

EP UV long-pulse beams with added leg flexibility

Nov. 15, 2011

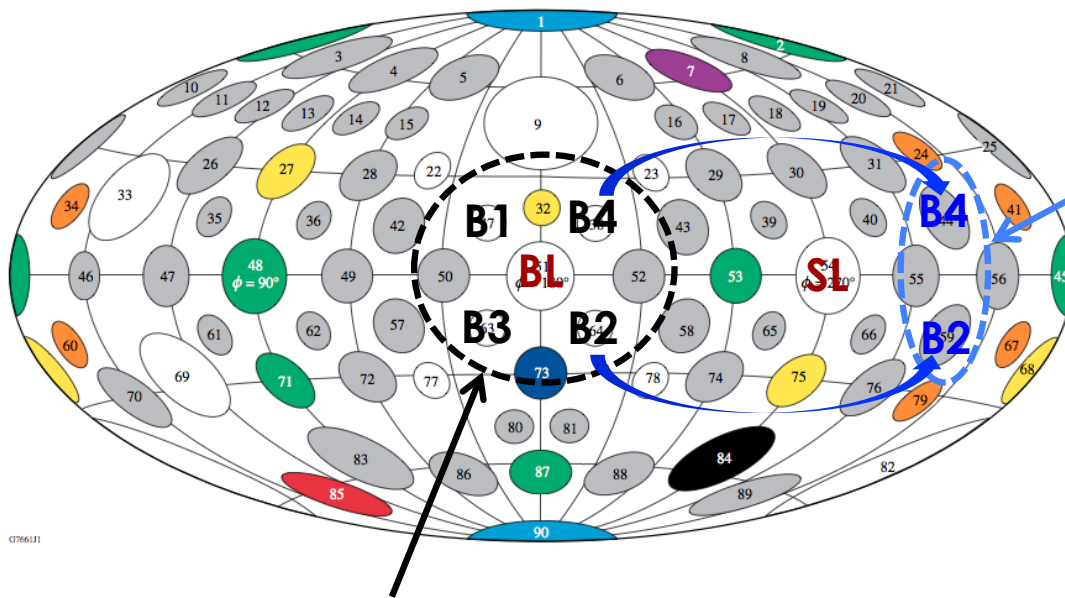
Omega User Group Meeting, Salt Lake City, Utah

Mingsheng Wei
General Atomics

Report material input from: Farhat Beg (UCSD), Mingsheng Wei, Richard Stephens (GA), Vladimir Smalyuk (LLNL), Bob Heeter (LLNL), Dustin Froula (LLE)

OMEGA EP long-pulse operations – enhanced capability

UV LP beam configuration on EPc



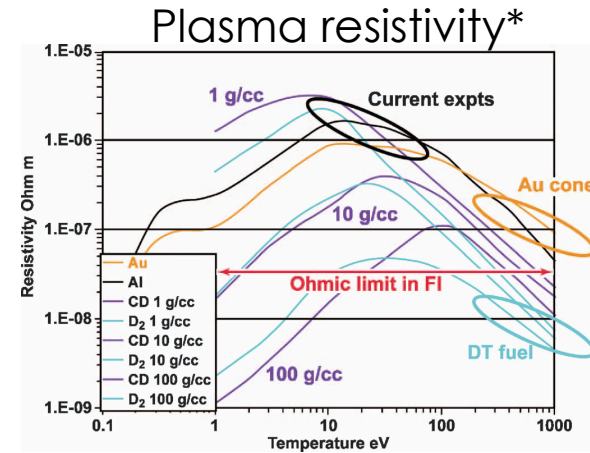
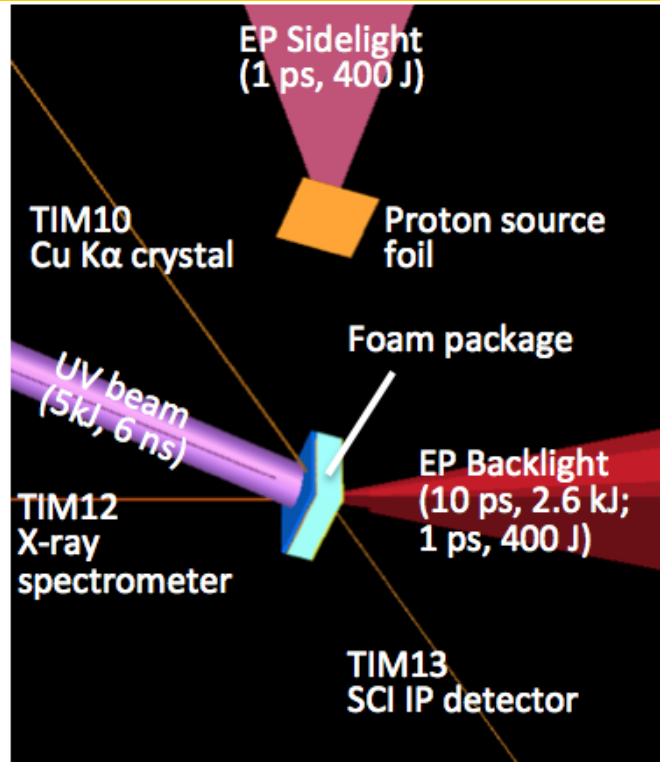
- Currently, all four long pulse beams (B1 – B4) are from 23° beam cone
- Or, two long pulse beams (B3&B4) from 23° ports with short pulse BL and SL

