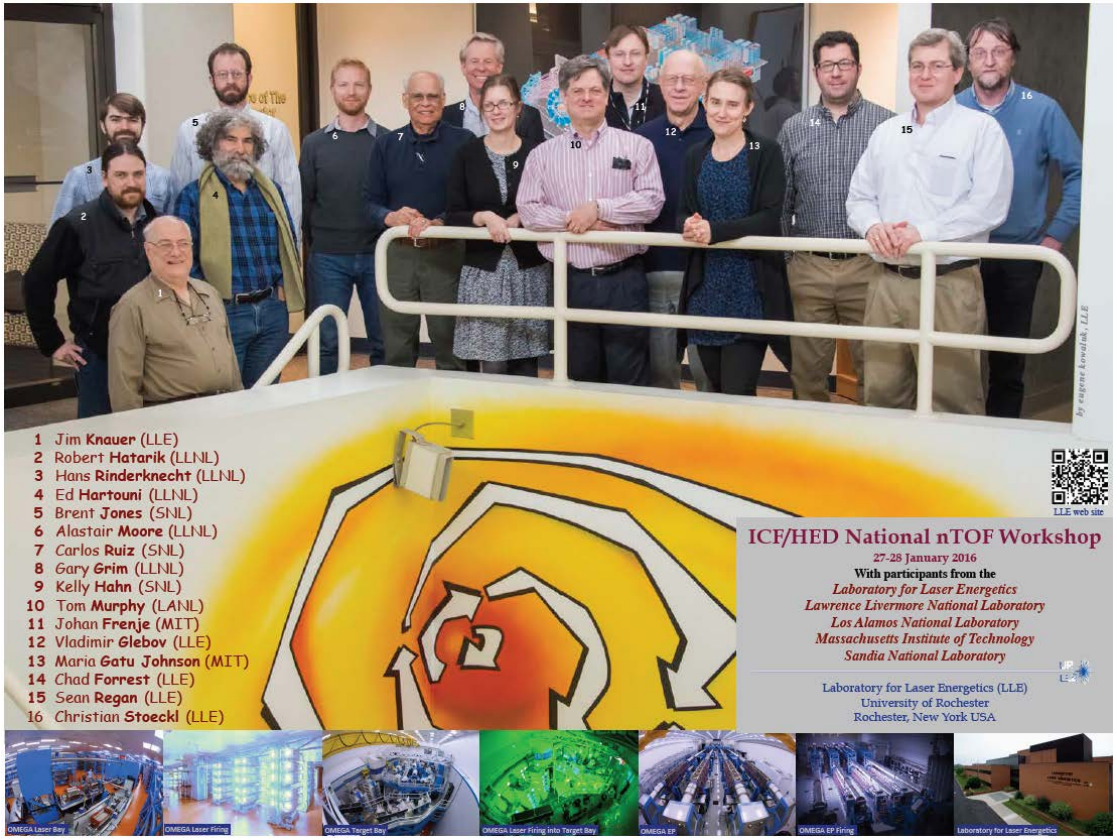
Summary of nToF Workshop



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8 – 9 March 2016
NISP Workshop
Lawrence Livermore National Laboratory

Summary

nToF Workshop was productive

- nToF Workshop held at LLE 27 – 28 January 2016
  - 18 participants from 5 institutions
- Conclusions from Workshop addressed two action items from NISP working group
- Action items
  - Three top level
  - Suggestions for each institution

There were 18 attendees from 5 institutions

Attendees

- **LANL**
  - **Tom Murphy**
- **LLE**
  - **Sean Regan**
  - **Jim Knauer**
  - **Christian Stoeckl**
  - **Vladimir Glebov**
  - **Chad Forrest**
- **SNL**
  - **Brent Jones**
  - **Kelly Hahn**
  - **Carlos Ruiz**
- **LLNL**
  - **Gary Grim**
  - **Robert Hatarik**
  - **Ed Hartoni**
  - **Alistair Moore**
  - **Hans Rinderknecht**
  - **Mark Eckart – Via Web conference**
  - **Dan Sayre – Via Web conference**
- **MIT**
  - **Johan Frenje**
  - **Maria Gatu-Johnson**

