Findings & Recommendations - SUMMARY

Summary

1. Equipment for improved hybrid workshop execution
2. Ensure that users have access to detailed, and up to date documentation on diagnostics
3. Make calibration data readily available on PI portal
4. 3rd VISAR leg on ASBO at EP and/or OMEGA
5. Thicker VISAR etalon support for improved ASBO resolution
6. Add a timing fiducial to Dante, noted in Sustainment plan (requires modern digitizers)
7. **Add OTS Diagnostic to EP** (Multiple Submissions)
8. **Capability to infer directional flow vector on D2-gas-filled or low DT yield implosions**
9. Request for capability for nTOF detectors to measure secondary DT-neutron spectra
10. Reduce min/max camera timing jitter
11. Dante maintenance and documentation improvements
12. Ability to Run Streaked X-ray Diagnostics with Gas Jet
13. Gated SXS: gated spatially-resolved x-ray spectroscopy
14. Additional TPS, more (mini) TIMs and/or NDIs for OMEGA
15. **Characterization of Gas Jet Nozzles**
    - TIM lab nozzle characterization test bench is now available to users
16. **Planar Cryo on EP**
17. Ability to Change MIFEDS Leads on Shot Day
18. **Increased UV power on EP**
19. 20 ns pulse duration at EP
20. Increase the quantity of tight focus circular Super-Gaussian DPPs.
21. Extended Backlighter Beam Delay
22. Update to HDF5 and Utilize Standard Meta-Data Formats (Multiple Submissions)
23. Enable instant analysis of data on shot day
24. Develop more open-source analysis software
25. Diagnostic for forward scattered light at OMEGA-EP

Green – complete
Orange – in progress
Red – deferred lack of funding
Black – no update or little progress

1. Equipment for improved hybrid workshop execution

- Capability request: Improved hardware for executing OLUG as a hybrid workshop

- Background: OLUG will continue to be run as a hybrid workshop to improve accessibility for users. To make it run smoother in the future, we need cameras to show the presenter and audience, and microphone(s) to make audience questions audible to virtual participants

- Requested by: Full community!

Documentation

2. Ensure users have access to detailed and up to date documentation on diagnostics

- Requested capability: Ensure that users have access to detailed, and up to date documentation on diagnostics.
- Capability requirements: Document TIM-Frame-CCD compatibility in spreadsheet. Document differences, advantages, disadvantages between XRFCs (e.g. radiation hardening, contrast, sensitivity).
- Impact of requested capability: Improve access to required information to analyze data, which will reduce turn around between experiment and use/publication over time. Ensure that most accurate and up to date info is available for data analysis and shot day preparation.

Proposal sponsor: LANL; contact(s): Pawel Kozlowski pkozlowski@lanl.gov and Heather Johns hjohns@lanl.gov

Calibration

3. Make calibration data readily available on PI portal

- Requested capability: Make calibration data readily available on PI portal.
- Capability requirements: Keep a database of calibrations for each diagnostic maintained on PI portal. Make sure they have correct dates and are well documented with relevant metadata. For example, put all the Dante response functions up on PI portal.
- Impact of requested capability: Improve access to required information to analyze data, which will reduce turn around between experiment and use/publication over time. Ensure calibrations are applied correctly and consistently for demonstrably reproducible scientific analysis. Enable instant analysis of data on shot day, which will be crucial if Omega wants to go to high rep-rate, as was suggested at the OLUG townhall at 2021 DPP.

Proposal sponsor: LANL; contact(s): Pawel Kozlowski pkozlowski@lanl.gov and Heather Johns hjohns@lanl.gov

Diagnostics

4. Additional (3rd and maybe 4th) VISAR leg(s) on ASBO at EP and/or Omega (details in backup slides)

- Requested capability: 3rd /4th VISAR leg(s) on ASBO at EP and/or Omega
- Capability requirements: adding a 3rd /4th leg(s) to the ASBO systems.
- Impact of requested capability: Improve the velocity dynamic range and sensitivity by 2.5, improve relative timing accuracy by 2x, increase system reliability (redundancy)
- Proposal sponsor: Marius Millot (all ASBO users would benefit from this upgrade)

With 4 interferometer legs, the number of resolution elements for the 1D VISAR is multiplied by 6

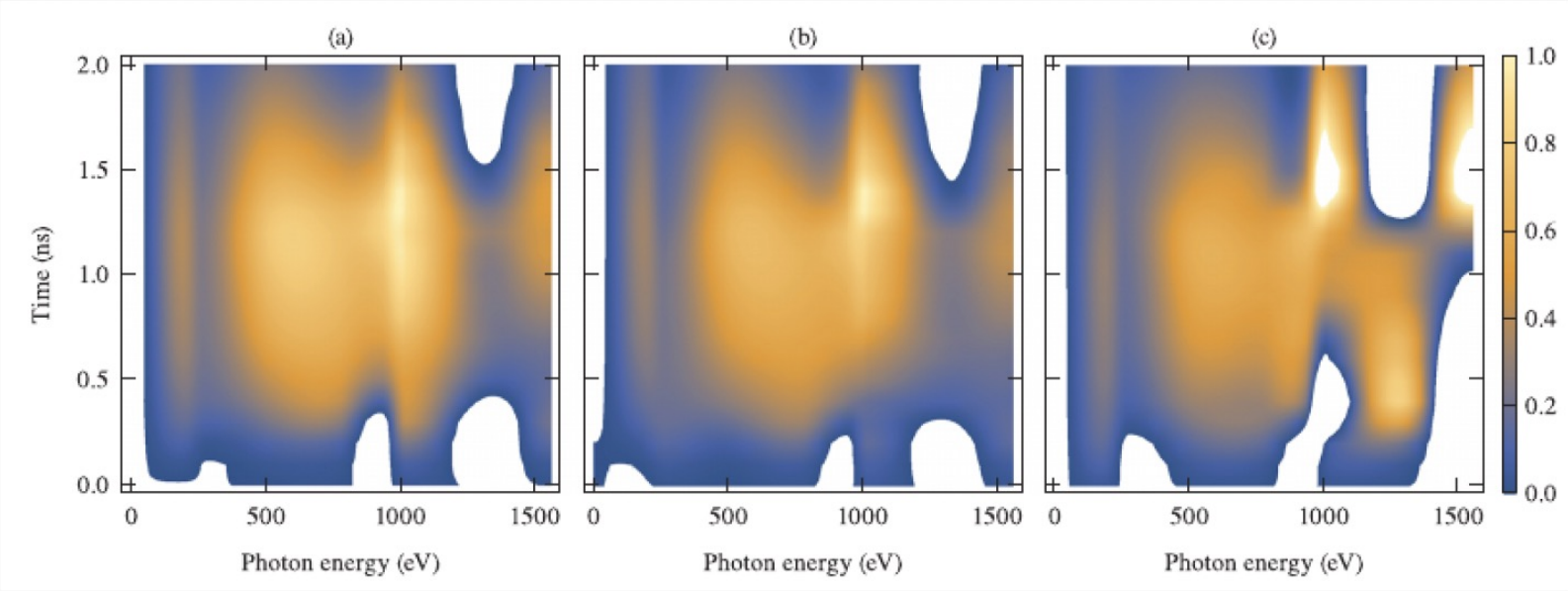
5. Thicker VISAR etalon support for improved ASBO resolution

- Requested capability: Enable use of etalons with vacuum velocity sensitivity as low as 100 m/s/fringe. This would enable measurement of spall strength in solid materials and allow for testing of spall strengths at high strain rates.
- Capability requirement: Rail space on at least one VISAR leg (either existing or LLNL proposed 3rd leg) for 500 mm thick etalon
  - Inclusion with proposed 3rd ASBO leg is preferred to allow for 2 low-sensitivity + 1 high-sensitivity measurements
- Impact of requested capability: Spall strengths in materials range from few to tens of GPa depending on strain rate. Free surface velocities in spall experiments will experience pull-back signal ~100 m/s. Thickest existing etalon has ~500 m/s sensitivity such that inherent uncertainty (~5% of fringe) in spall strength would be ~25% of spall strength, cutting uncertainty by factor of 5 will make measurements viable for strain rate dependent material spall strength and allow for investigations into dynamic strengths of materials.
- Sponsor: C. McCoy, SNL
- Other benefactors: LLNL

6. Add a timing fiducial to DANTE

- Requested capability: Add a timing fiducial to Dante
- Capability requirements: Relate Dante oscilloscope timings to Omega-60 facility time.

Proposal Sponsor: LANL; contact(s): Pawel Kozlowski pkozlowski@lanl.gov



Impact of requested capability: Multiple campaigns are using indirect drive platforms with measurements which require precise Dante data. Currently, Dante signals are aligned in an ad-hoc manner (align to peak signal on each channel) to enable spectral and radiation temperature unfolds. Such ad-hoc alignments are not possible when multiple radiation sources are observed by Dante (e.g. hohlraum, and backlighters), and recent work has shown that misaligning by as little as ~70 ps in time can pose significant issues to successfully unfolding spectra. See panel (c) in the above figure where white regions represent a nonphysical negative flux caused by oscillatory solutions to the unfold due to 70 ps misalignment (https://doi.org/10.1063/5.0002856).

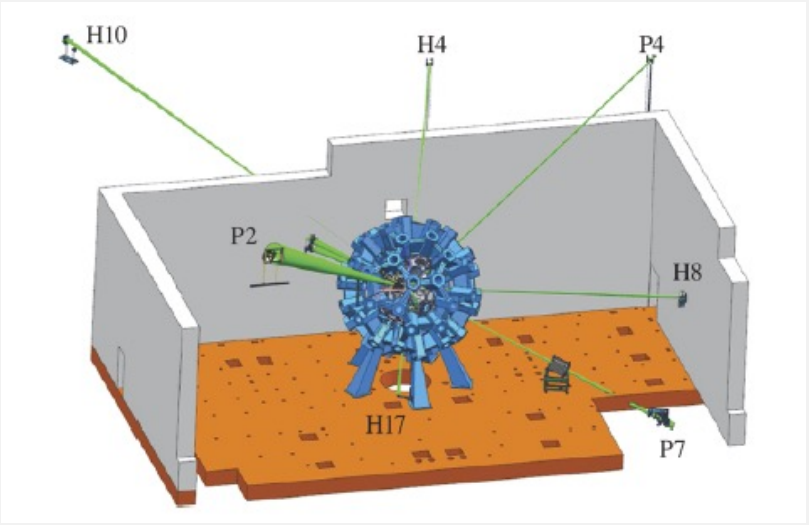
7. OTS Diagnostics on EP (additional info in backup slides)

- Requested capability: Many experiments elect to use Omega 60 because it is the only LLE facility with optical Thomson scattering (OTS), often vastly underutilizing the facility's laser capabilities because only a few beams are needed. These experiments would be better suited for EP, but no TS capability currently exists. While an independent OTS system similar to that on OMEGA 60 would be ideal, additional (cheaper) options utilizing the 3w beams and/or existing diagnostics should also be explored.
- Capability requirements: Add an OTS diagnostic of similar form and functionality as that on OMEGA 60, coupled with streaked and/or imaging detectors. Alternatively, explore ways to utilize existing components on EP, such as pairing a 3w beam with a suitable spectrometer and streak camera. Compared to an independent system, using existing components will likely sacrifice some scientific capability (such as measuring IAW features).
- Impact of requested capability: Experiments on EP would benefit from the powerful diagnostic capabilities afforded by OTS. Localized OTS measurements would also complement the global images provided by the current 4w probe beam.
- Proposal sponsor: HZDR, Princeton, GA, Imperial
- Proposal support: K. Falk (HZDR), M. Manuel (GA), D. Schaeffer (Princeton), S. Zhang (PPPL), M. Bailly-Grandvaux (UCSD), C. Walsh (LLNL), G. Kagan (Imperial)

***Potential dual benefit of enabling new capabilities for LPI studies (transmission beam diagnostic) – M. Bailleux-Grandvaux, USCD**

8. Renewed from 2021: Capability to infer directional flow vector on D_2-gas-filled or low DT yield implosions

- Background: LLE has developed capability to measure a 3D flow vector in implosions with DT yield 1e13-2e14, using nTOF detectors in multiple lines-of-sight (Mannion et al., Rev. Sci Instrum. 92, 033529 (2021))



