

# EP UV long-pulse beams with added leg flexibility

April 26, 2011

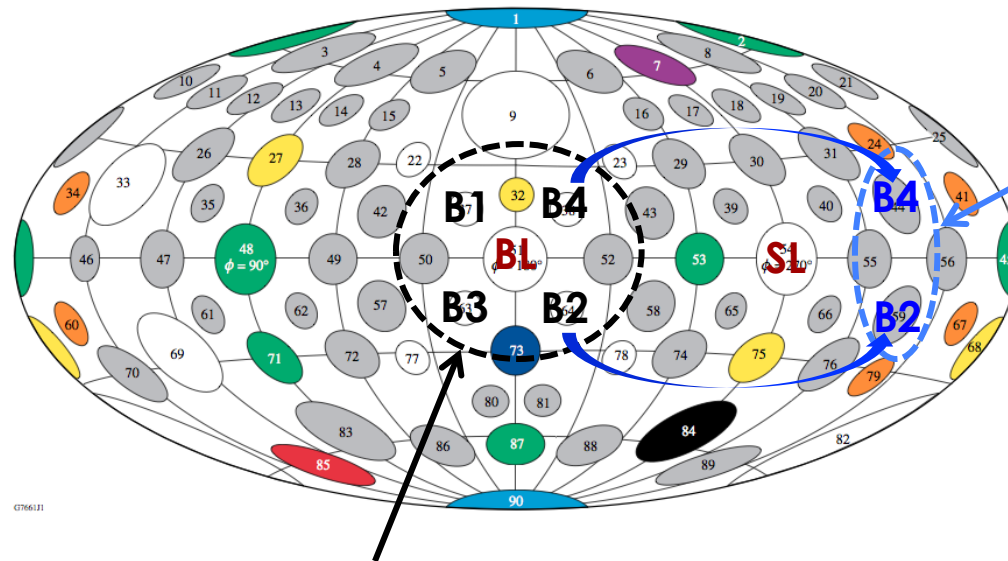
Omega Laser User Group Workshop, LLE, Rochester

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), and many people in the audience

# OMEGA EP long-pulse operations – enhanced capability

## UV LP beam configuration on EP



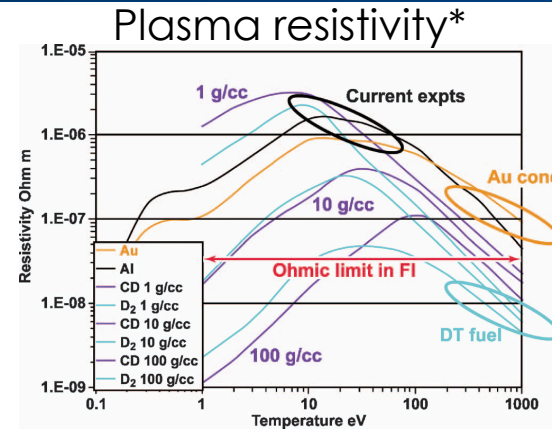
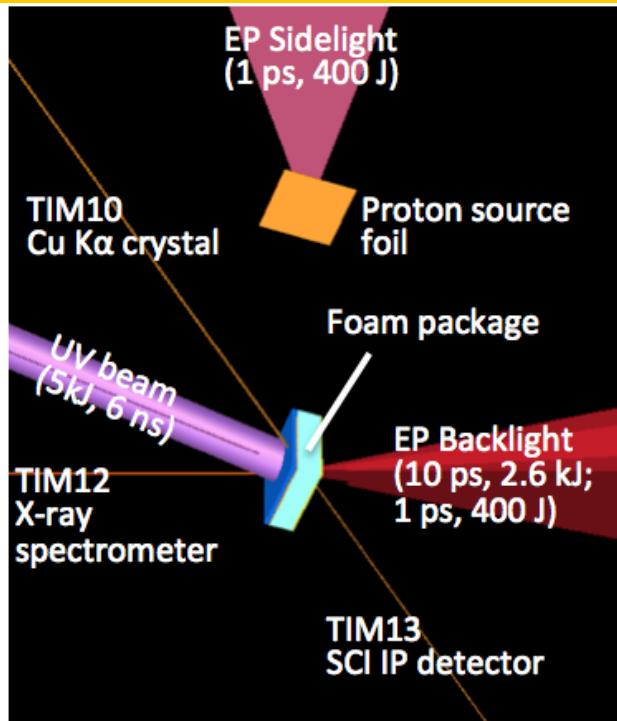
- Currently, all four long pulse beams (B1 – B4) are from 23° beam cone
- Or, two long pulse beams (B3&B4) from 23° ports with short pulse BL and SL

