. Skobelev, A. Stepanov, N. Andreev

Abstract: Spectral modifications of an intense femtosecond laser pulse exciting a plasma wave in a gas-filled dielectric capillary tube were used to characterize the wake's amplitude. The value of the accelerating fields up to 10MeV/cm for a 5cm capillary tube was derived from a comparison of the experimental and stimulated spectra.

9	**Name:** David Martin
	Title: A high-energy resolution X-ray spectrometer with interchangeable detectors (HEX-ID) for short-pulse laser-plasma experiments
	Authors: D.F. Martin, A.L. Meadowcroft

Abstract: The design of previous x-ray spectrometers (Henway and HENEX) have been analysed in order to produce a four channel high-energy x-ray spectrometer (HEX-ID) with superior resolution. The shielding has been adapted for use on short-pulse laser plasma experiments. HEX-ID is intended for: verification of backlighter materials; identification of plasma ion species and their charged states; and measurement of plasma opacity and absolute conversion efficiency of characteristic x-ray line emissions. The spectrometer will be fielded at the new Orion laser facility at AWE (UK) and on OMEGA.

10	**Name:** Joana Martins
	Title: Betatron radiation from multi-PW laser driven wakefield accelerators
	Authors: J.L. Martins, J. Vieira, S.F. Martins, R.A. Fonseca, L.O. Silva

Abstract: We explore the features of the betatron radiation that can be obtained from upcoming multi-PW laser-facilities, capable of accelerating electrons to energies over 10 GeV through laser-wakefield acceleration. We model these scenarios with massivelly parallel PIC simulations coupled to a post-processing radiation diagnostic code.

11	**Name:** Matthew McCormack
	Title: Establishing equivalence of transport equations and conservation laws
	Authors: M. McCormack

Abstract: Conservation laws are a vital and fundamental component of our understanding of physical systems. An equivalence relation between conservation laws and the transport equations for differential forms will be established. The conservation of particle number within plasmas will be considered to test this result.

12	**Name:** Sebastian Meuren
	Title: Radiative corrections in strong field QED in intense laser fields
	Authors: S. Meuren, A-D Piazza

Abstract: We investigate radiative corrections to electron states in a back-ground plane-wave laser field. At the tree level, electrons in strong-field QED are described by Volkov states. We investigate these quantum corrections by solving the Dirac-Schwinger equation perturbatively in a contact-crossed field and in a linearly polarized plane wave field.

13	**Name:** Chris Murphy
	Title: Antimatter creation using intense lasers
	Authors: C.D. Murphy
Abstract: Recent developments in laser technology has allowed new states of matter found elsewhere in the universe to be produced and studied. One such example is the electron-positron plasma. We study mechanisms to produce a dense collection of positrons in the laboratory.	

14	**Name:** Liviu Neagu
	Title: Towards laser-produced plasma opacity measurements for x-ray lasers optimization
	Authors: L. Neagu, R. Banici, O. Manta, R. Ungureanu, R. Dabu, D. Ursescu
Abstract: Using a 15 TW laser system, plasma opacity experiments are developed. A 200 ps pulse creates a plasma, while a 100 fs laser pulse is transmitted through the plasma at different incidence angles. Varying the energy of the short pulse, the transition form linear-to-non-linear inverse Bremsstrahlung absorption mechanism areinvestigated.	

15	**Name:** Alex Ortner
	Title: Investigation of a dense, inderectly heated plasma for energie loss experiments with heavy ions
	Authors: A. Ortner, D. Schumacher, A. Frank, A. Blazevic, M. Roth
Abstract: We use a submillimeter hohlraum to convert the light of the high energy laser system PHELIX into intense x-ray radiation. With this, we heat a carbon foil and produce a dense plasma. Now, we investigate the interaction of this plasma with a fast heavy ions beam. We are particularly interested in the energy loss in this plasma. In a first step we used a multi-frame interferometer to determine the plasma expansion which is presented in this poster.	