- Capability requirements: Implementation of two new absolutely timed nTOF detectors to make this measurement possible in D2-gas-filled and lower yield DT implosions (four detectors are required but two already exist); DD yield >~5e9, DT yield 5e11-1e13
- Impact of requested capability: New results would be used to constrain implosion conditions for, e.g., ICF, kinetic, nuclear, and transport physics experiments
- Proposal sponsor: Maria Gatu Johnson, MIT (with MIT, Imperial, LANL, SNL, and LLE collaborators)

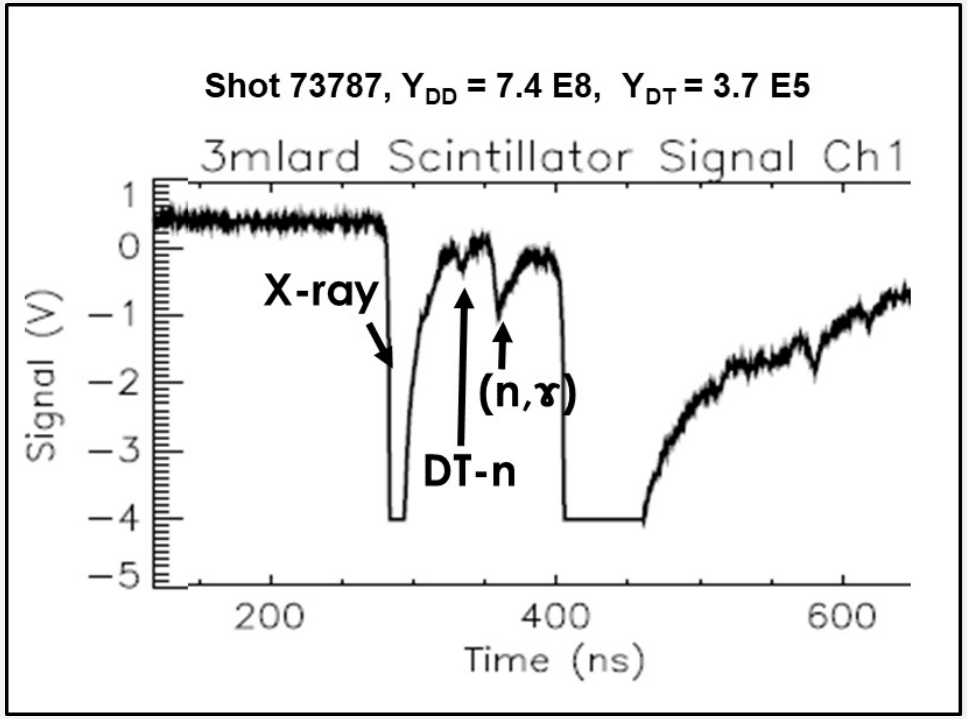
9. Request for capability for nTOF detectors to measure secondary DT-neutron spectra

- Requested capability: measure secondary DT-n yields and spectra at yields >~5e5, in presence of a strong x-ray background signal
- Background: Secondary DT-n are routinely measured with the 3mLARD nTOF but X-ray and (n-γ) background are too significant for an accurate measurement. We need an n-TOF that is more sensitive to DT-n and insensitive to photon background.
- Benefit of capability: Secondary DT-n yield measurement will allow accurate inference of fuel ρR; spectral measurements will help diagnose fuel magnetization.
- Interested parties: Any user who uses D^3He or D_2 gas-filled implosions. P. Adrian, N. Kadabi et al. (MIT), M. Bailleux-Grandvaux (USCD), …

- **The secondary neutrons are created in reactions:**

  D + D → p (2.5 MeV) + T (1.01 MeV)

  T (1.01 MeV) + D → α + n (11.8–17.1)



10. Reduce min/max camera timing jitter

- Requested capability: Reduce min/max camera timing jitter
- Capability requirements: Reduce min/max timing jitter on XRFCs to <50ps (a quarter of the 200ps PFM). Currently we are seeing a min/max timing jitter of >100 ps on a given shot day.
- Impact of requested capability: Would enable co-timing of cameras to short duration ~200 ps backlighters while minimizing motion blur and noise accumulation by having a short integration time. From the PI's perspective, min/max timing jitter within a shot day is a more important metric than the standard deviation of jitter across multiple shot days.
- Proposal sponsor: LANL; contact(s): Pawel Kozlowski pkozlowski@lanl.gov and Heather Johns hjohns@lanl.gov

11. Dante maintenance and documentation improvements

- Requested capability: Dante maintenance and documentation improvements.
- Capability requirements: Mitigate damage to filters or increase replacement frequency (pinholes from debris strikes generate systematic errors in measurement). Catalog filters and include info in header file necessary for calculating response functions.
- Impact of requested capability: Multiple campaigns are using indirect drive platform to mitigate preheat. Precise Dante measurements are critical for characterizing drive and constraining simulations on these campaigns.

Proposal sponsor: LANL; contact(s): Pawel Kozlowski pkozlowski@lanl.gov and Heather Johns hjohns@lanl.gov

12. Ability to Run Streaked X-ray Diagnostics with Gas Jet

- Requested capability: currently, if using the gas jet system, it is not possible to run any streaked x-ray diagnostics, including streak cameras and spectrometers. This severely limits diagnostic capabilities for gas jet experiments.

- Capability requirements: identify safe operational limits in which streaked x-ray diagnostics can be qualified to run with gas jet.

- Impact of requested capability: adds ability to utilize significant diagnostic capabilities that already exist on EP.

- Proposal sponsor: D. Schaeffer, Princeton, PPPL, and likely many others

13. **Gated SXS**: gated spatially-resolved x-ray spectroscopy

- The SXS crystal spectrometer has recently been qualified for use with gated detectors, i.e., single- or multi-MCP strip framing cameras. It has also been successfully tested in this new mode (**Gated SXS**) in a NLUF campaign at OMEGA EP

- We request investigating the feasibility and design of single- and multi-slit substrates and mounting hardware for **Gated SXS** in order to perform gated spatially-resolved x-ray spectroscopy measurements

- This extended capability of SXS will impact all users doing x-ray spectroscopy in experiments at OMEGA 60 as well as OMEGA EP

- Proposal sponsor: Roberto Mancini UNR, rcman@unr.edu, USCD, HZDR, …

14. An additional TPS, more (mini)TIMs, and/or NDIs, for OMEGA

- Background:
  - OMEGA currently has six TIMs and one available NDI (nuclear diagnostic inserter)
  - This frequently forces users to downselect diagnostics to use for their experiments
  - Having an additional target positioner will often free up a TIM for other diagnostics

- Requirements: Capability for fielding additional TPS, TIMs and/or NDIs
- Impact of requested capability: Would improve characterization of experiments/generate more output data for each shot
- Proposal sponsor: Johan Frenje, MIT

Target Capability

15. Characterization of Gas Jet Nozzles

- Requested capability: the gas jet system is quickly becoming a key component of many Omega experiments. While a basic theoretical understanding of gas jet performance has been demonstrated, there has been little direct characterization (e.g. density profiles vs gas pressure) of the wide variety of currently available gas jet nozzles, especially at large nozzle diameters.

- Capability requirements: provide a means for PIs or LLE liaisons to characterize gas jet nozzles on request or prior to use. A small test stand was set up for this purpose, but it is not yet used in practice.

- Impact of requested capability: provides PIs with critical information about gas jet performance.

- Proposal sponsor: D. Schaeffer, Princeton, PPPL, likely anyone who uses the GJ system

16. Planar Cryo on EP

- Requested capability: Add Planar cryo at EP
- Capability requirements: enable cryogenic D2 and He (if possible) experiments
- Impact of requested capability: Enable new experiments eg EOS , optical properties, release studies, fast-ignition, provide greater range and control of isochoric heating and enable optimizing charged particle and neutron production and radiography.
- Proposal sponsor: M. Millot, LLNL, and ICF/HED programs

17. Ability to Change MIFEDS Leads on Shot Day

- Requested capability: currently for Gen2X MIFEDS coils, the input and output wires to the coils are fixed and cannot be changed on the shot day. As a result, it's not possible to flip the sign of the coil magnetic field by swapping the input and output leads, which might be needed if there was a mistake during construction or if shots indicate that a reversed field would yield better data. This also requires additional coil manufacturing (and potentially target fab) work to accommodate the same set of coils with different polarities.

- Capability requirements: add a hardware switch that would allow the MIFEDS wire leads to be flipped during the shot day.

- Impact of requested capability: gives PIs additional flexibility on shot days to maximize their data returns. Could also reduce manufacturing and target fab workload just to accommodate simple polarity reversals.

- Proposal sponsor: D. Schaeffer, Princeton, PPPL, U. Michigan

Beams

18. Increased UV power on EP

- Requested capability: higher UV power Drive at EP
- Capability requirements: Deliver more than 1250 J in B1 and B2 ESG10v001
- Impact of requested capability: Improve the signal to background of multiple experiments using UV beams to generate secondary sources (eg X-ray Diffraction, radiography)
- Proposal sponsor: M. Millot, LLNL, and ICF/HED programs

19. 20 ns pulse duration at EP

- Requested capability: 20 ns pulse duration at EP
- Capability requirements: Deliver longer than 10 ns pulse shapes
- Impact of requested capability: Enabling highly planar, well controlled dynamic compression experiments including XRD, EOS Hugoniot, Strength etc. Current limit to 10 ns forces us to create composite pulse shapes by stacking up beams, but this has been shown to be less than optimal in terms of drive planarity and reproducibility (as small timing or power imbalance can have a dramatic impact). This will also enable new experiments nott currently possible within the 10 ns boundaries.
- Proposal sponsor: M. Millot, LLNL, and ICF/HED programs

20. Increase the quantity of tight focus circular Super-Gaussian DPPs

- Requested capability: Increase the quantity of tight focus circular Super-Gaussian DPPs.
- Capability requirements: Minimum 24 DPPs with R0 <= 250 um at best focus.
- Impact of requested capability: Would enable improved beam smoothing on smaller capsule implosion backlighters to improve implosion uniformity and reduce backlighter flash timing jitter. Would also enable LPI mitigation on small capsule backlighters to reduce preheat.
- Proposal sponsor: LANL; contact(s): Pawel Kozlowski pkozlowski@lanl.gov, Heather Johns hjohns@lanl.gov

DPP	# Available	R0 (um)
SG5	60	358
SG5-650	60	287.2
SG8	14	438
SG8_FLAT	10	435
100um	2	100
200um	2	105
500um	2	150
700um	2	195
LLNL-3W-250	2	125
LLNL-3w-150	1	75
PD-SG2-600	60	300

21. Extended Backlighter Beam Delay (more info in backup)

- Requested capability: We request an additional leg in the beamlines to enable greater temporal spacing between backlighter beams and drive beams.
- Capability requirements: Ideally, arbitrarily timed backlighter and drive beams.
- Impact of requested capability: An extended backlighter delay would allow hydrodynamics campaigns to image targets further beyond the drive phase, later into the implosion at higher convergence.
- Proposal sponsor: LANL hydrodynamics campaigns

Data management

22. Enable instant analysis of data on shot day

- Requested capability: instant analysis of diagnostic data on shot day

- Impact of requested capability: provides PIs with critical input for making adjustments to diagnostics and setups between shots, for optimal shot day output

- Proposal sponsor: LANL; contact(s): Pawel Kozlowski pkozlowski@lanl.gov, Heather Johns hjohns@lanl.gov

23. Update to HDF5 and Utilize Standard Meta-Data Formats

- Requested capability: many datasets are returned in the antiquated hdf4 file format, which requires extra work to process compared to the newer hdf5 format. The datatset meta-data is also entirely unique to LLE, making it difficult to develop a software ecosystem where shared code can be run for datasets from multiple facilities.

- Capability requirements: going forward, update all datasets to hdf5 and implement or help develop a standard meta-data format.

- Impact of requested capability: uniform implementation of a modern file format and meta-data that is compatible with shared codebases.

- Proposal sponsor: Derek Schaeffer, Princeton, PPPL, U. Michigan, Derek Mariscal, LLNL, and many others

24. Develop more open-source analysis software

- Requested capability: Develop more open-source analysis routines and synthetic forward models for diagnostics on OMEGA and EP.

- Capability requirements: Code should perform routine analysis tasks for commonly used diagnostics. Code should be well documented, tested, and easy to use. Where possible, code written in free and commonly used languages like Python is desirable to maximize accessibility. Collaboration with organizations like PlasmaPy can improve the quality and distribution of these codes.

- Impact of requested capability: Make data analysis more accessible to new community members and students. Synthetic diagnostics would increase shot effectiveness by helping PI's design experiments. Standardizing common analysis routines would reduce duplicated effort and increase scientific reproducibility.

