ONEGA EP Short-Pulse Transmission Siudy Staius Report

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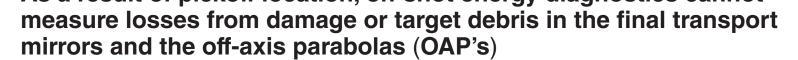
A diagnostic has been developed to characterize transmission losses in the OMEGA EP short-pulse transport paths

• As a result of pickoff location, on-shot energy diagnostics cannot

A ratiometer technique has been implemented to characterize transmission through the final OMEGA EP short-pulse optics



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• Current on-target energy reports rely on estimated coating reflectivities of the final short-pulse optics

- The short-pulse ratiometer diagnostic was designed to provide accurate measurement and tracking of transmission performance through the final optics
- This diagnostic will be used to provide more-accurate on-target energy reports and for a more-deterministic method of specifying disposable debris shield usage

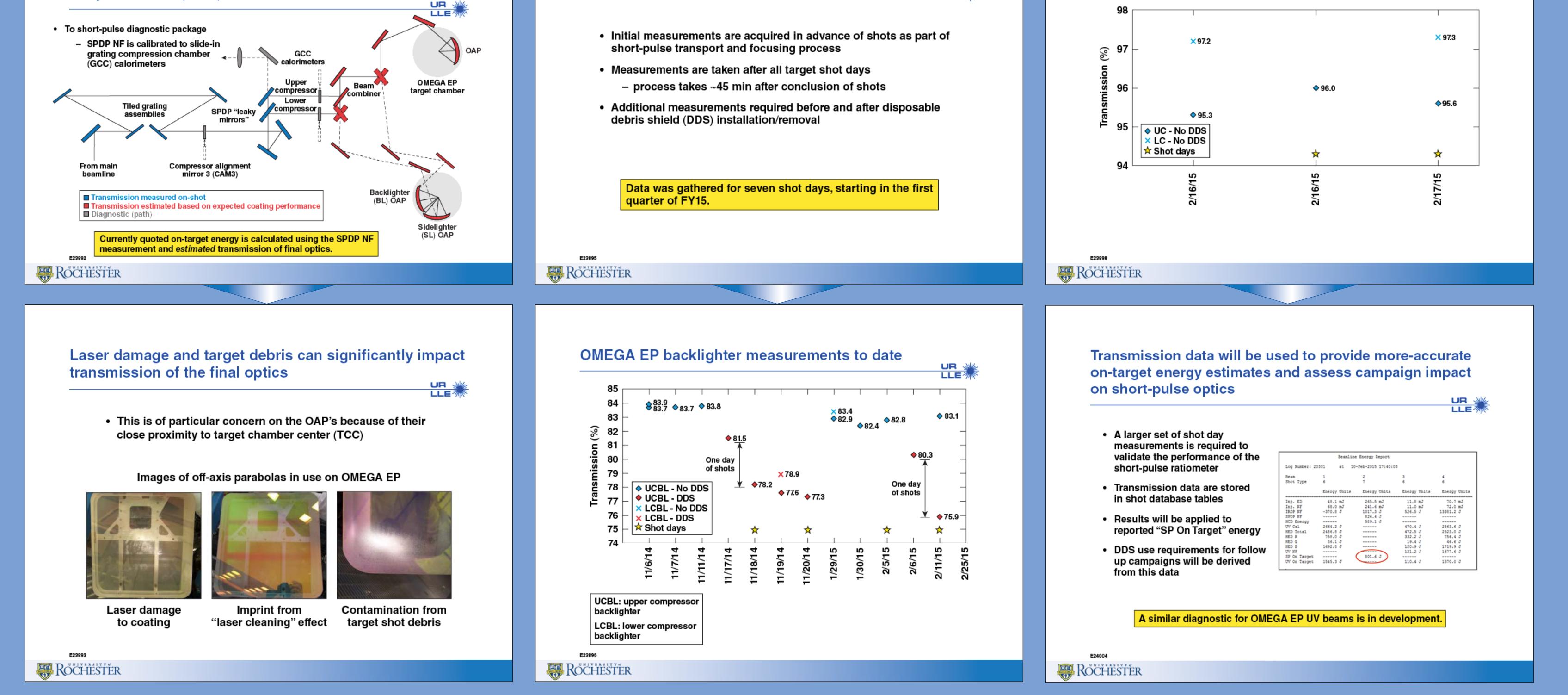
Transmission measurements are now acquired before and after all short-pulse target shot days.

