ALPA-Seminar – Jörg Schreiber

This short document provides information on the Seminar Applications of Laser-driven Particle Acceleration (ALPA). The seminar talks shall give opportunity to profoundly explore a topic of own interest. The aim is to find and understand relevant information, to gain deeper knowledge of a special topic and to practice to pass this knowledge on to fellow students. This requires comprehending, modifying and reproducing scientific content practicing scientific language and communication.

If you have presented before, I still recommend the notes for **getting started**, the shortlist of **seminar talk guidelines** and the guide to **find literature**, at worst, they put a smile on your face. If you are super motivated or feel that it would help your training, you can also hand in a **written report** for your topic, which I am happy to evaluate. Most importantly, you will find suggestions for **presentation topics**. In addition, I am always open to your suggestions if they topically fit.

I. Getting Started

Find your topic

Familiarize with the general topic (Laser-plasma interactions and applications). Flash-read through the field, do not go too much into the detail of specific papers yet.

A good source to start with is of course the internet. Do not hesitate to download a presentation or a PhD-thesis that you stumble across, or watch a video of a presentation. Often, you will find the abstract and/or the introduction to be quite indicative.

Understand the motivation and the physical approach of a specific topic.

Spot points of interest (your own and your audience's).

Ask yourself, if you are interested and if you feel comfortable with this topic.

Develop your idea

You have 30-40 minutes for the presentation. Depending on your presentation style, you will have time for 10-30 slides. Sit down with a piece of paper and a pen and imagine your presentation. The success is based on a simple goal: Tell a story! There are a number points that can help organizing your thoughts:

- Introduction and Motivation: Why should the audience bother to listen to you for half an hour? Why are people investing time and money to research on this topic? What is the big picture? (Be convinced on the motivation, do not just take statements in papers for granted … this process can guide you back to "Find a topic")
- Focus on 1-2 technical/physical problems and discuss them in detail. Explain, in the context of your motivation, why you chose those. Try to focus on the frontiers of your topic.
- The audience will need to understand these points without being experts. Imagine, how you will guide them to this understanding, starting from a common knowledge basis. Avoid jargon, especially as you are not an expert yet yourself. If some wording is unavoidable, explain it.
- Be careful in inclusion of data/diagrams. Take your time to understand and explain them.

- Talk about the (potential) applications of the research topic. What is/will be its impact?
- Conclude with future challenges and future directions. Where are things going? What will we see in the next years? Do not just repeat what you have read, but form your own opinion and tell it (can be critical but must be diplomatic).
- What is your "take-home message" you want your audience to get from your presentation?
- There will be 20 minutes for discussion following your presentation, this needs to be prepared as well. This time is a chance for the audience to dig deeper and further their understanding. Take the chance to learn from this discussion yourself. (As a presenter, you can also trigger questions yourself). Eventually, it is helpful to have some back-up slides prepared.

Prepare your presentation

You have probably noticed that, given the thoughts before, 10-30 slides is not much space and 30-40 minutes is not much time. You should now also be aware, that the preparation of one slide can take a good hour. The task is not only to copy/paste information from the material you have at hand, but to present the topic as if it was your own research. This requires time and dedication!

If you invest that time, your presentation will be much easier as you will think of your wording already during preparation. You will also notice that the transitions between the slides and your train of thoughts is smooth. If not, you may have to introduce an extra slide to make it smooth.

Do not waste your time yet by realizing fancy animations. Form a solid basis first!

Practice your presentation

There is no better way to find weak points in your presentation than practicing it. Speak aloud what you are going to tell while presenting.

Do not make the mistake of silent reading!

You will find that some of your words could be strengthened by a few bullet points. You may also find yourself reading of the slides, this means you have too much text on them.

Practicing is the only key to give your presentation the required smoothness. You may even find that one or a view slides are missing or do not fit. Do not be afraid of re-iteration!

Announce your presentation

Even the best topic and presentation requires announcement. Sit down and write an abstract to do exactly that. It should contain no more than 3-4 sentences. Send it to me on the Friday before your big day.

An abstract is mandatory and often one writes it before you actually prepare your presentation. It is therefore an interesting exercise to write your abstract after you defined your topic and developed your idea already, but you can rephrase it in the end of course.