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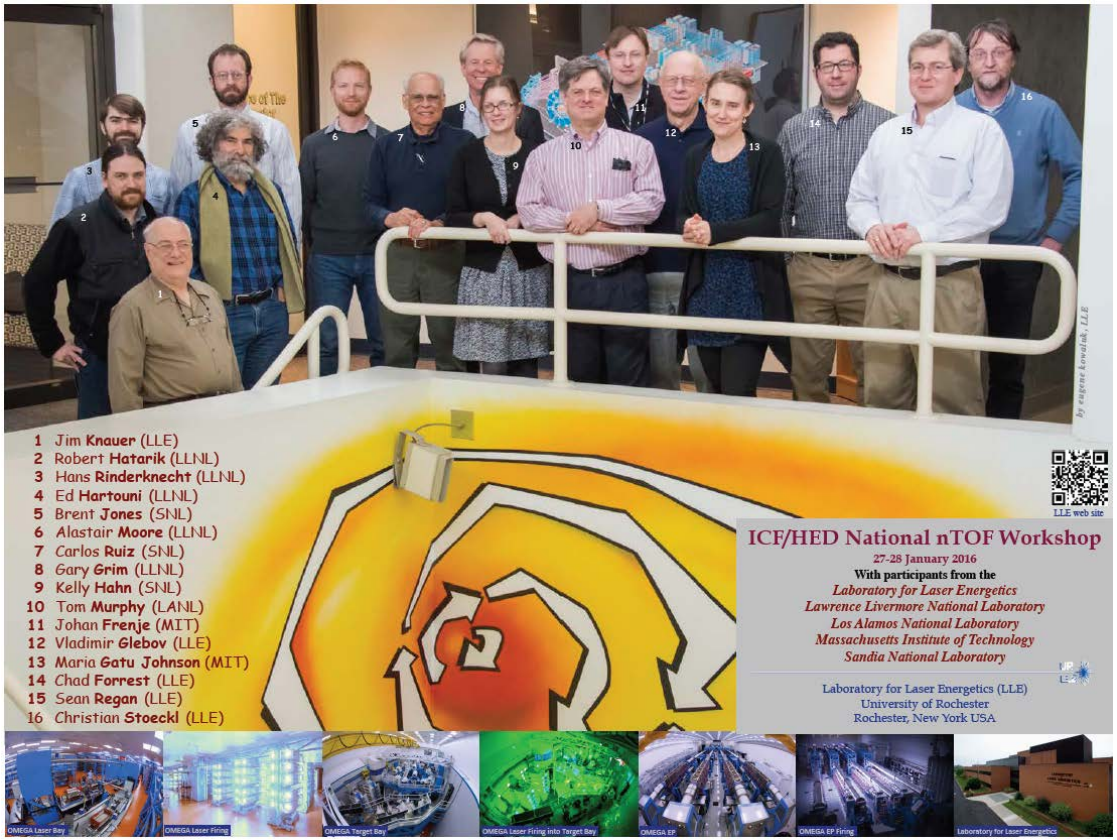

Two of the eight action items identified by the NISP working group were discussed at the nToF workshop

1. **“Non-radial flow: emphasis on nTOF analysis, with peer review by LLE, LLNL. Sandia will look for precision requirements**
2. **Compare consensus on image shapes and Ti variation. Shouldn’t round images and isotropic temperatures go together?”**

The strategy for the workshop was to have staff from each participating facility analyze a small set of nToF data from LLE and the NIF

- Three OMEGA and three NIF shots were identified for the “peer review” of the nToF analysis techniques used at each facility
- The OMEGA and NIF shots were selected to look at the variation in the inferred ion temperature (Tion) along different diagnostic lines of sight as mentioned in the second NISP action item listed above
- Researchers were asked to analyze the data sent to them to extracting a Tion for each instrument for either the DT neutron peak or the DD neutron peak. More precisely, the standard deviation (□n) of the neutron distribution, a scalar multiple of the full width half maxium for an assumed Gaussian distribution, was extracted from the DT and DD neutron spectra

Conclusions of the workshop

1. **The inferred DT ion temperatures produced by anayses of NIF and Omega organic scintillator nToF diagnostics, agreed to the precision of the known systematic uncertainties (±0.3 keV).**
   a. **A post workshop activity is for LLNL to reanalyze the LLE CVD diamond detector data with a more precise detector impulse response function.**
   b. **The LLE systematic uncertainty needs to be reduced to satisfy the ±0.1 keV target physics requirement for the 100 Gbar campaign on OMEGA.**
2. **The LLE analyses of NIF inferred DD ion temperatures, using a forward fit methodology, agreed to with NIF anlayes to better than precision of the known systematic uncertainties (±0.3 keV).**
3. **The LLNL analysis of the Omega inferred DD ion temperatures did not agree with Omega analyses to the precision of the known systematic uncertainties (±0.3 keV).**

Conclusions of the workshop cont.

4. The LLE observed DT ion temperature asymmetry with LOS was also observed in the LLNL analysis.
    a. A post workshop activity is for LLE and LLNL to perform follow up studies on the possible sources of this variation, which could include physics, as well as, detector systematics.
5. NIF implosion ρr measured either by the nT backscatter or the DT DSR are in general agreement (to 0.15 g/cm2).
6. The new analysis technique from LLNL to fit the moments of the neutron spectrum and relate them to moments of the fluid temperature and velocity distributions in the hot spot may lead to a better understanding of the hot-spot ion temperature.
7. The LLE analysis based on the work of T. Murphy1 produces the 0th-2nd moments of the neutron time-of-flight distribution.

Conclusions of the workshop cont.

8. **LANL, LLE, LLNL, MIT, and SNL should pursue collaborations leading to more accurate instrument response functions for nToF detectors based on direct neutron measurements, as well as hard x ray measurements coupled with MCMP simulations.**
9. **The nToF workshop will greatly benefit the ICF/HED research fields.**

Several Action Items were identified

Top level

- **Establish a protocol for future data sharing LANL, LLE, LLNL, MIT and SNL**
- **Hold an nToF workshop twice a year**
- **Schedule a periodic nToF web conference to discuss progress on action items**

Laboratory Specific

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