16	**Name:** Evgeny Papeer
	Title: Femtosecond laser plasma filament interaction with microwave radiation
	Authors: J. Papeer, Y. Ehrlich, A. Zigler
Abstract: Laser filament induced microwave waveguiding in air have been recently suggested. The efficiency of such process strongly depends on the electron density inside the filament. We suggest a simple method to evaluate the electron density by a direct measurement of microwave - filament interaction.	

17	**Name:** Sergey Pikuz
	Title: Multi-MeV X-ray source induced by femtosecond laser pulses in air environment
	Authors: S.A. Pikuz Jr., A.Ya. Faenov, O.V. Chefonov, A.V. Ovchinnikov, P.S. Komarov, S.V. Gasilov, S.I. Ashitkov, I.Yu. Skobelev, A.G. Zhidkov, A. Zigler
Abstract: The source of multi-MeV X-ray photon was obtained yb means of moderate intensity (~1e15 W/cm2) femtoseond laser pulses focused in air very close to solid target surface. It is proven that mechanism of X-ray emission is connected with generation of very fast electrons in the air plasma wake field. The source was applied to radiography of thin films and biological samples.	

18	**Name:** Peter Racz
	Title: Strong field ultrafast plasmonics
	Authors: P. Rácz, P. Dombi, M. Lenner, N. Kroó, G. Farkas, S. E. Irvine, A. Mitrofanov, A. Baltuška, T. Fuji, F. Krausz, A. Y. Elezzabi
Abstract: We investigated experimentally few cycle surface plasmon generation by a time-resolved multi-photon photoemission measurement. We could achieve a 2-3 optical cycle long propagating surface plasmon wavepacket. Furthermore we demonstrated efficient all-optical plasmonic electron acceleration up to keV energy at relatively low laser intensity, demonstrating the existence of strong-field effects in plasmonic fields.	

19	**Name:** Martin Ramsay
	Title: Characterization of laser-accelerated protons transiting planar foil targets
	Authors: M.G. Ramsay, A.J. Simons
Abstract: Two-dimensional particle-in-cell (PIC) simulations have been performed to characterize the forward-travelling proton population produced during short pulse laser interactions. The differences between the predicted proton spectra inside the targets (necessary for activation calculations) and the spectra behind the foils that might be recorded by standard diagnostic methods are also demonstrated.	

20	**Name:** Ayesha Rehman
	Title: Optical Probing of high-intensity laser propagation through plasmas
	Authors: A. Rehman, Z. Najmudin , P.A. Norreys, , C. Bellei, S. Kneip, S.P.D. Mangles, S. Nagel, C. Palmer, N. Dover, K.L. Lancaster, M. Borghesi, H. Chen, E.L. Clark, S. Hassan, J. Jiang, N. Kageiwa, N. Lopes, C. Russo, G. Sarri, R.H.H. Scott, R. Ramis, K.A. Tanaka, M. Temporal, T. Tanimoto, R. Trines, J.R. Davies, M. Yeungand, M. Zepf, J. Schreiber
Abstract: There are number of applications that require the formation of a stable channel in underdense plasma. Tabak et al. proposed the use of a laser with an intensity exceeding 1020 W cm-2 to make a channel through the underdense plasma and to push the critical surface close to the core (hole boring). Here we represents the results of two experiments to study plasma channelling with high intensity short pulse (1ps) and with long pulse(30ps) laser at the Rutherford-Appleton Laboratory using Vulcan Petawatt facility.	