OLUG recommendation on LP:

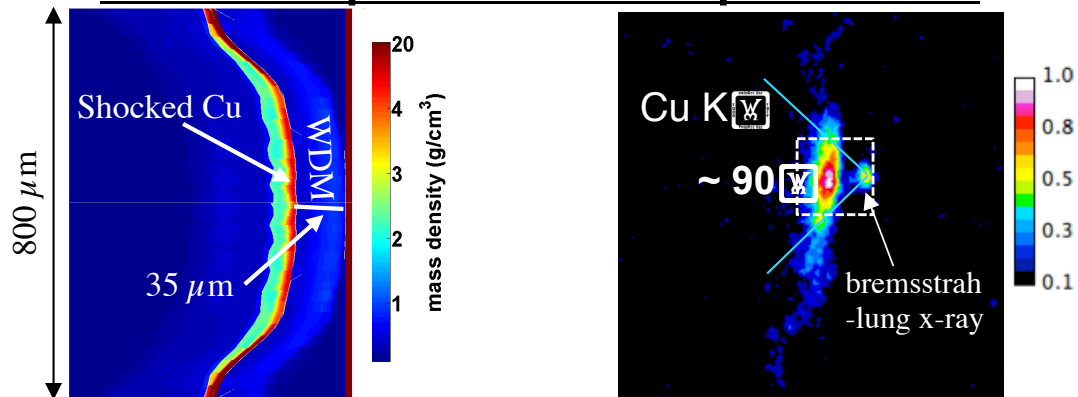
- More flexible beam legs – strong request of opposing beam operation from both internal and external users)
- 100-ps UV pulse, 100 J/beam
- Bring all the beams to the full performance
- 4ω Thomson Scattering probe beam

Opposing UV beam operation facilitates fast ignition electron source and transport study

Study of fast electron transport into warm dense plasmas



Titan transport in WDM experiments#



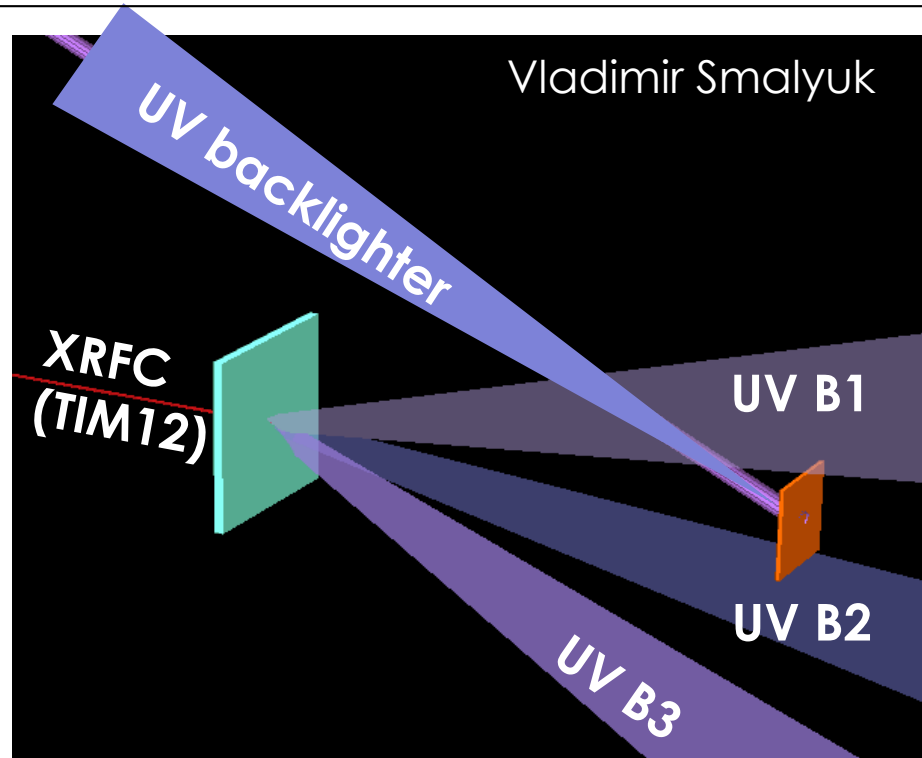
- UV beam drives shock to assemble hot dense plasmas in foam or solid
- Characterize shock propagation and compression with side-on x-ray radiography
- Systematic investigation of 10 ps kJ high intensity EP BL beam produced fast electron transport into hot dense plasmas
- Characterize fast electrons transport by $K\alpha$, bremsstrahlung x-ray radiation and side-on proton probe measuring intense fields