II. Seminar Talk guidelines - shortlist

- The presentation can, but does not need to be in the form of a PowerPoint presentation.
- Duration of presentation: 30-40 min
- Prior to the talk you should send an abstract (3-4 sentences) to Joerg.Schreiber@lmu.de who will then announce your presentation to the group

Points to consider for a good presentation:

- Depending on your presentation style, a good rule of thumb is much less than slide per minute.
- Make graphics and text large enough (min 18pt). Do not forget the size of axes labels, in particular if you copy information from publications this often requires re-labeling!
- Keep the slides with little text. The slides are there to illustrate your words, not to speak for themselves.
- Tell a story! The audience will need to understand your argumentation and explanation without being experts. Imagine how you will guide them to this understanding, starting from a common knowledge basis. Avoid jargon, especially as you are not an expert yet yourself. If some wording is unavoidable, explain it
- What is your "take-home message" you want your audience to get from your presentation?
- As a presenter, you can also ask questions to the audience (and the instructors).
- Practice your presentation! This way you can find weak points and missing links.
- A good presentation style includes explaining axis of plots and graphics

III. How to find literature

If you are looking for literature for your paper presentation or your seminar talk you can use one of the following options to gain access:

E-Medien Login:

- https://www.ub.uni-muenchen.de/suchen/index.html
  On this page you can find several options how to find the literature you need
- For scientific papers we recommend to use
  https://www.ub.uni-muenchen.de/suchen/google-scholar/index.html
  Click on the link "Direkt zu Google Scholar" and log in with your LMU user ID (Firstname.Lastname) and your LMU password. You will be forwarded to Google Scholar where you now have access to all papers provided by LMU

Proxy Configuration:

- https://www.lrz.de/services/netzdienste/proxy/journals-access/
  You can also configure your internet browser such that you have automatic access to all scientific papers provided by LMU
- First you have to make sure that you use a computer that has access to the Munich Scientific Network

- If you want to use your computer at home, you will need to use a VPN connection to LRZ
- In the following link you can find an instruction on how to set up the VPN connection:
  https://www.lrz.de/services/netz/mobil/vpn_en/
  We recommend to use AnyConnectClient
  https://www.lrz.de/services/netz/mobil/vpn_en/anyconnect_en/
- After you have logged in via VPN you can change your browser setting according to the following instruction
  https://www.lrz.de/services/netzdienste/proxy/browser-config_en/
  You can either use the proxy http://pac.lrz.de or http://wpad.physik.uni-muenchen.de

IV. GUIDELINES FOR A WRITTEN REPORT

Every written report, article summary – henceforth called "paper" for simplicity – requires a clear leading thread ("Roter Faden") running through it. The paper has to tell a story, which in the ideal case is also instructive.

BEFORE YOU START WRITING

Write down in bullet points the story you want to tell. For this, think about motivation of the work, the activities, methods, results you want to describe, interpretation of results and possible points for discussion. Order your bullet points and evaluate them critically, especially the relation between motivation and results. Before writing, it is possible to adapt the motivation. Only when you have finished your concept start writing (and creating elaborate graphics).

Basic Structure

INTRODUCTION. It is necessary to pick up the reader from a common (scientific) ground and to motivate him to spend time reading the paper. This means the paper should create interest. Basic terms and concepts need to be explained and the scientific context of the paper set in order to facilitate the reader understanding the paper. This description should represent the current state of the art in research and technology. Be careful not to exaggerate and not to drift to irrelevances. After this "briefing", the contribution of the paper to the research topic (the novelty of the work) is explained. Based on this the reader will decide how much time he will dedicate to the paper.

SETUP/ METHOD DESCRIPTION. Here starts the description of the author's work. Only the applied methods including the experimental or simulated setup should be described without anticipation of results. This separation helps enormously to keep structure and comprehensibility.

RESULTS. Following the methods and setup, the results can be presented in different forms, e.g. raw data that allow easily seeing the connection to the method. This is the opportunity to describe possible artifacts of the results. Henceforth, the data can be presented in a more elaborate or further evaluated way in order to illustrate relationships that are more complex. This further elaborated data form the base for the discussion.