21	**Name:** Aakash Sahai
	Title: Proton acceleration by trapping in a laser driven relativistic plasma snow-plow
	Authors: A. Sahai, T. Katsouleas, A. Tableman, J. Tonge, F. Tsung, W. Morl
Abstract: A novel regime of proton and ion acceleration using Plasma created by Laser ionization is presented. In Coulomb explosion and TNSA the protons are neither of high enough energy nor monoenergetic enough. We are studying the Relativistic transparency regime to control the proton acceleration in a snow plow of charge at the critical density. The snow plow's space charge drags the protons and its speed can be controlled by increasing the laser intensity at a specified rate. We derive analytical expressions for the snow plow speed and design equations for laser pulse shape to optimally accelerate protons from rest to desired veolocities.	

22	**Name:** Nasrulla Satlikov
	Title: Third and fifth harmonic generation in plasma plumes using picosecond laser pulse
	Authors: N.Kh. Satlikov, G.S. Boltaev, R.A. Ganeev, T. Usmanov
Abstract: We studied processes of interaction between laser plasma plumes on Mn, Cu, Ag, Au, targets and picosecond Nd:YAG laser pulses at different experimental conditions. The optimization of these processes allows enhancement of frequency conversion efficiency of fundamental pulse energy into third and fifth harmonics.	

23	**Name:** Tiberiu Sava
	Title: The ELI-NP Project
	Authors: ELI-NP Team (working groups at http://www.nipne.ro/eli_np_workshop/working-groups.php)
Abstract: The ELI-NP research infrastructure will be built starting with the beginning of 2012 at the NIPNE-HH (IFIN-HH) site in Bucharest-Magurele and will incorporate two major facilities: One multi-PW APOLLON type laser, having the foreseen power in the range of 10 PW and a highly-brilliant γ-ray source based on laser-electron beam interaction. The scientific case implies perturbative and non-perturbative high-field QED experiments, high resolution nuclear spectroscopy, astrophysics nucleosynthesis and also applications in the field of life and material sciences, nuclear resonance fluorescence (NFR) and new acceleration tehniques.	

24	**Name:** Gabriel Schaumann
	Title: Target Fabrication at Darmstadt University
	Authors: G. Schaumann, S. Bedacht, O. Deppert, D. Schumacher, M. Roth, D. Hoffmann
Abstract: This poster outlines several target fabrication techniques such as photo lithography, electroplating, thin film coating, micro-moulding and laser machining, which are amenable to the production of 3D micro-targets. The presentation aims at providing information about manufacturing techniques with respect to target specifications achievable, possible geometries, tolerances and material combinations to support researchers in the field of laser-plasma experiments with their target design.	

25	**Name:** Elad Schleifer
	Title: Generation of Multi-MeV protons by interaction of modest laser intensities with H2O "snow" nano-wire targets
	Authors: E. Schleifer, N. Bruner, S. Eisenmann, M. Botton, S.A. Pikuz, A. Zigler
Abstract: The ability to generate fast protons from small and relatively inexpensive systems is of great importance to many applications. Target structuring is considered as one of the possible ways towards this goal. Nano-structured targets attract significant attention. The presented scheme of using H2O “snow” nano-wires can relieve the demand for very high laser intensities, thus reducing the size and the cost of laser systems.	

26	**Name:** William Schumaker
	Title: Ultrafast electron beam radiography of self-generated magnetic fields from high intensity laser-solid interactions
	Authors: W. Schumaker, C. McGuffey, N. Nakanii, A.G.R. Thomas, C. Zulick, V. Chvykov, G. Kalintchenko, V. Yanovsky, A. Maksimchuk, K. Krushelnick
Abstract: Using ~10 fs electron bunches generated with laser wakefield acceleration as a probe, the femtosecond temporal evolution of a ~4x10^19 W/cm^2 short laser pulse with a metallic foil has been studied experimentally. Magnetic fields of ~100 megagauss were observed travelling outward from the interaction point of the laser with the metallic foil at nearly the speed of light. These results are supported by OSIRIS particle-incell simulations.	