- Proposal sponsor: Submitted by Peter Heuer/broad community support

Post-session added material (discussed in words on Thursday 4/28)

25. Diagnostic for forward scattered light at OMEGA-EP

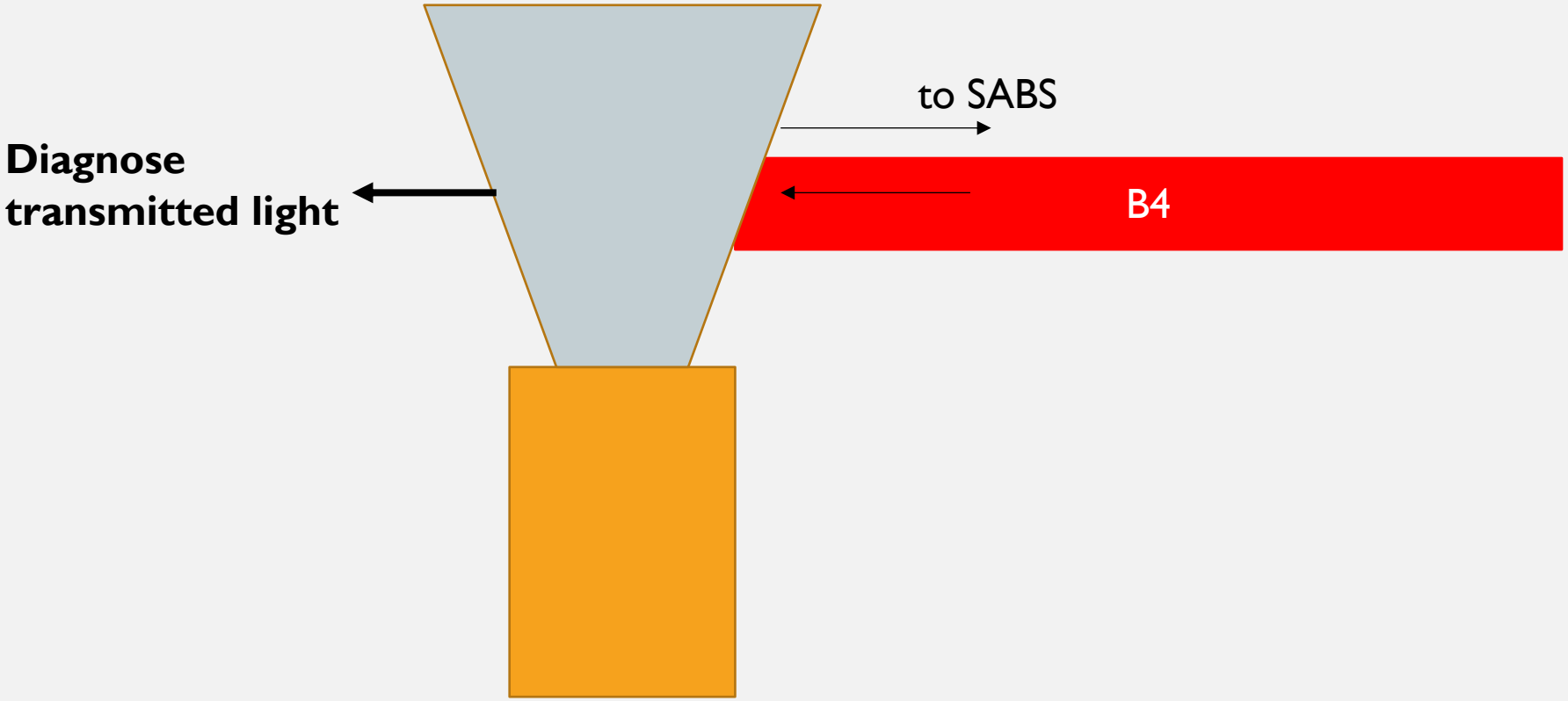
- Requested capability: Diagnose the near-forward scattered light of Beam-4 (fielded in TIM12) at OMEGA-EP with spectral–time resolution (similarly as SABS).

- Capability requirements: Similar diagnostic than SABS or OTS but for near-forward-scattered light. It can be merged with a self-optical Thomson Scattering development (F&R#8). However, it requires to have the capability to tune the wavelength of the optical spectrometer.

- Impact of requested capability: provide a more complete set of data for laser-plasma instability experiments.

- Proposal sponsor: UCSD – Simon Bolaños and M. Bailly-Grandvaux

25. Diagnostic for forward scattered light at OMEGA-EP



Backup

Other notes from Thursday F&R session

- How can OLUG excom make the F&R session more accessible for early career users (less jargon-y)

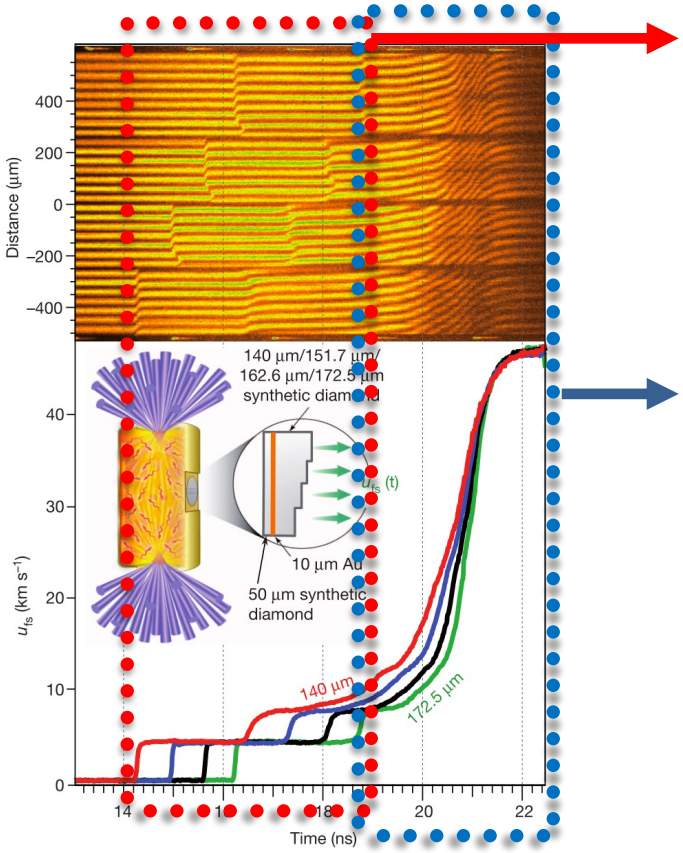
4. We can extend the velocity dynamic range by adding more interferometer legs

- With two interferometers the number of velocity resolution elements is **250**:
  - Velocity resolution is $\delta v \approx$ (0.05 fringe) x VPF_{min} (*)
  - VPF chosen so that minimum velocity ≈ 3-5 fringes x VPF_{min}, maximum velocity ≈ 2.5 x 5 x VPF_{min} ≈ 12.5 fringes x VPF_{min}
  - Number of velocity resolution elements: $N_{<\delta v>} \approx 12.5/0.05 \approx$ **250**
- With additional interferometers we can extend this:
  - Adding 3rd leg: $N_{<\delta v>} \approx 250 \times 2.5 \approx$ **625**
  - Adding 4th leg $N_{<\delta v>} \approx 625 \times 2.5 \approx$ **1563**

*VPF_{min} is the sensitivity of the most sensitive interferometer

With 4 interferometer legs, the number of resolution elements for the 1D VISAR is multiplied by 6

4. Additional 1D VISAR legs also allow more flexibility to improve the relative timing accuracy by 3x – 4x

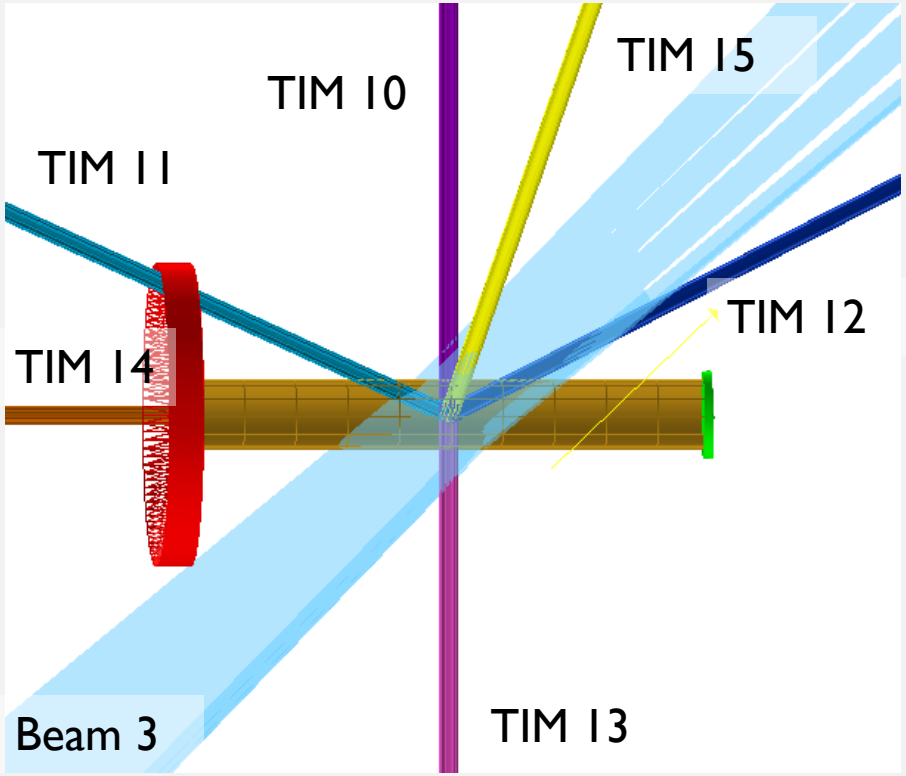


- Most experiments strike a compromise between sweep window and time resolution
- Example of improved data return for ramp compression:
  - Use 2 legs to measure early time with longer sweep, low VPF (thick etalons): **high precision in the early part of the ramp**
  - Use other 1 or 2 legs to measure high acceleration with faster sweep, intermediate VPF: **high time resolution for the faster events**

7. OTS Diagnostics on EP

- Initial TS spectra have been calculated for plasma conditions relevant to 3 different campaigns where one of the long-pulse beams could be used as the probe beam
- Spectra were calculated for a potential TIM-based spectrometer near 3w
- A higher-energy 4w probe or another dedicated beam would be preferred, but using one of the UV beams could still provide critical data for multiple campaigns

7. Setup 1: Quasi-parallel Collisionless Shock Formation



Probe Beams:

- Beam 3

Usable TIMs:

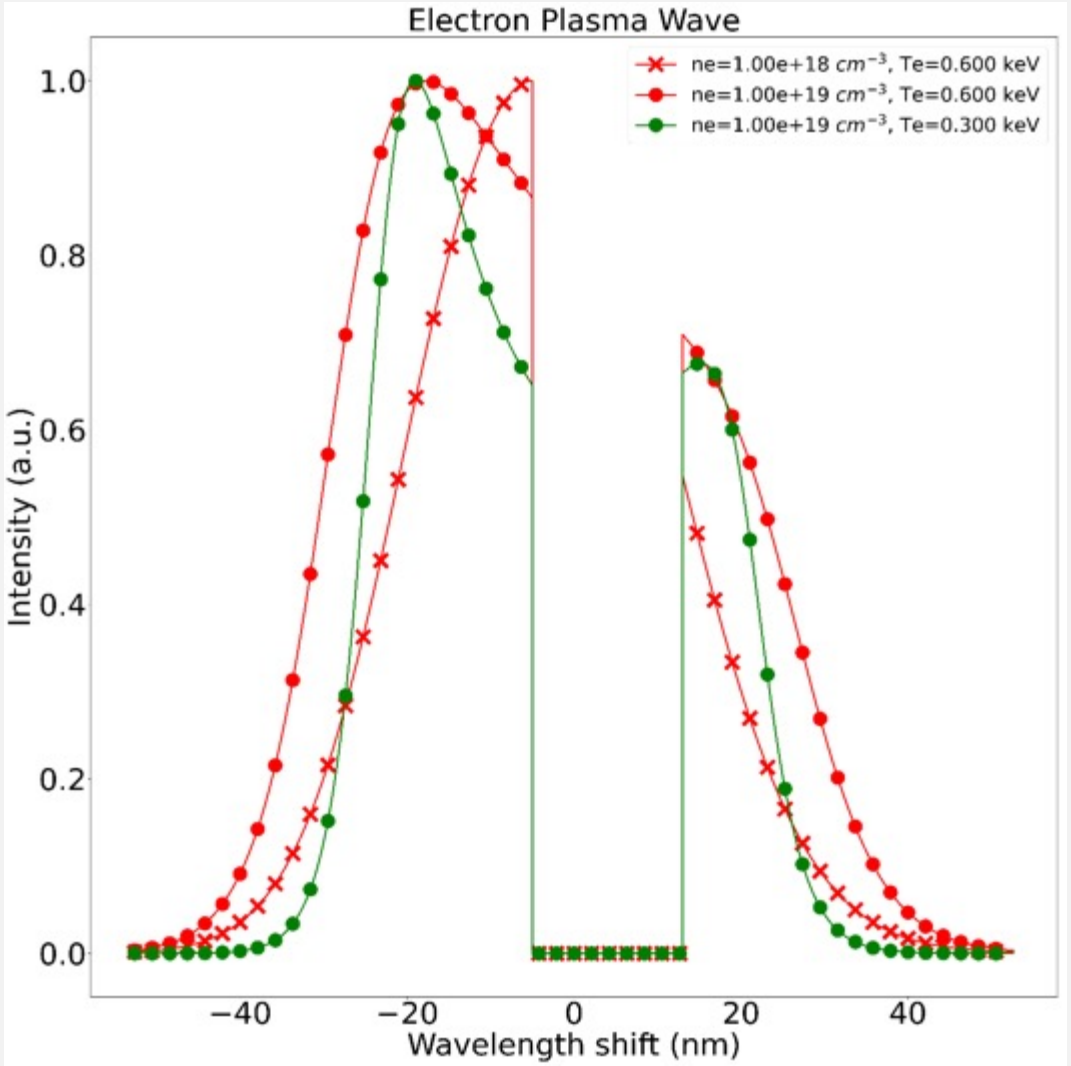
- TIM 10 and TIM 12 (Same angle)
- TIM 14 and TIM 13 (Same angle)
- TIM 15

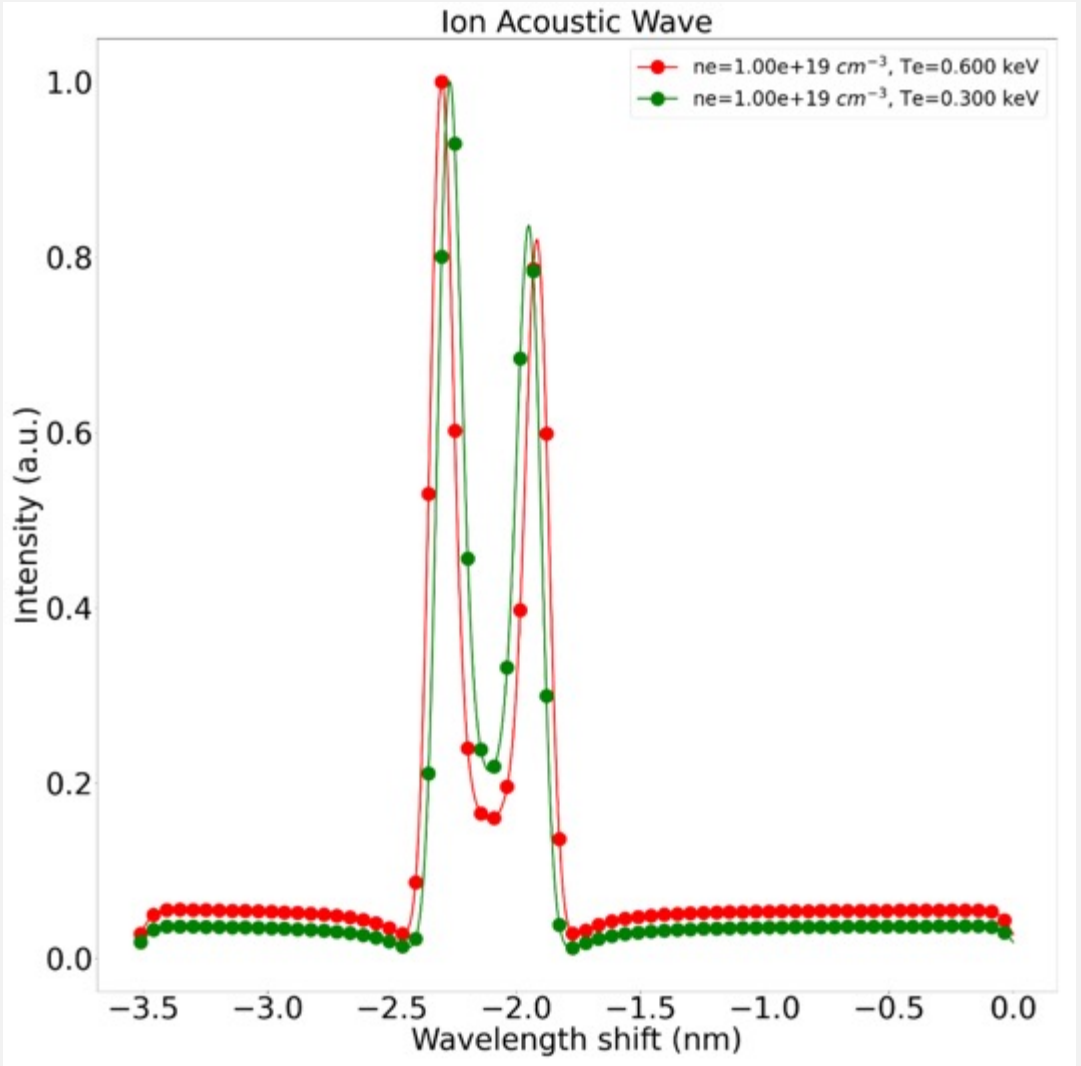
Simulation parameters:

- Electron density: 1e17 – 1e19 cm-3
- Electron temperature: 300-2000 eV
- A: 22
- Z: 20
- Expansion velocity: 1500 km/s

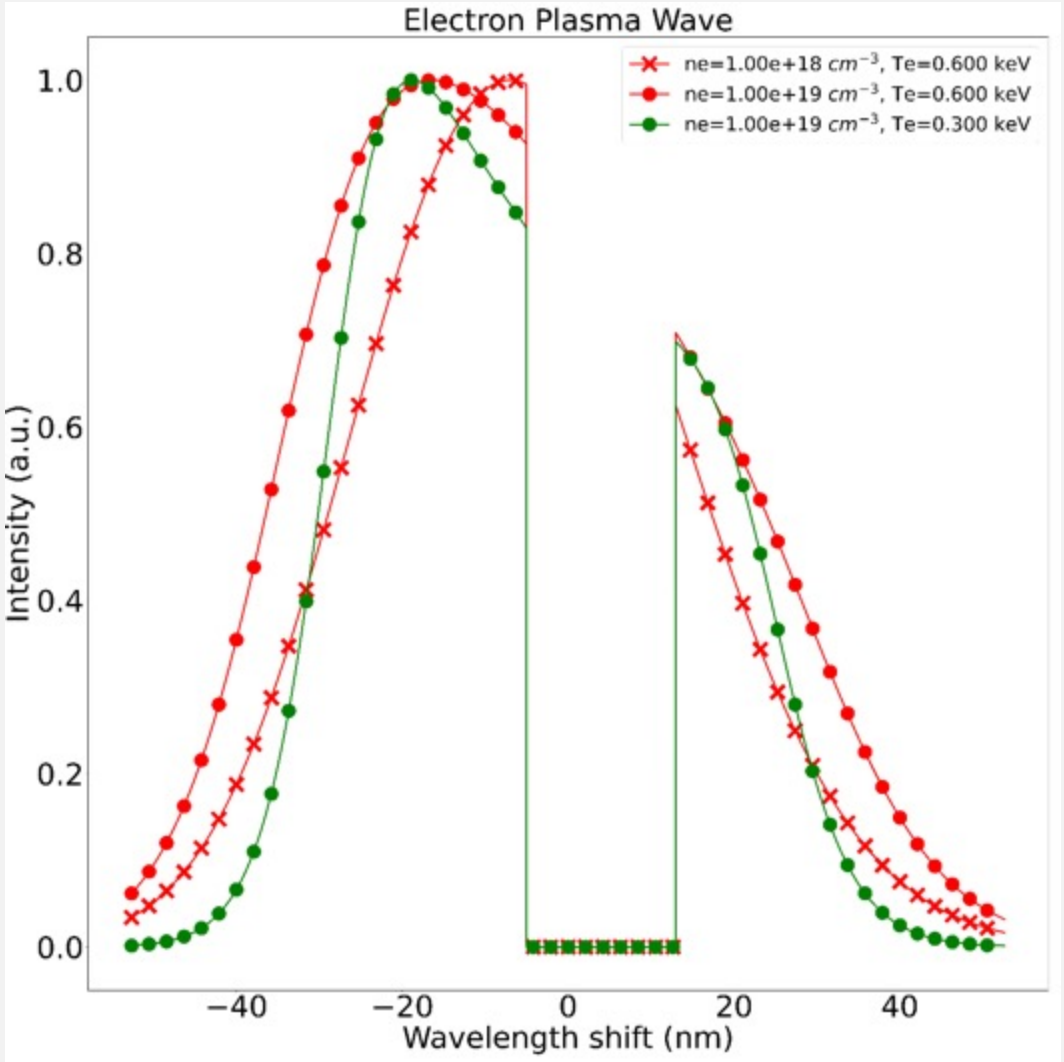
Impact to the community and program: This platform is designed to study quasi-parallel collisionless shock formation and the associated electromagnetic instabilities responsible for this process. OTS on EP will allow measurements of plasma density and temperature, providing the required information to determine which instabilities are dominant in the quasi-parallel collisionless shock formation.

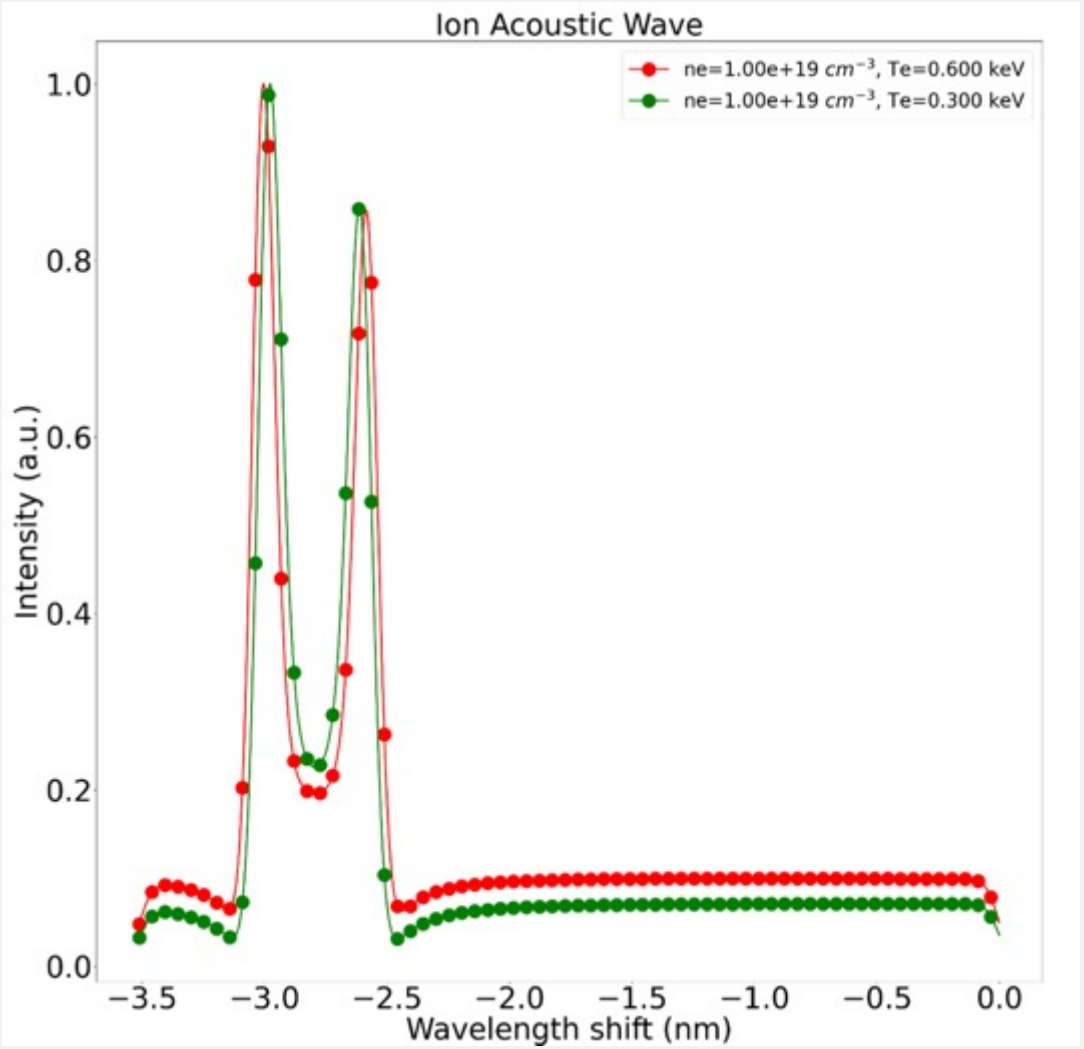
7. Sample traces: TIM 10 and TIM 12 ($\theta_s = 74$)