*M. Key, Physics of Plasmas **14**, 055502 (2007)

#M.S. Wei et al., submitted to PRL

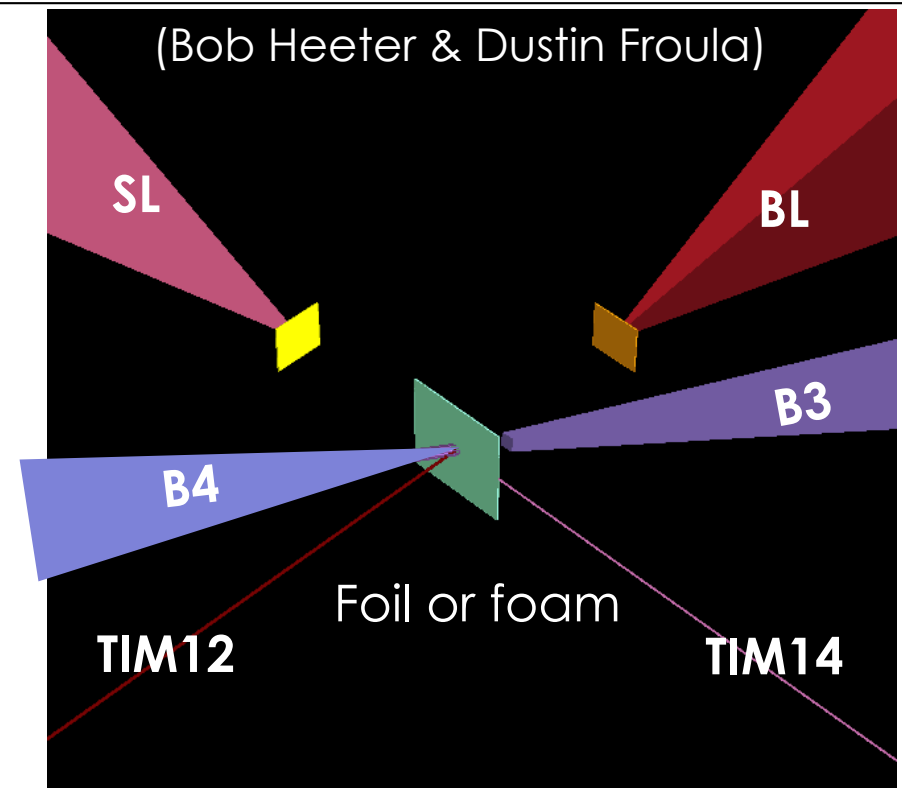
Opposing beams will also allow study of important hydro physics and non-LTE plasmas on EP

Study of RT instability



- 3 UV beam driver (10 ns, 15-20 kJ)
- Opposing beam produce bright backlight source for characterizing RT instability
- Framing camera at TIM 12 to record the x-ray image with good access

Study of LTE & non-LTE plasma



- Opposing beams to create LTE&non-LTE plasmas
- Probes with BL and SL with extremely high temporal (10 ps) and spatial resolution enable detail measurement of n_e , T_e , opacity of LTE or non-LTE expanding sample
 - precise validation of time-dependent atomic kinetics along experimentally-measured rho-T paths