27	**Name:** Graeme Scott
	Title: Maximising the dynamic range of radiochromic film through novel scanning techniques
	Authors: G.G. Scott, J.S. Green, C. Brenner, P. Gallegos, M.R. Mitchell, J. Rickman, F. Fiorini, S. Green, D. Kirkby, P. McKenna, D. Neely
Abstract: We report that by using the ultra violet region of the spectrum to backlight radiochromic film, the maximum measurable dose of the film can be increased to at least 200 kGy, an order of magnitude greater than the three colour method, and up to two orders of magnitude greater than using greyscale scanning.	

28	**Name:** Hanan Sheinfux
	Title: Plasma structures for Quasi phase matched high harmonic generation
	Authors: A.H. Sheinfux, Z. Henis, M. Levin, A. Zigler
Abstract: We suggest a scheme for creation of periodic plasma structures by ablation of a lithographic pattern and consider its application in increasing the efficiency of high harmonic generation in plasma. In a proof of principle experiment, the plasma parameters and modulations of the ablated plasma were measured.	

29	**Name:** Boussaidi Slah
	Title: Spectroscopy of laser-induced Plasma and applications
	Authors: S. Boussaidi, R. Riahi, R. Hannachi, H. Ghalila, Z. Benlakhdar, N. Jaidane
Abstract: We have performed diagnostics of plasmas produced by laser ablation of water and soils to evaluate the possibility of pollutant detection by means of laserinduced breakdown spectroscopy. Large band optical emission spectra were analyzed to measure plasma temperature, electron density and the densities of atomic and ionic species within the plume. The analyses were performed by comparing the experimental spectra to those obtained by simulations.	

30	**Name:** Martin Stefan
	Title: Ponderomotive force in a quantum plasma
	Authors: M. Stefan, J. Zamanian, G. Brodin, M. Marklund
Abstract: The concept of a ponderomotive force due to the intrinsic spin of electrons is developed. An expression containing both the classical as well as the spin-induced ponderomotive force is derived, including effects from higher order spin fluid moments such as the spin-velocity correlation tensor.	

31	**Name:** Anna Subiel
	Title: ALPHA-X laser-plasma wakefield accelerator
	Authors: A. Subiel, S. Abuazoum, M.P. Anania, C. Aniculaesei, E. Brunetti, S. Chen, S. Cipiccia, D. Clark, B. Ersfeld, J. Farmer, D. Grant, Y. Kravets, G. Manahan, T. McCanny, A. Noble, R. Islam, R. Issac, G. Raj, G. Vieux, G. Welsh, M. Wiggins, X. Yang, D. Jaroszynski
Abstract: ALPHA-X (Advanced Laser-Plasma High-energy Accelerators toward X-rays) laser wakefield accelerator at the University of Strathclyde has been used to study properties of generated electron beams. We present investigated parameters: emittance, charge and electron energy. High quality properties of produced electrons indicate their feasibility to many applications.	

32	**Name:** Steinke Sven
	Title: Dynamics of nanometer-scale foil targets irradiated with ultra-high contrast laser pulses
	Authors: S. Steinke
Abstract: In the regime of dominant ion acceleration by the laser radiation pressure we studied the high harmonic radiation in transmittance of nanometer foil targets. The observation of the harmonies spectra allows a non-invasive extraction of the target density which is of utmost interest for the optimization of the ion acceleration process.	

33	**Name:** Elena Svystun
	Title: Numerical simulation of effect of finite plasma radius on regular wakefield by driver
	Authors: M.O. Azarenkov, V.I. Maslov, I.N. Onishchenko, O.M. Svystun, A.M. Yegorov
Abstract: It is shown that the laser pulse - driver forms sufficiently wide plasma, so that the strong stochastization of wakefield in comparison with the case of preliminary created plasma is not observed; the surface wave decreases wakefield in the steeping region; the wakefield becomes more regular at increase of plasma radius.	