DISCUSSION. It is important to reflect critically about the work. This is the part of the paper to write about weaknesses and strengths of the results and methods. This section interprets results and evolves statements, theories or explanations of the results.

CONCLUSION. The paper should find a proper end. This depends on the kind of work. A more technical paper can summarize the reached specifications of the developed device or

method. It can also show the ways to further improve it or tell about new application possibilities of the work. However, depending on the discussion, this part can also be simply a closing comment or a summary.

General points (incomplete)

- Use simple sentences, especially when writing in English. Mainly Main clauses.
- Unambiguous choice of terms, always use the same term for the same thing; repetitions are not a problem.
- For graphics: Resolution min. 300 dpi. Label axes! Labels min 80% of font size of the text and the same font for all graphics. Captions need to explain the graphic. If it gets too long, include the description in the main text.
- Every graphics needs to have a reference in the written text.
- Do only list references, which you have studied and cite in the text. Do not use second hand information (i.e. do not cite a paper because someone else did).

V. Presentation topics

#	Topic/Thema	Literature (to start with…)	Rec. contact
1	Laser-Wakefield acceleration of electrons	Book: Applications of Laser-Particle Acceleration (Bolton, Parodi, Schreiber), Chapter 2 Doktorarbeit A. Popp, LMU (2011); Dream-Beams Nature 2004	Schreiber
2	Laser-Accelerated Electrons as X-Ray/γ-Ray Sources	Book: Applications of Laser-Particle Acceleration (Bolton, Parodi, Schreiber), Chapter 4	Schreiber Karsch Doepp
3	Laser-driven Ion Acceleration	Book: Applications of Laser-Particle Acceleration (Bolton, Parodi, Schreiber), Chapter 5 Schreiber J, Bolton PR, Parodi K, Invited Review Article: "Hands-on" laser-driven ion acceleration: A primer for laser-driven source development and potential applications, Review of Scientific Instruments 87 (2016) 071101. J. Schreiber et al., Analytical model for ion acceleration by high-intensity laser pulses, Phys. Rev. Lett. 97, 045005 (2006) J .Schreiber, Doktorarbeit LMU, 2006	Schreiber Hartmann
4	New Tools for Facing New Challenges in Radiation Chemistry	Book: Applications of Laser-Particle Acceleration (Bolton, Parodi, Schreiber), Chapter 7	Schreiber Prasselsperger
5	Ultra-short ion bunch measurements	Book: Applications of Laser-Particle Acceleration (Bolton, Parodi, Schreiber), Chapter 9 Dromey, B. et al. Picosecond metrology of laser-driven proton bursts. Nat Commun 7, 10642, doi:10.1038/ncomms10642 (2016).	Schreiber Prasselsperger

