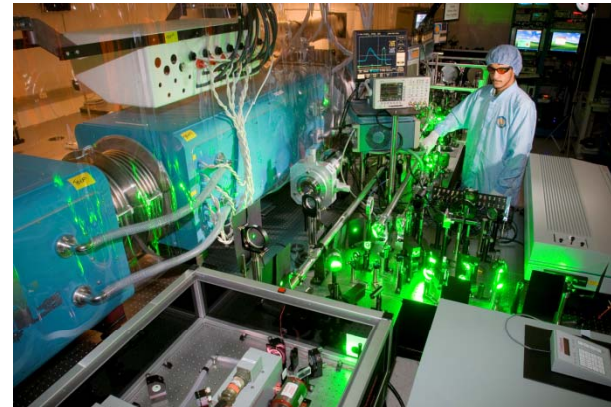
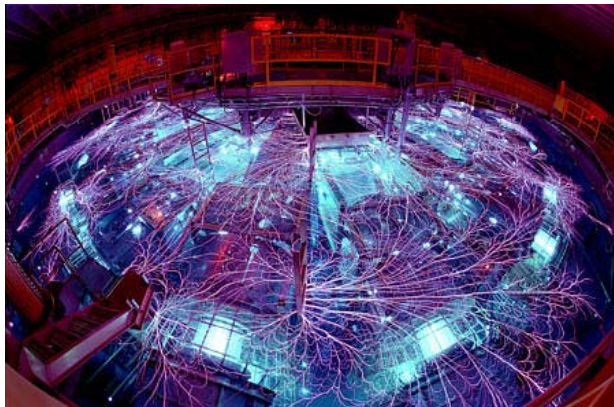


Workshop on “Science with High-Power Lasers and Pulsed Power (#2) Research Opportunities and User Meeting”



Santa Fe Eldorado Hotel
August 4-6, 2010

Presented by:

Alan Wootton
University of Texas

Introduction

- Purpose, objectives and deliverables of this meeting
- Summary of 2009 (inaugural) workshop
 - Status of highlighted concepts
- Agenda
 - Research Directions
 - new ideas, more on older ideas
 - User meeting:
 - ongoing 'user' research
 - facilities and how to access them
 - Discussion
- Administrative information

The purpose of this meeting

A 2½-day workshop to discuss broad-interest, fundamental science experiments that can be performed using the pulsed power facilities and high-power lasers at Sandia National Laboratories (SNL) and the University of Texas (UTX).

To facilitate a user meeting for current and prospective users of the same facilities. Of note is the intent to provide up to 15% of the shot time on Z at SNL for fundamental science.

The facilities will be discussed on Thursday

At SNL: the Z, Z-Beamlet, and Z-Petawatt facilities are all available for HED science experiments. Up to 15% of Z shots will be available for fundamental science

At UTX (Austin): Texas Petawatt, THOR, THOR PW, GHOST

Information on facility capabilities, and access, will be provided on Thursday

The objectives of this meeting

- To propose and discuss fundamental research worthy of pursuit on the pulsed power and laser facilities at SNL and UTX
 - New ideas
 - New participants (especially new-to-HED and new-to-materials science academic participation)
 - Status of proposals from last year
- To facilitate a user meeting, and present to users the various facility operational plans, capabilities and support infrastructure
- To obtain user recommendations for improvements
- Provide an opportunity for existing and new working groups to develop experimental plans and proposals, even do some science

Last year we discussed ‘worthy of pursuit’

- Be performed using the UTX or SNL (or both) high power lasers or pulsed power (or both)
- Involve the national or international scientific community
- Grow the community
- Facilitate a proposal to a specific funding agency (e.g. DoE, NSF, NIH, ...)
- Produce great science in the broadest national interest
- Produce results publishable in high-impact journals
- Produce results in either a short term (~3 year) or longer term (~5 year) timeframe
- Be in either basic or applied science areas
- Cover low-hanging fruit through grand challenges

Deliverables

- As suitable, grow existing research and research-proposal teams
 - grow the community by further involving academia, including students
- Develop teams for those concepts highlighted in 2009 but not yet further developed
 - if possible academic PI, with student participation
 - faculty co-PI
 - initiate proposal writing (break-out sessions)
- Propose new fundamental research opportunities that can be developed into proposals (session 1 and break-out sessions)
- Initiate new teams, new proposals (break-out session)

A first national Research Directions workshop (2009) established ties to a national user community



IHEDS: SNL & UTEXAS

Science with High-Power Lasers and Pulsed Power:

Report on the inaugural workshop, Santa Fe,
July 28 – 30, 2009

8/10/2009

<http://www.ph.utexas.edu/~iheds/2010%20IHEDS%20Workshop.html>

A summary report included specific recommendations

Objectives: Discuss and propose projects worthy of further pursuit: high science impact, expand community, involve students, timely, reasonable cost, ..