34	**Name:** Olivier Tresca
	Title: Control of the spatial-intensity profile of laser accelerated proton beams using shaped limited-mass targets
	Authors: O. Tresca, D. C. Carroll, X. H. Yuan, et al
Abstract: Lateral spreading of laser generated hot electrons on thin foil target surface has been previously observed. We will present experimental and numerical results showing how those electrons can be used to modified the TNSA acceleration of ions. We will discuss the possibility of using those electrons to enhance the ion accelerating field, and to modified the spatial-intensity distribution using shaped targets.	

35	**Name:** Marija Vranic
	Title: Radiation cooling dominated regimes in particle-in-cell simulations
	Authors: M. Vranic, J.L. Martins, R.A. Fonseca, L.O. Silva
Abstract: Under the presence of high intensity lasers, the motion of particles in the ultrarelativistic regime can be severely affected by radiation damping. We have implemented the radiation reaction in Osiris 2.0 framework and assessed the role it plays in several physical scenarios including single particle motion and collective behaviour in laser-matter interactions.	

36	**Name:** Florian Wagner
	Title: Laser-accelerated proton beams
	Authors: F. Wagner
Abstract: The topic is the acceleration of protons with a mechanism called TNSA (=Target Normal Sheath Acceleration). Micrometer-thin metal foils are irradiated with high-energy short-pulse lasers. This leads to the acceleration of protons and ion beams at the rear side of the target.	

37	**Name:** Thomas White
	Title: Simulation of ion dynamics in dense non-ideal plasmas
	Authors: T. White, J. Mithen, B. Crowley, G. Gregori
Abstract: Electron-ion relaxation processes play an important role in laserproduced plasmas and Inertial Fusion Energy experiments. We have performed large-scale molecular dynamics simulations of non-ideal dense plasmas showing how the x-ray scattering cross section (dynamical structure factor) varies for regimes above and below the solid/fluid phase transition. Applications to experiments performed at LLNL and FLASH will be discussed.	

38	**Name:** Steven White
	Title: X-ray scattering from warm dense iron
	Authors: S. White, K. Mckeever, M. Mikako, G. Nersisyan, M. Notley, K. Falk, G. Gregori, C.L.S. Lewis, D. Riley
Abstract: Results from a recent experiment at the Vulcan target area west facility are presented. Iron samples were shock compressed to pressures and densities characteristic of WDM states and probed with 4.75 KeV x-rays. Scattering was both angularly and spectrally resolved using a wide angle spectrometer (WASP).	

39	**Name:** Lucy Wilson
	Title: Double slit interferometry to measure EUV refractive indices of solids using high harmonics
	Authors: L. Wilson, A. Rossall, E. Wagenaars, G. Tallents
Abstract: Work has been undertaken to measure both the real and imaginary parts of the refractive index of aluminium using double sliti nterferometry and high hamonics. Values of the refractive index between 17eV and 40eV have been obtained. It is hoped that this technique could be applied to laser heated materials.	

40	**Name:** Mark Yeung
	Title: High harmonic generation from relativistic laser plasma interactions
	Authors: M. Yeung
Abstract: High intensity laser interactions with solid targets can generate high order harmonics of the fundamental laser frequency due to upshift from the relativistically oscillating surface or from attosecond electron bunch driven plasma oscillations. These harmonics are beamed and phase-locked and so can support short wavelength, attosecond pulses for potential uses in biomolecular imaging, studying bound electon dynamics and in free-electron laser seeding.	

41	**Name:** Jens Zamanian
	Title: Semiclassical relativistic kinetic theory
	Authors: J. Zamanian, M. Marklund, G. Brodin, F. Asenjo
Abstract: Starting from a fully relativistic Foldy-Wouthoysen transformed Dirac Hamiltonian a scalar kinetic theory for an electron is developed. The resulting equation is valid when the scale length is sufficiently long compared to the de Broglie wave length. This is a work in progress and hopefully there will be time to find some nice applications for this.	

SUSSP68
Laser-Plasma Interactions
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