6	Ion-Bunch Energy Acoustic Tracing (I-BEAT)	Haffa D, Yang R, Bin J, Lehrack S, Brack FE, Ding H, Englbrecht FS, Gao Y, Gebhard J, Gilljohann M, Gotzfried J, Hartmann J, Herr S, Hilz P, Kraft SD, Kreuzer C, Kroll F, Lindner FH, Metzkes-Ng J, Ostermayr TM, Ridente E, Rosch TF, Schilling G, Schlenvoigt HP, Speicher M, Taray D, Wurl M, Zeil K, Schramm U, Karsch S, Parodi K, Bolton PR, Assmann W, Schreiber J, I-BEAT: Ultrasonic method for online measurement of the energy distribution of a single ion bunch, Sci Rep 9 (2019) 6714.	Schreiber Gerlach Prasselsperger
7	Time-Resolved Intensity Contouring (TRIC)	Haffa D, Bin J, Speicher M, Allinger K, Hartmann J, Kreuzer C, Ridente E, Ostermayr TM, Schreiber J, Temporally Resolved Intensity Contouring (TRIC) for characterization of the absolute spatio-temporal intensity distribution of a relativistic, femtosecond laser pulse, Sci Rep 9 (2019) 7697.	Schreiber Speicher
8	Chirped Pulse Amplification	Strickland D, Mourou G, Compression of amplified chirped optical pulses, Optics Communications 56 (1985) 219-221. G.A. Mourou et al., Optics in the relativistic regime, Rev. Mod. Phys. 78, 309 (2006)	Schreiber
9	Temporal characterization of femtosecond laser pulses	R. Trebino, Frequency-Resolved Optical Gating: The measurement of ultrashort laser pulses	Schreiber
10	Laser-driven Ion Acceleration from Isolated Micro-plasmas	Hilz, P. et al. Isolated proton bunch acceleration by a petawatt laser pulse. Nat Commun 9, 423, doi:10.1038/s41467-017-02663-1 (2018) Ostermayr, T. M. et al. Proton acceleration by irradiation of isolated spheres with an intense laser pulse. Phys Rev E 94, 033208, doi:10.1103/PhysRevE.94.033208 (2016).	Schreiber
11	Time-resolved Proton-radiographie/ deflectometry	L. Romagnani et al., Dynamics of electric fields driving the laser acceleration of multi-MeV protons, Phys. Rev. Lett. 95, 195001 (2005)	Schreiber
12	Optical probing of fast processes in plasmas	A. Buck et al., Real-time observation of laser-driven electron acceleration, Nature Phys. 7, 543 (2011) A. Sävert et al., Direct imaging of the dynamics of a laser-plasma accelerator operating in the bubble-regime, arXive:1402.3052	Schreiber Speicher
13	The relativistic mirror	D. Kiefer et al., Relativistic electron mirrors from nanoscale foils for coherent frequency upshift to the extreme ultraviolet, Nature Comm. 4, 1763 (2013) D. Kiefer - Disseration LMU (2012) https://edoc.ub.uni-muenchen.de/15379/	Schreiber
14	Laser-driven inertial fusion	S. Atzeni und J. Meyer-ter-Vehn, The physics of inertial fusion, Oxford Science Publications (2004)	Prof. Jürgen Meyer-ter-Vehn, MPQ Garching

15	Coherent Synchrotron radiation	B. Dromey, S. Rykovanov, M. Yeung, R. Horlein, D. Jung, D.C. Gautier, T. Dzelzainis, D. Kiefer, S. Palaniyppan, R. Shah, J. Schreiber, H. Ruhl, J.C. Fernandez, C.L.S. Lewis, M. Zepf, B.M. Hegelich, "Coherent synchrotron emission from electron nanobunches formed in relativistic laser-plasma interactions," Nat Phys 8, 804-808 (2012). W.J. Ma, J.H. Bin, H.Y. Wang, M. Yeung, C. Kreuzer, M. Streeter, P.S. Foster, S. Cousens, D. Kiefer, B. Dromey, X.Q. Yan, J. Meyer-ter-Vehn, M. Zepf, J. Schreiber, "Bright subcycle extreme ultraviolet bursts from a single dense relativistic electron sheet," Physical review letters 113, 235002 (2014). M. Yeung, B. Dromey, S. Cousens, T. Dzelzainis, D. Kiefer, J. Schreiber, J.H. Bin, W. Ma, C. Kreuzer, J. Meyer-ter-Vehn, M.J.V. Streeter, P.S. Foster, S. Rykovanov, M. Zepf, "Dependence of Laser-Driven Coherent Synchrotron Emission Efficiency on Pulse Ellipticity and Implications for Polarization Gating," Physical review letters 1122014).	Schreiber
16	Pulse compression in under-dense plasmas	J. Schreiber, et al. "Complete temporal characterization of asymmetric pulse compression in a laser wakefield," Physical review letters 105, 235003 (2010) and references therein/citing papers	Schreiber
17	Relativistic Plasma Engineering	J.H. Bin, W.J. Ma, H.Y. Wang, M.J.V. Streeter, C. Kreuzer, D. Kiefer, M. Yeung, S. Cousens, P.S. Foster, B. Dromey, X.Q. Yan, R. Ramis, J. Meyer-ter-Vehn, M. Zepf, J. Schreiber, "Ion Acceleration Using Relativistic Pulse Shaping in Near-Critical-Density Plasmas," Physical review letters 1152015).	Schreiber