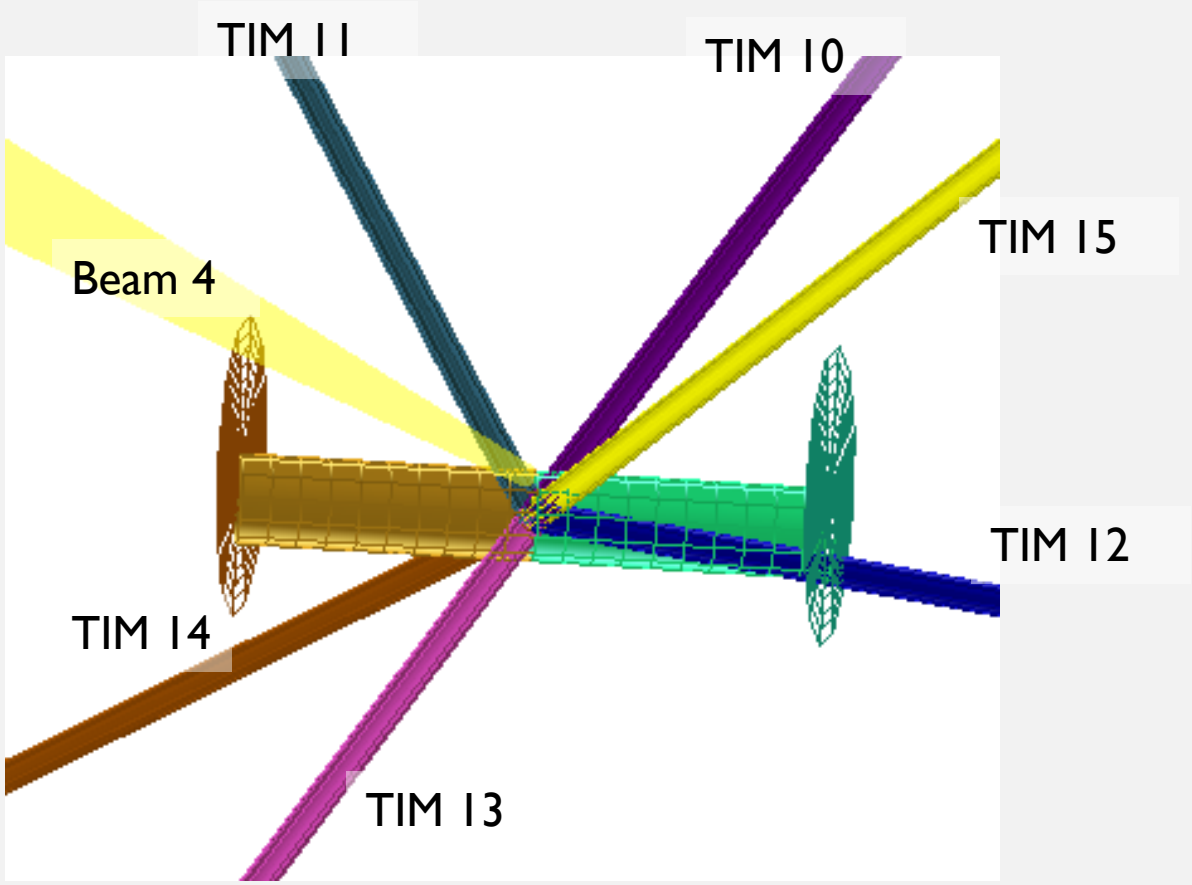


7. Sample traces: TIM 13 and TIM 14 ($\theta_s = 106$)





7. Setup 2 – Counter-propagating collisional jets



Probe Beams:

- Beam 4

Viable TIMs:

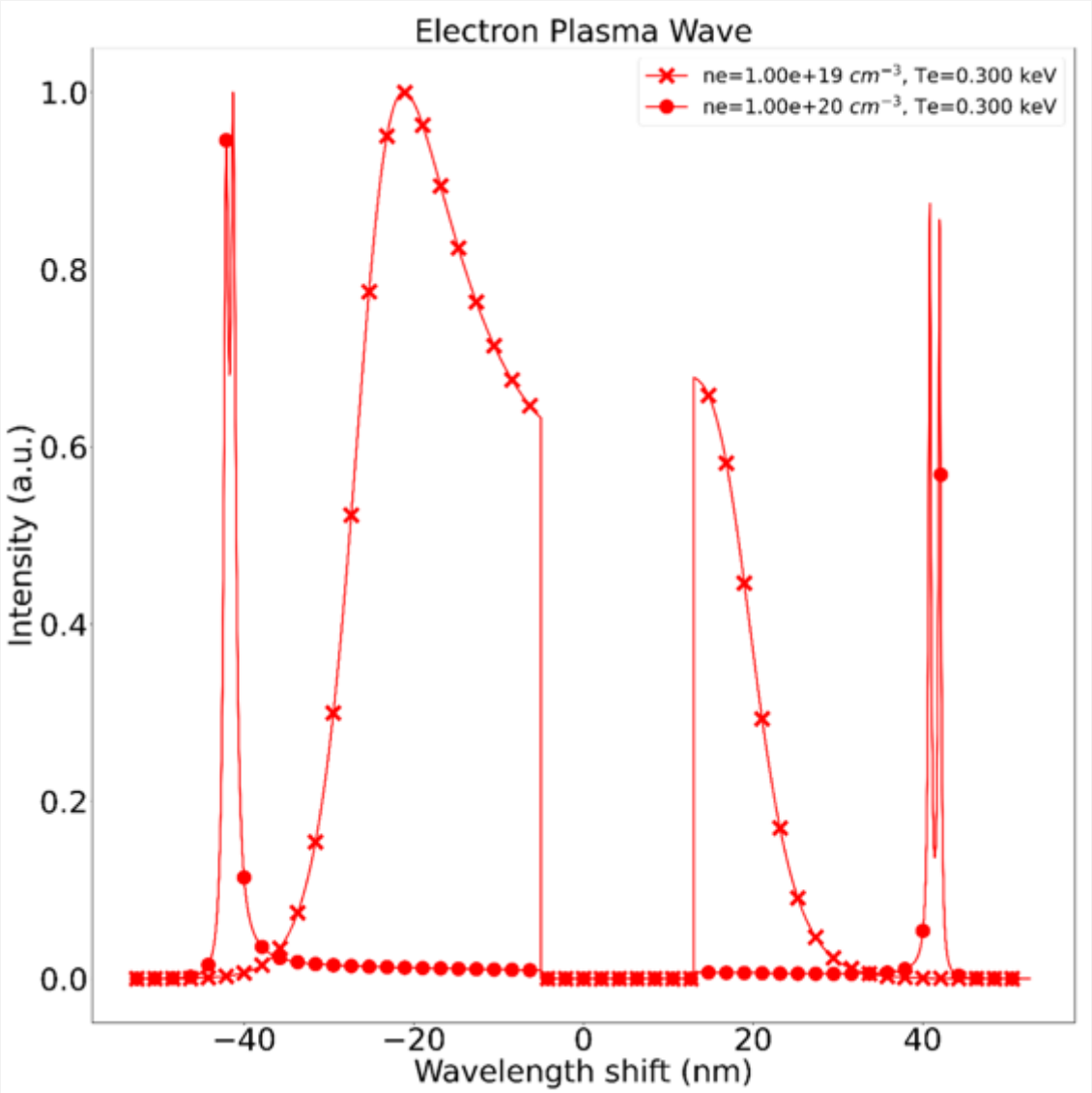
- TIM 10
- TIM 11
- TIM 14 and TIM 13 (Same angle)
- TIM 15

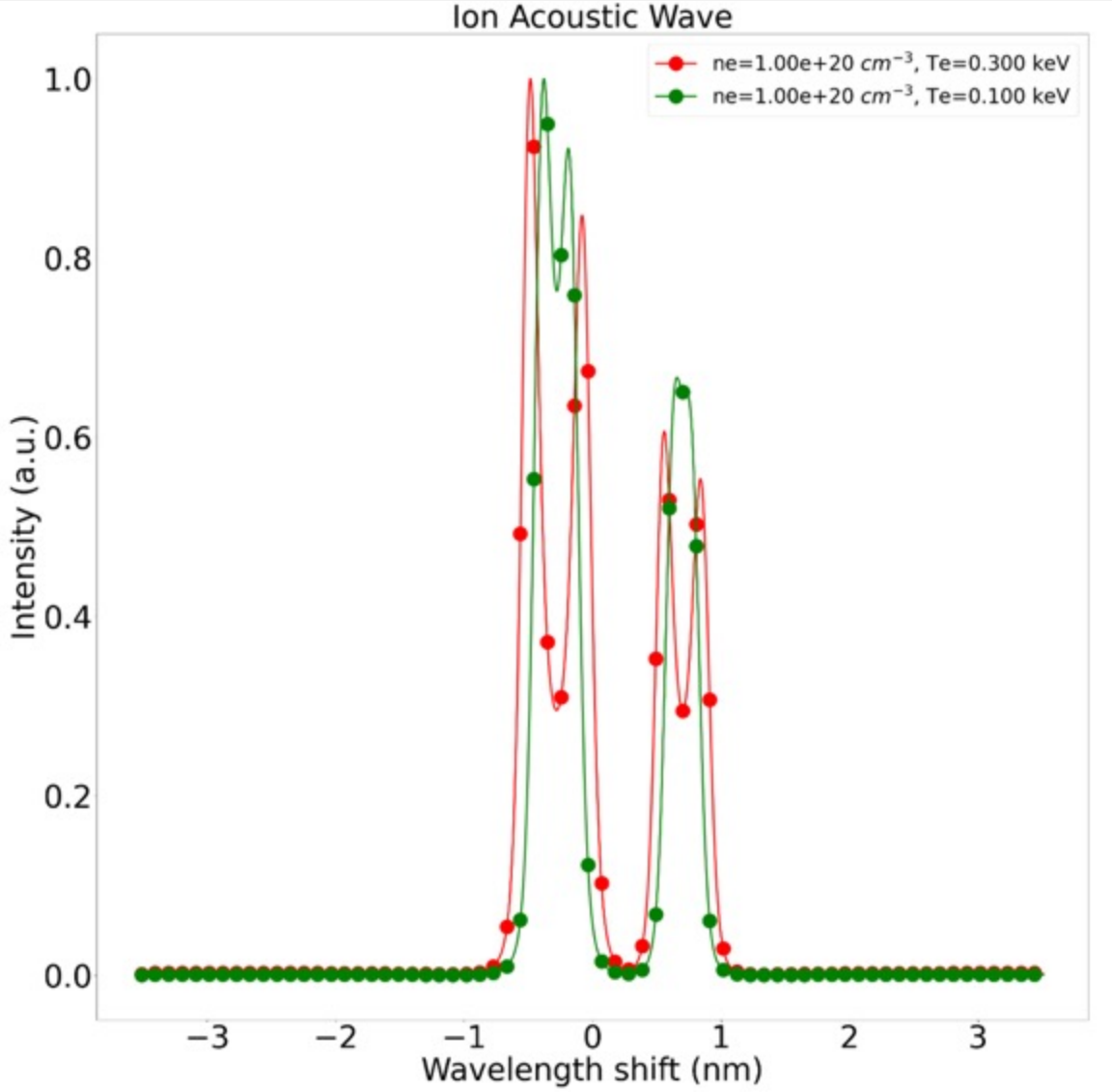
Simulation parameters:

- Electron density: 1e18 – 1e21 cm-3
- Electron temperature: 100 - 1000 eV
- A1:22 & A2=12
- Z1: 20 & Z2=6
- Expansion velocity 1: 200 km/s
- Expansion velocity 2: -500 km/s

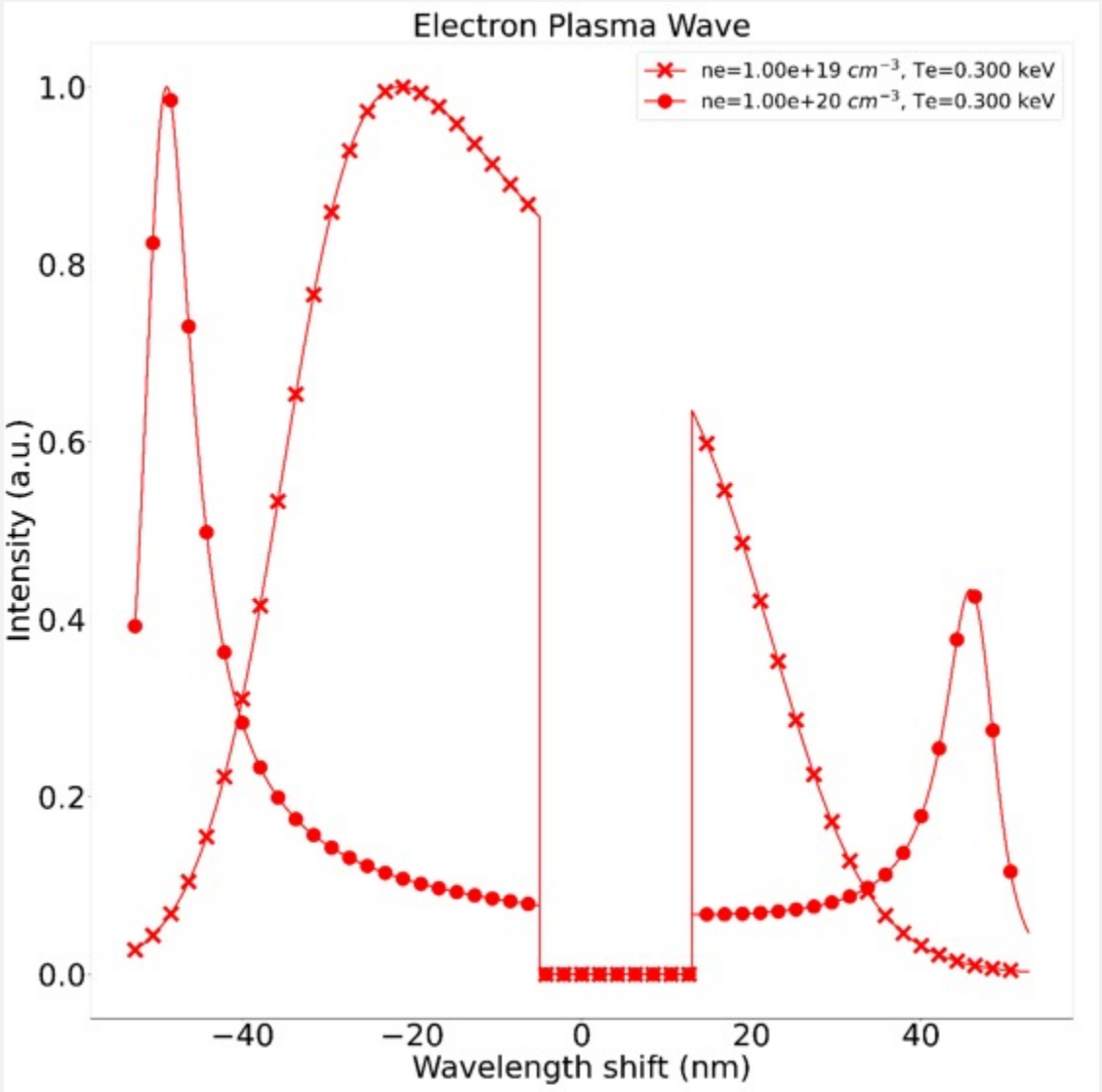
Impact to the community and program: understanding of nonlocal electron transport, preheat and generally heating of plasma by charged particles is crucial to efficiency in ICF heating and implosion dynamics and it has astrophysical applications, e.g. supernova shock heating.

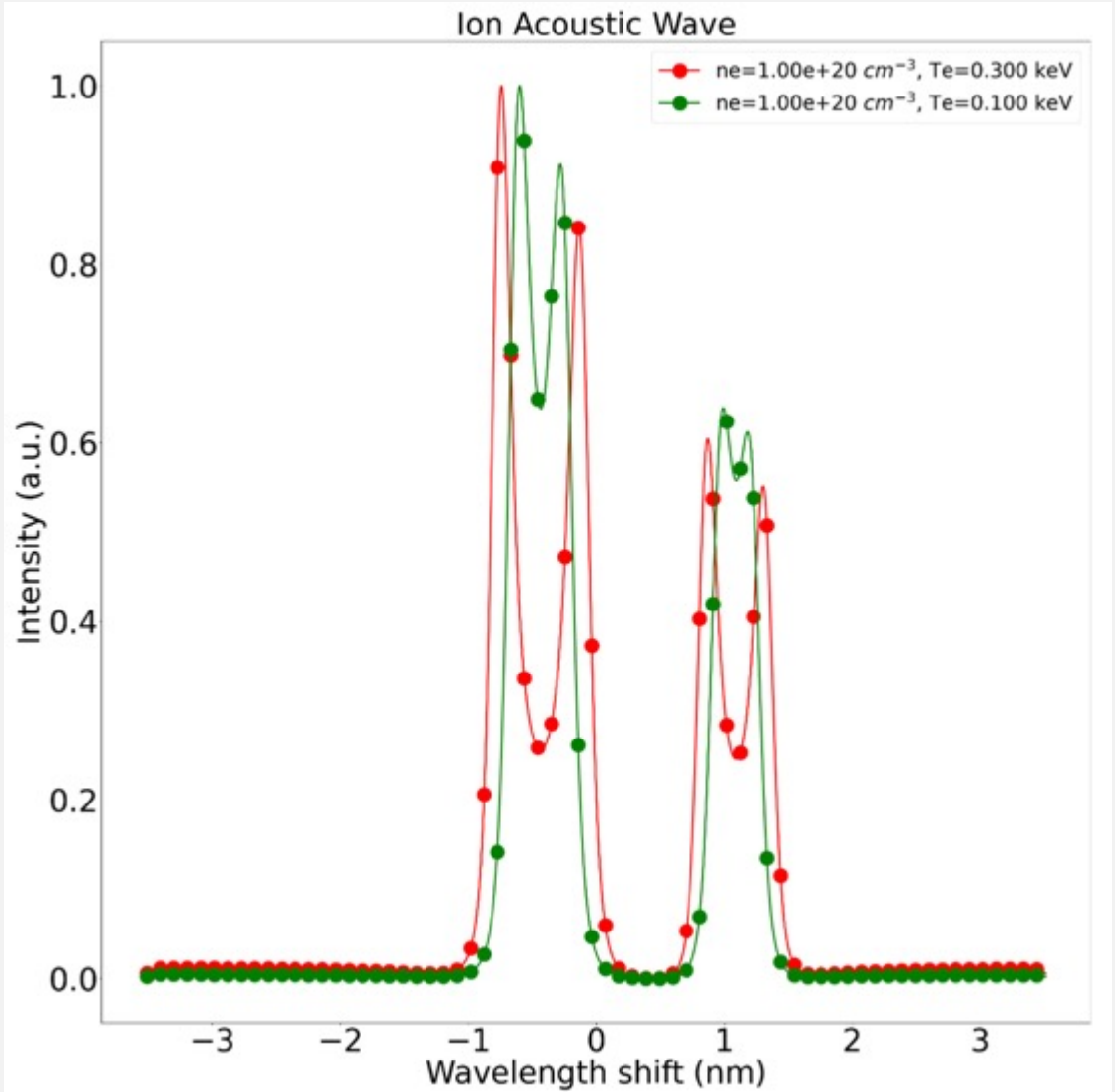
7. Sample traces: TIM 13 and TIM 14 ($\theta_s = 74$)



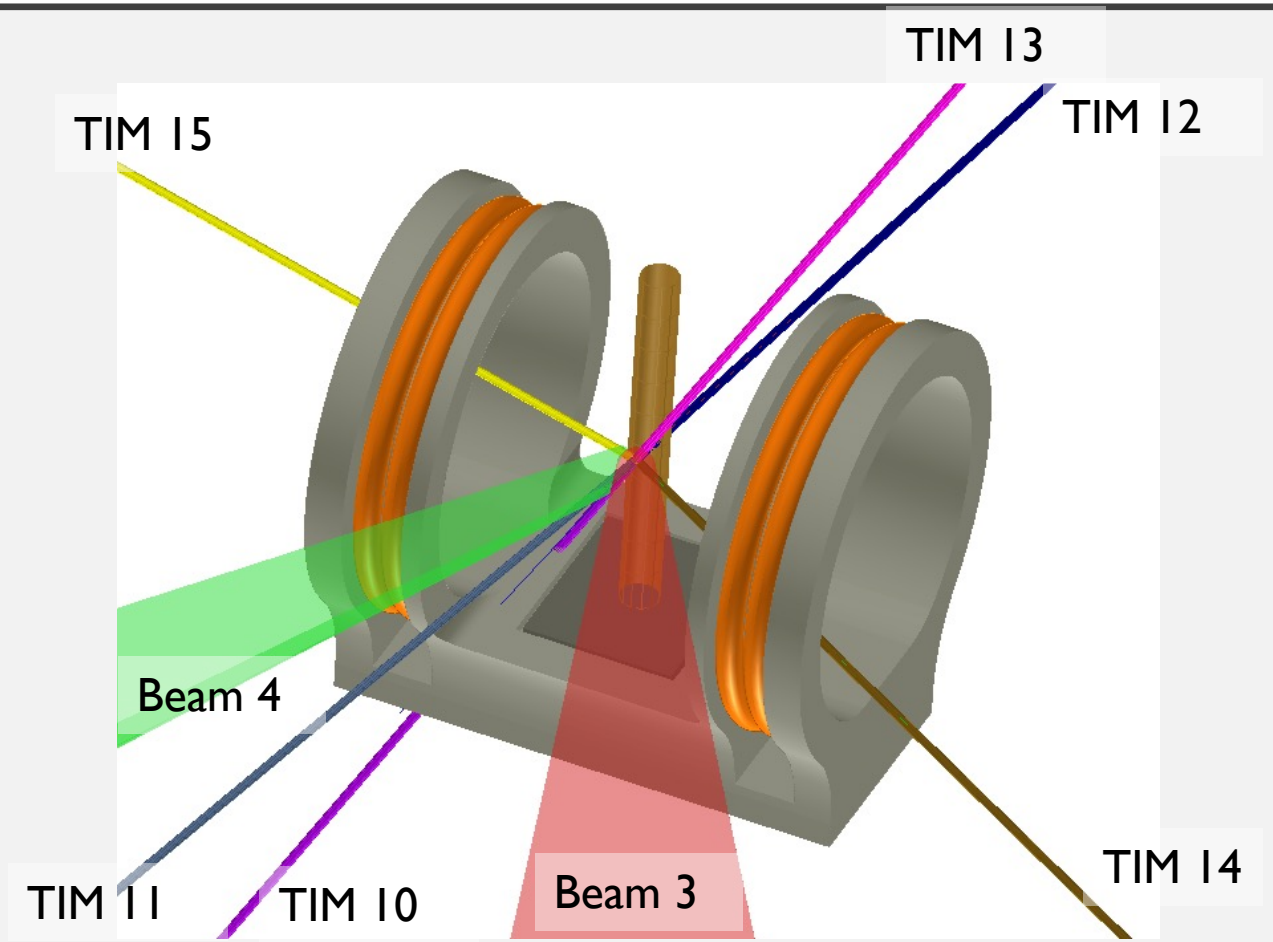


7. Sample traces: TIM 15 ($\theta_s = 138.3$)





7. Setup 3: Quasi-Perpendicular Collisionless Shock Heating



Probe Beams:

- Beam 3
- Beam 4

Viable TIMs:

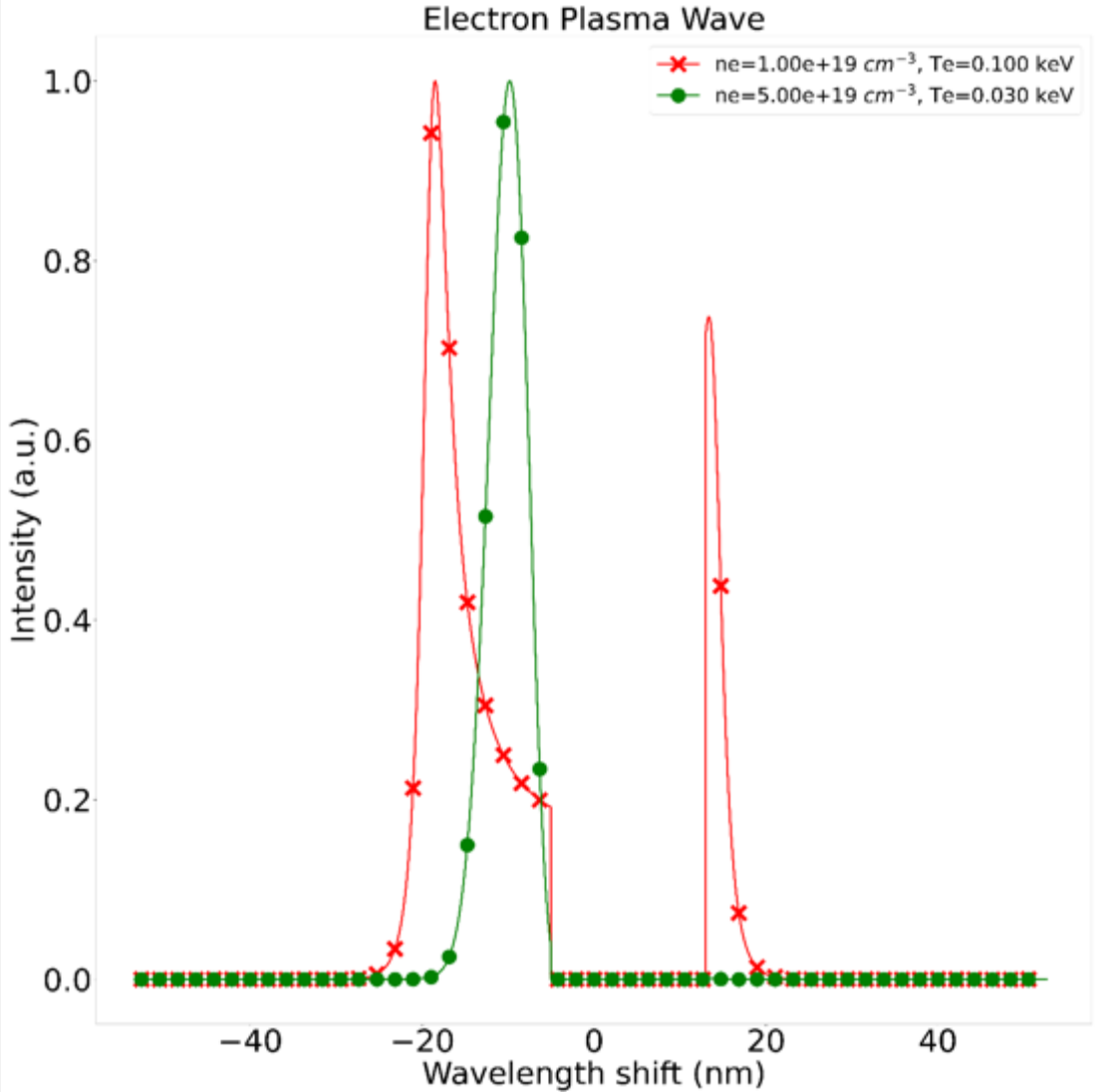
- TIM 11, TIM 12, TIM 13 , TIM 14, TIM 15

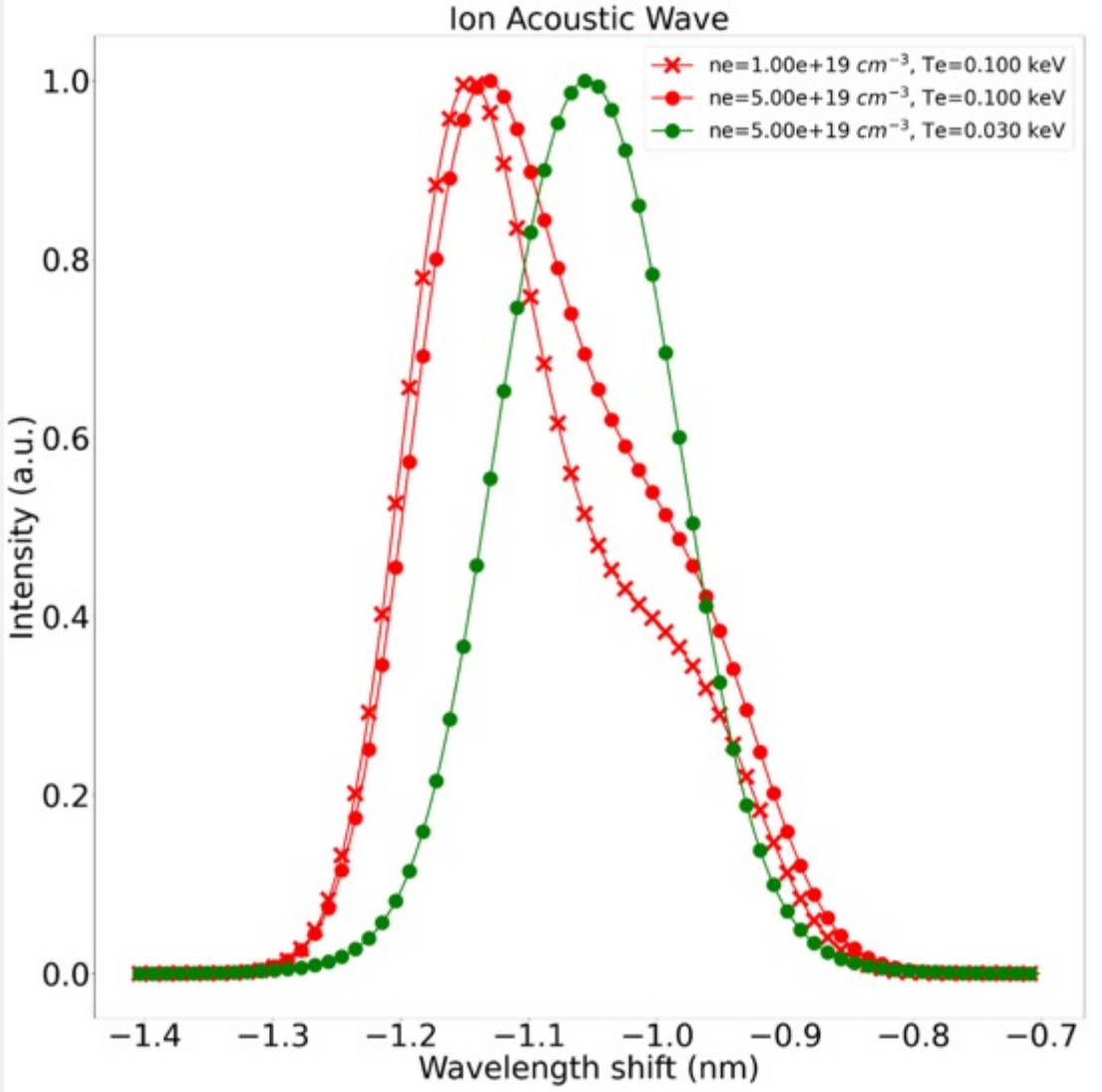
Simulation parameters:

- Electron density: 5e18 – 5e19 cm-3
- Electron temperature: 30 - 500 eV
- A1:1 & A2=12
- Z1: 1 & Z2=6
- Expansion velocity 1: 750 km/s

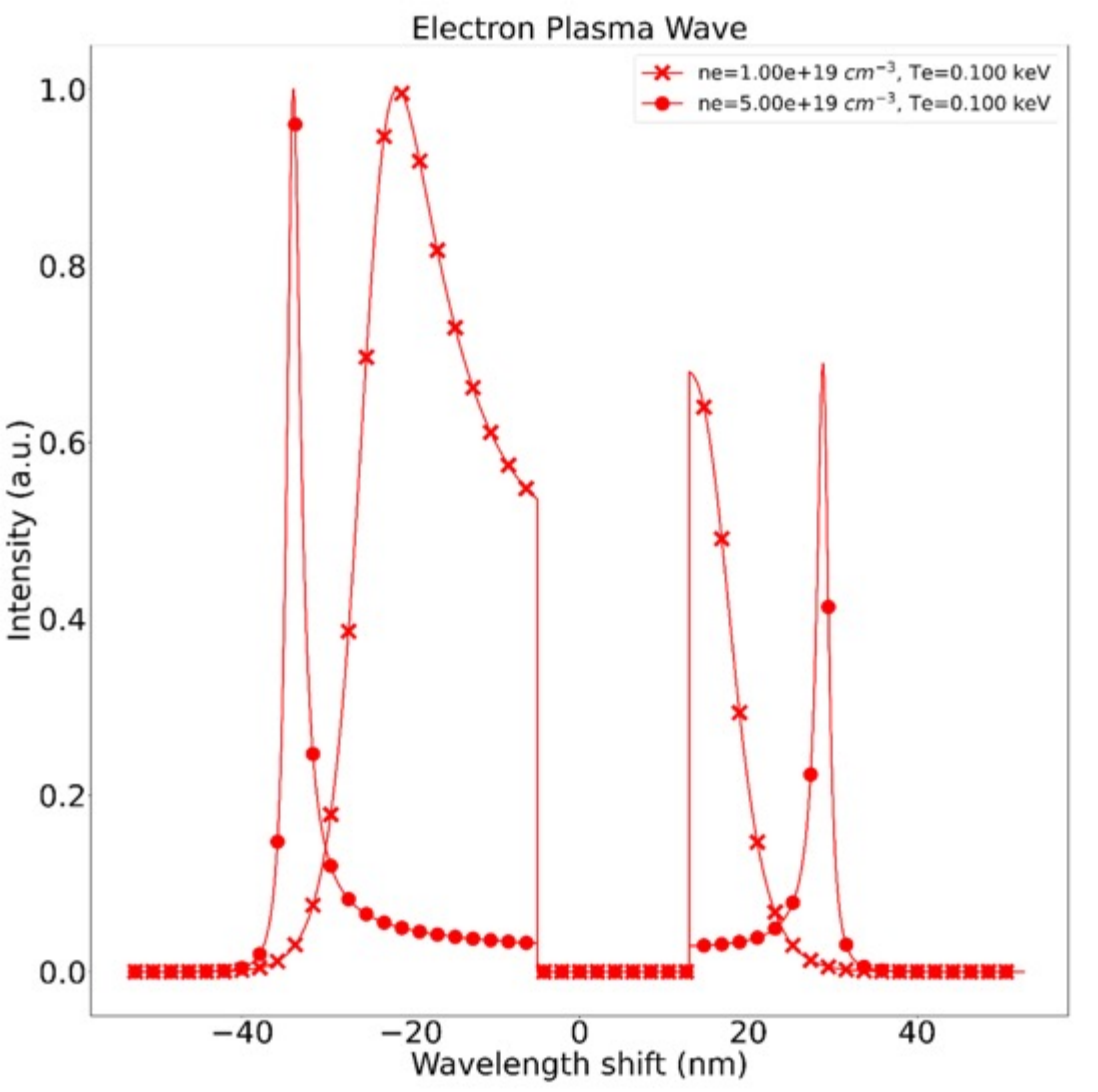
Impact to the community and program: This platform is designed to study particle heating by quasi-perpendicular collisionless shocks. OTS on EP will allow driect measurements of electron and (potentially) ion heating as a function of shock Mach number, providing data that can be compared to both simulations and spacecraft data of shock heating.