## OLUG recommendation on LP:

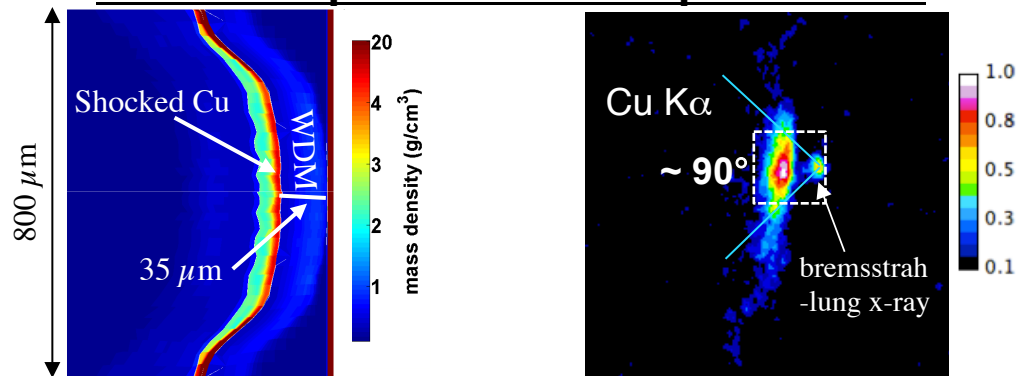
- **More flexible beam legs – strong request of opposing beam operation from both internal and external users**
  - Facility has identified routing options (Beam2 to P44, Beam 4 to P59) and included in FY13-17 LLE proposed activities
- **100-ps UV pulse, 100 J/beam (already available)**
- **Bring all the beams to the full performance (see LLE website for the latest update)**

# Opposing UV beam operation facilitates fast ignition electron transport study in well characterized plasmas

## 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

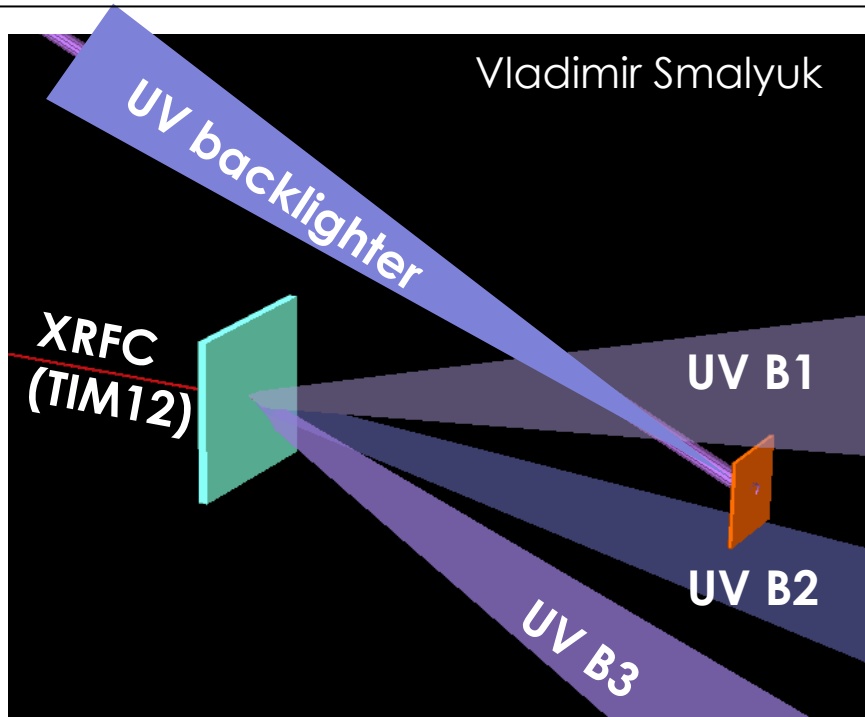
\*M. Key, Physics of Plasmas **14**, 055502 (2007)

#M.S. Wei et al., PRL (under revision)

# Opposing beams configuration will allow variety types of HED science experiments on OMGA EP

## Study of RT instability

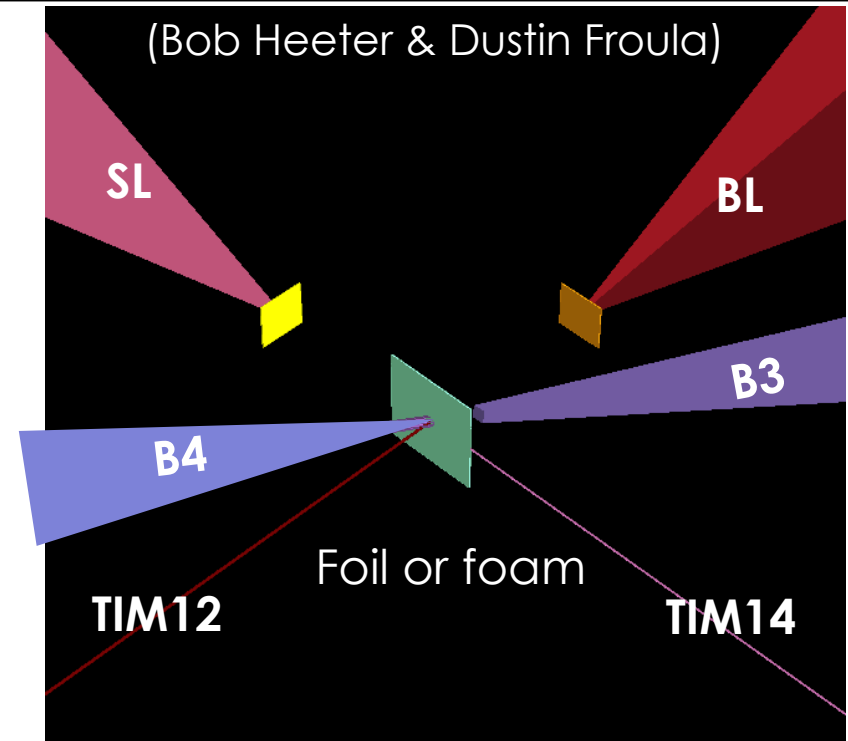
Vladimir Smalyuk



- 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

(Bob Heeter & Dustin Froula)



- 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