Participation: 9 universities, 5 national labs, new (to HEDS) academic researchers, international

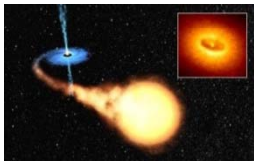
Recommendations:

1. Encourage working groups to develop concepts
2. Initiate a national call for proposals for User-involved research at SNL and UTX, to be peer reviewed
4. Hold an annual SNL / UTX Users' Meeting

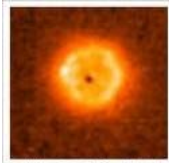
The first workshop defined four research areas and ten specific experimental topics

Summary: Science with High Power Lasers and Pulsed Power

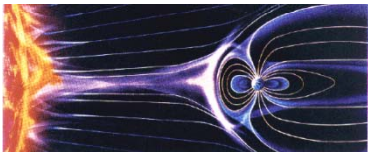
Laboratory astrophysics



Black holes



White dwarfs

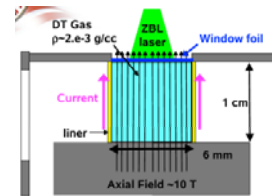
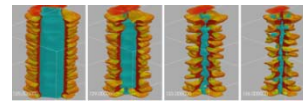


Collisionless shocks

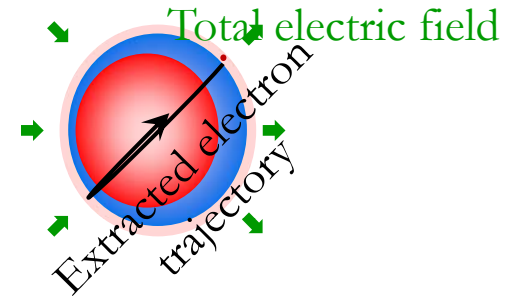


Collisionless dissipation

Fusion science

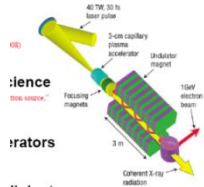


Magnetized liner inertial fusion



Cluster fusion

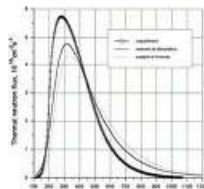
Particles and beams



Electron accelerators

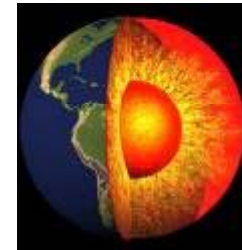


Proton acceleration



Thermal neutrons

Planetary science

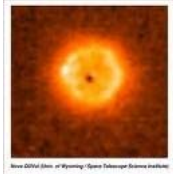


Earth core properties – the dynamo

Prioritization was required

Laboratory astrophysics

Test case

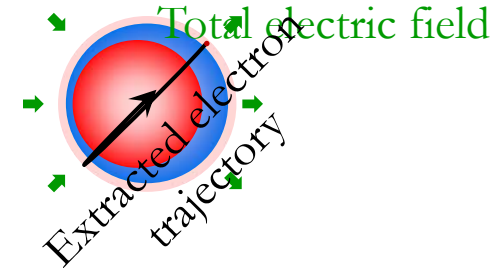


White dwarfs

UTA Astronomy, CHEDS, SNL, UNR

Fusion science

LDRD

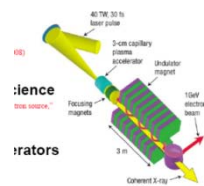


Cluster fusion

IFS, CHEDS, SNL

Particles and beams

Ongoing at UTX



Electron accelerators

UTA physics, CHEDS, SNL

LDRD



Proton acceleration

MD Anderson, IFS, CHEDS, SNL

Planetary science

Selection was based on: new-to-HED academic involvement, high scientific impact, timeliness, reasonable cost, preparedness, least impact on facilities. Two highly-rated proposals have not moved forward: black holes, earth's core.

Agenda Session 1: Research Directions workshop

Wednesday, August 4th

Session 1: New Ideas

- | | |
|---------------|--|
| 8:45 – 9:15 | Todd Ditmire (UT), Next generation lasers and light sources |
| 9:15 – 9:45 | Nathaniel Fisch (Princeton), Wave Compression in Plasma |
| 9:45 – 10:15 | Gilbert Collins (LLNL), Planetary cores |
| 10:30 – 11:00 | Edison Liang (Rice), Generation and Application of Superstrong Magnetic Fields with Ultra-Intense Lasers |
| 11:00 – 11:30 | Bedros Afeyan (Polymath), Nonlinear Optical Processes and their Control in High Energy Density Plasmas |
| 11:30 – 12:00 | Duane Liedahl (LLNL), X-rays from black hole accretion disks |
| 1:15 – 1:45 | Didier Saumon (LANL), Unsolved problems in dense hydrogen and helium |
| 1:45 – 2:15 | Dmitri Ryutov (LLNL), Magnetized high energy density plasmas |
| 2:15 – 2:45 | Ronald Redmer (Rostok), High-pressure phase diagram and planetary interiors |
| 2:45 – 3:15 | Joseph Kindel (UNR), Research at the Nevada Terawatt Facility |