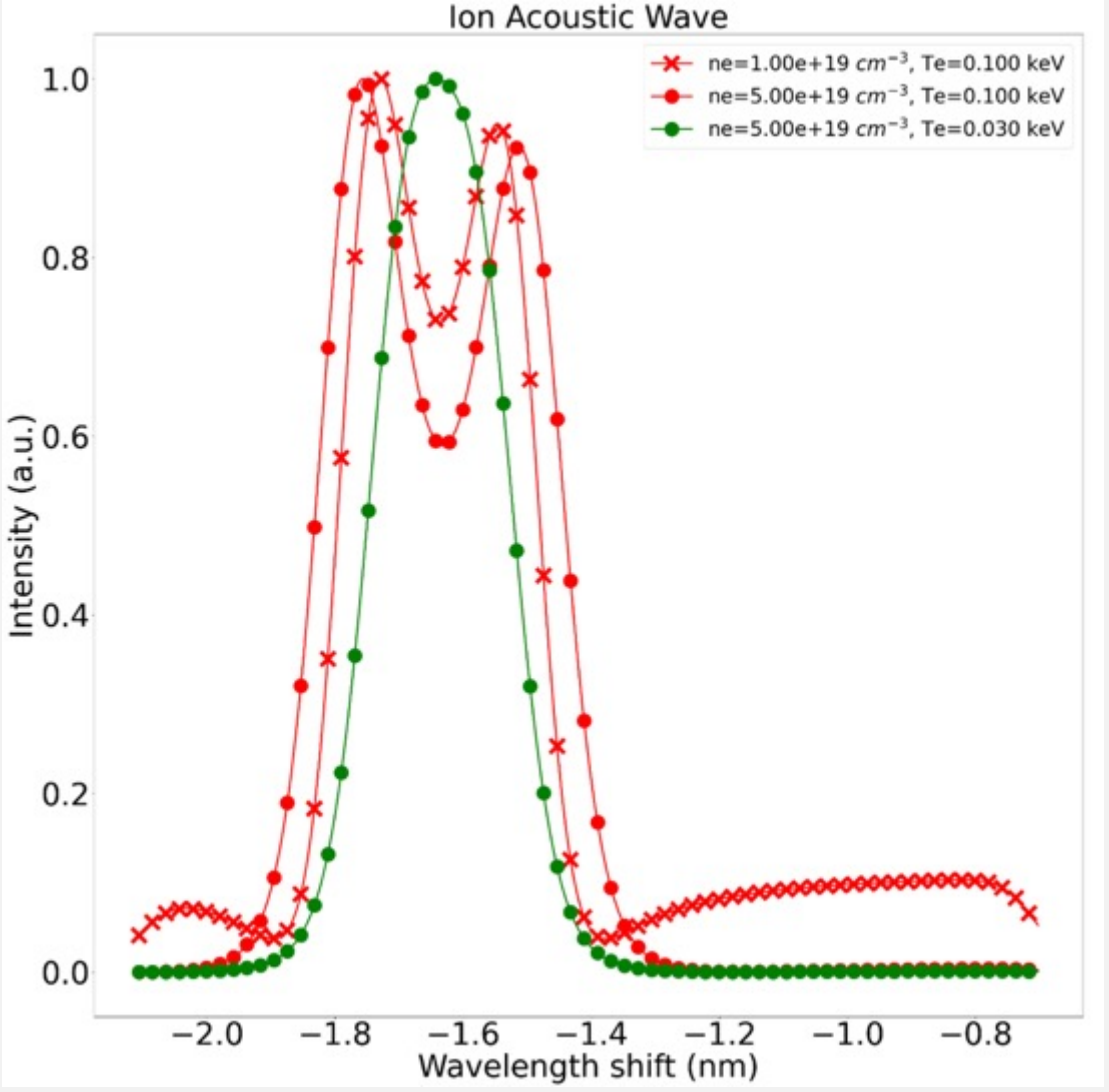
7. Sample traces: Beam 3 probe, TIM 12 ($\theta_s = 74$)





7. Sample traces: Beam 4 probe, TIM 15 ($\theta_s = 138.3$)

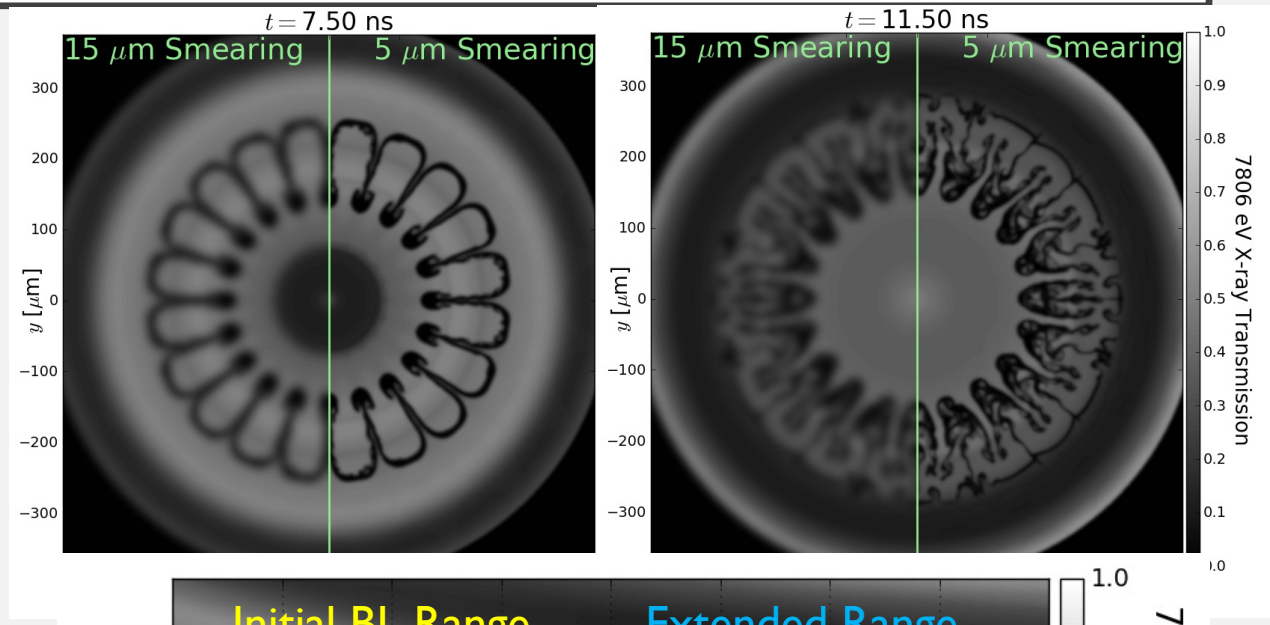


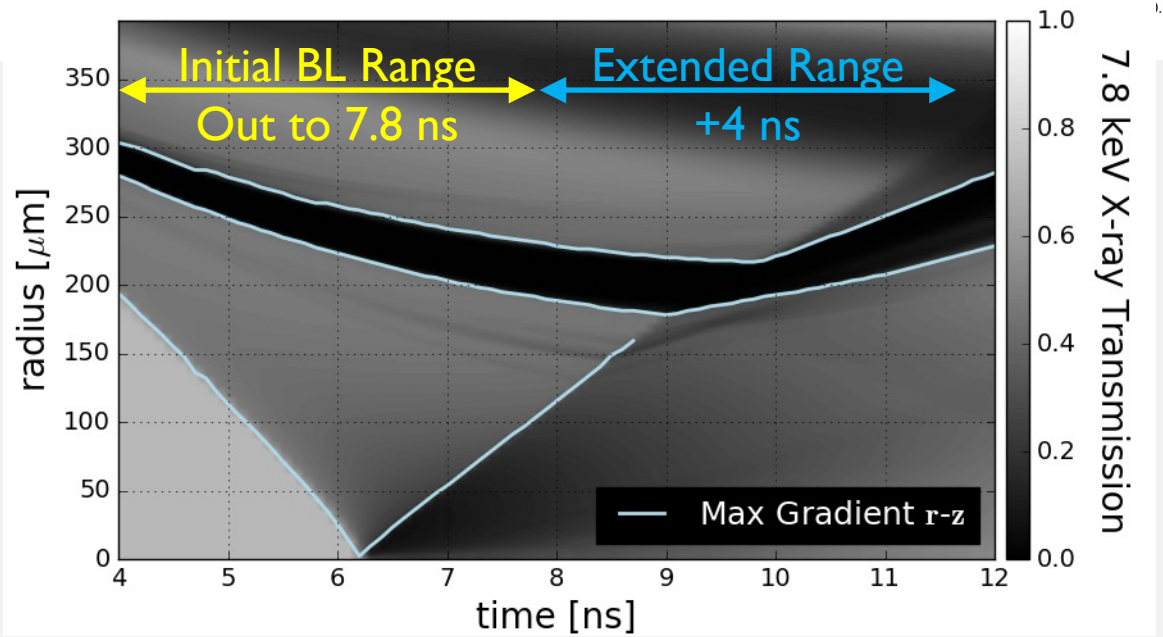


21. Extended Backlighter Beam Delay

- Additional leg added by operations would extend the backlighter delay time relative to the drive in convergent cylindrical implosion systems
- Enables late-time imaging of moderate fill (300 mg/cc) foams at low CR~2.25
- Would also benefit from higher resolution Fresnel zone plate imaging

We could examine reshock phase for these modest convergence implosions





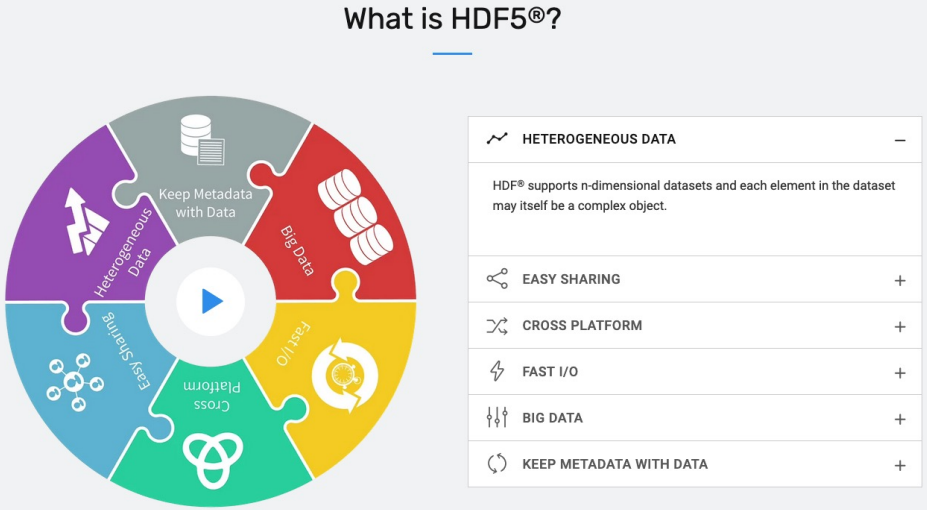
23. Upgrade to hdf5 standard for data

- Requested capability:
  - Upgrade to hdf5 standard for data (can still retain hdf4, but adding hdf5 eases use with modern tools like python). Added benefit would be some virtual compute/desktop capability for quick/live data processing on LLE servers (a la Amazon Web Services, Google Colab, etc.)

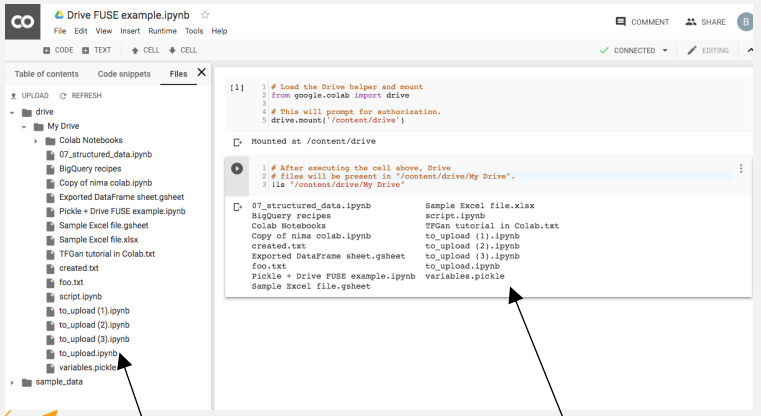
- Capability requirements: just upgraded file format to keep with current data standards. Virtual desktop with access to common tools (matlab/python)
- Impact of requested capability: enables use of modern tools like python for rapid data analysis and better data feedback during campaign days

- Proposal sponsor: All users could benefit from the upgrade/additional file format. Similarly, for virtual desktop/remote compute to avoid common analysis pathway of: 1) locate data, 2) download data, 3) process data, 4) repeat for all diagnostics, 5) collate data for next decision point. If users develop analysis scripts ahead of time, could directly act on new data as it is populated to display shot results.

23. User Capability Request



OR



Cloud or LLE server compute for data processing

Direct access to files on LLE server