Agenda Session 2: User meeting – ongoing work

Wednesday, August 4th

Session 2: User Science

- | | |
|-------------|---|
| 3:30 – 4:00 | Don Winget (UT), White dwarf photospheres |
| 4:00 – 4:30 | Roberto Mancini (UNR), Experiments and modeling of photoionized plasmas at Z |
| 4:30 – 5:00 | Jim Bailey (SNL), Laboratory tests of stellar interior opacity models |
| 5:00 – 5:30 | Daniel Sinars (SNL), Measurements of magneto-Rayleigh-Taylor instability growth in solid liners on the 20 MA Z Facility |
| 5:30 – 6:00 | Mike Desjarlais (SNL), Materials at high pressure |

Thursday, August 5th

Session 2: User Science (Continuation from Day 1):

- | | |
|-------------|---|
| 8:15 – 9:00 | Aaron Bernstein (UT), Current research using the UT laser systems |
| 9:00 – 9:30 | Marius Schollmeier (SNL), Proton acceleration experiments |
| 9:30 – 9:45 | Alexey Arefiev (UT), Proton production theory |

Agenda Session 3: User Meeting – how to access the facilities and what is available

Thursday, August 5th

Session 3: Planning for users

- 9:45 – 10: 30 Gilliss Dyer (UT), The UT laser facilities and diagnostics: what they can do and how to become a user
- ~~10:45 – 11:45 Gordon Leifeste (SNL), The Z Facility, diagnostics, plans, and user access~~
- 10:45 11:15 Gordon Leifeste (SNL), Z Fundamental Science Collaboration Program
- 11:15 11:45 Greg Rochau (SNL), Fundamental Science Experiments on Z: A Diagnostic Perspective
- 11:45 – 12:30 Briggs Atherton (SNL), The SNL laser facilities (including diagnostics) and how to become a user

Agenda: working groups

Thursday, August 5th 1:15 – 6:00 pm

Working Groups: Sunset, Pinon, Chaparral & Turquoise rooms

Breakout 1: Radiative astrophysics, organized by Don Winget and Jim Bailey – Sunset Room

Breakout 2: Planetary and materials science, organized by Thomas Mattsson – Pinon Room

Breakout 3: Magnetized high energy density science organized by David Ampleford – Chaparral Room

Breakout 4: Proton acceleration , organized by Marius Schollmeier – Turquoise Room

Format: presentations, discussions, work

Objectives:

1) Discuss new ideas from Session 1

Develop new proposals, new teams?

Grow our community? (who should be here but isn't, especially new-to-HED or materials)

2) Discussion of current work from Session 2

Existing group(s) work together on their current projects

Extend teams or proposals?

Grow the community?

3) Discussion of facility capabilities and access from Session 3:

How to improve?

Agenda: working groups report, and round table discussion

Friday, August 6th

Session 4: Round table discussion (half day)

- | | |
|---------------|---|
| 9:00 – 9:15 | Chris Keane (LLNL), NIF Governance and Basic Science Proposal Process |
| 9:15 – 9:30 | Don Winget (UT), Astro working session report |
| 9:30 – 9:45 | Thomas Mattsson (SNL), Planetary physics working session report |
| 9:45 – 10:00 | David Ampleford (SNL), Magnetized HED working session |
| 10:00 – 10:15 | Marius Schollmeier (SNL), Proton acceleration |
| 10:15 – 10:25 | Ken Struve (SNL), Students and SNL |
| 10:25 – 10:35 | The White Dwarf team (UT), Our experiences at SNL |
| 10:35 – 12:00 | Discussion |

Administrative Details

Meeting Room Assignments (also listed on your printed materials):

Plenary Sessions: Sunset

Parallel Breakouts Sessions (Thursday afternoon):

Astrophysics: Sunset

Planetary and materials: Pinon

Magnetized HED: Chaparral

Proton acceleration (particles and beams): Turquoise

You cannot work in the break-out rooms past 6 pm

Note start times; Friday is different (9 am not 8:15 am)

Schedule changes

Thursday 10:45 11:15 Gordon Leifeste (SNL), Z Fundamental Science Collaboration Program

11:15 11:45 Greg Rochau (SNL), Fundamental Science Experiments on Z: A
Diagnostic Perspective

Maria: maria.aguirre@mail.utexas.edu

Cari: cagerlo@sandia.gov (505) 417-2398