lignment Transmission to be measured Output Ratiometer diagnostic CAM3 reflector in GCC Spherical reflector at TCC (intergrating spheres to fibers imaged onto CCD) (Uncoated optics with Fresnel reflections) RetroR₂/OutputR₂ $Transmission_{R_1 \rightarrow R_2} = \sqrt{\frac{1}{\text{RetroR}_1/\text{OutputR}_1}}$

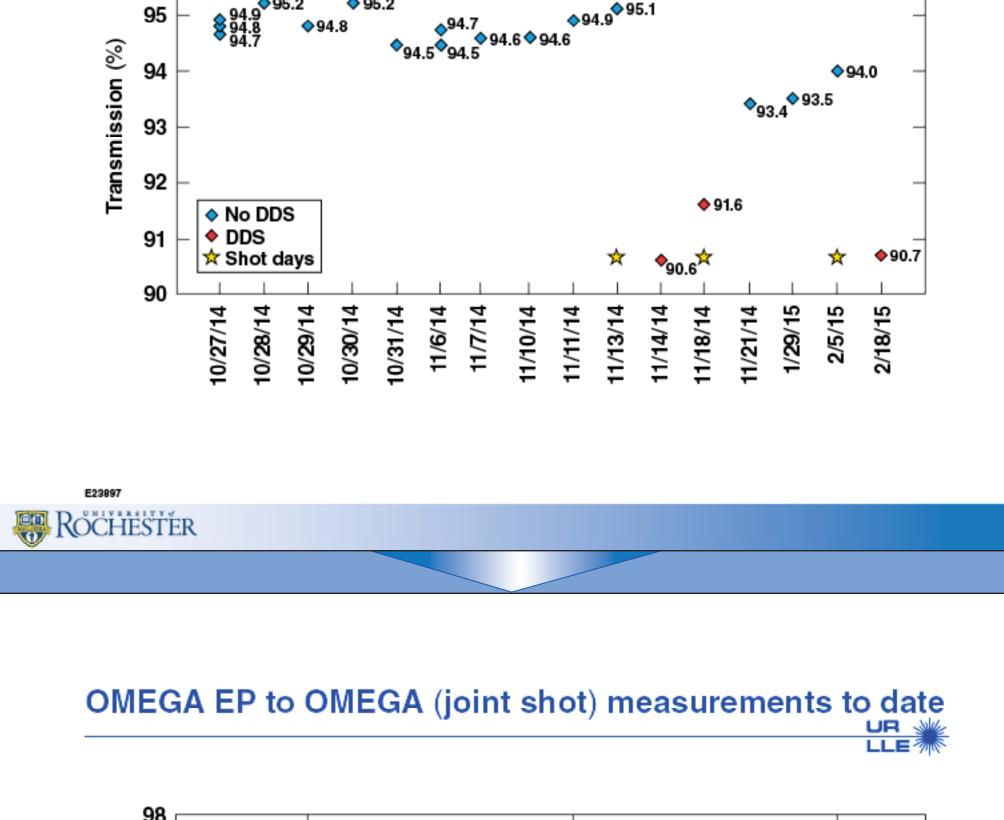
Injection

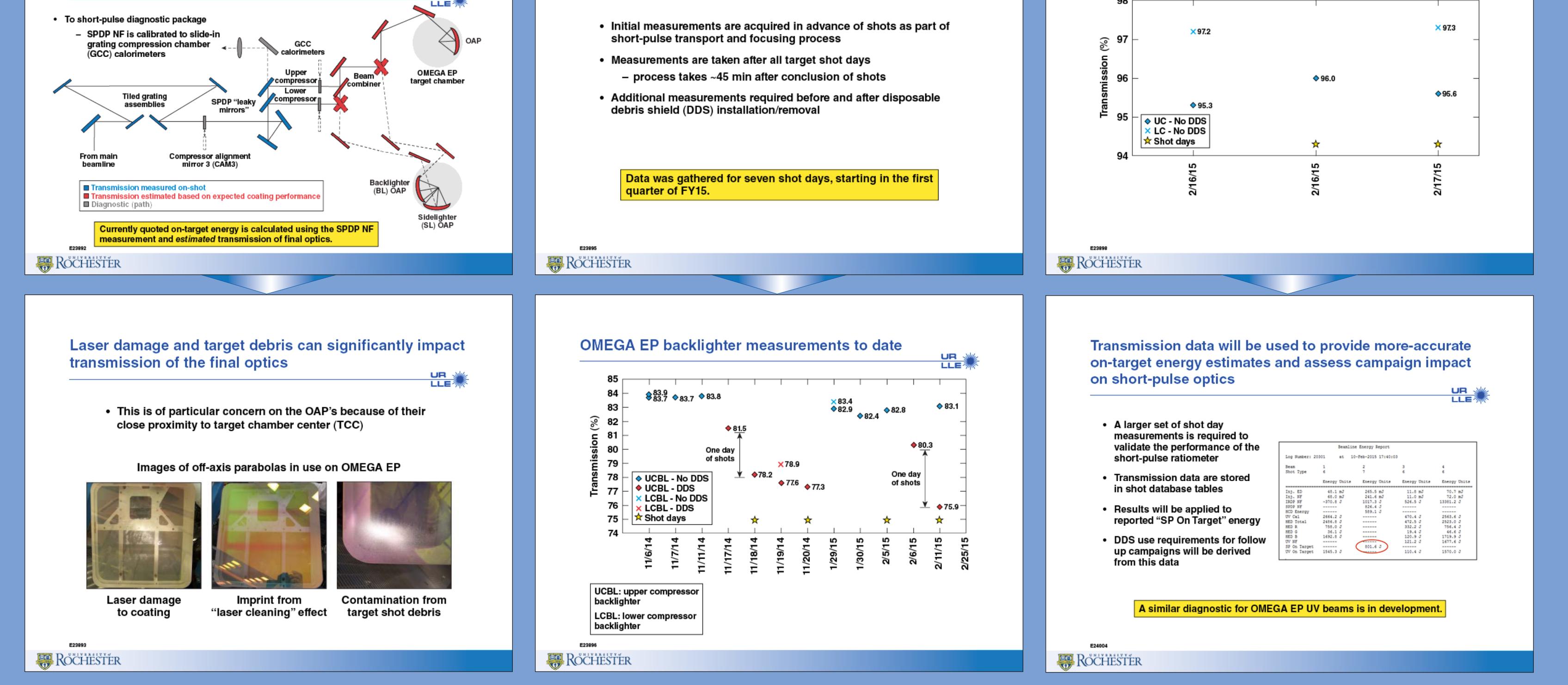
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Short-pulse ratiometer measurements are now acquired for all target campaigns





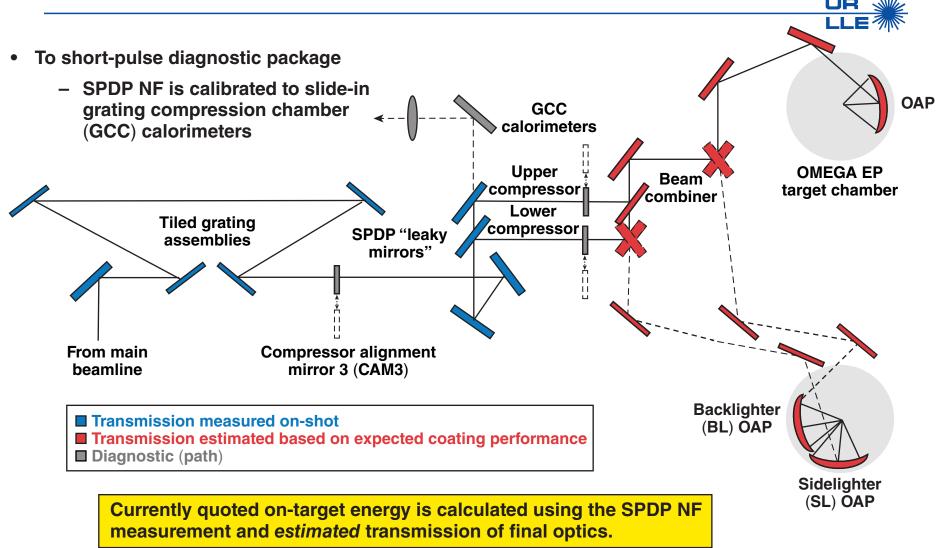
A diagnostic has been developed to characterize transmission losses in the OMEGA EP short-pulse transport paths

- As a result of pickoff location, on-shot energy diagnostics cannot measure losses from damage or target debris in the final transport mirrors and the off-axis parabolas (OAP's)
- Current on-target energy reports rely on estimated coating reflectivities of the final short-pulse optics
- The short-pulse ratiometer diagnostic was designed to provide accurate measurement and tracking of transmission performance through the final optics
- This diagnostic will be used to provide more-accurate on-target energy reports and for a more-deterministic method of specifying disposable debris shield usage

Transmission measurements are now acquired before and after all short-pulse target shot days.



Reported on-target energy is determined by the shortpulse diagnostic package near-field (SPDP NF) chargecoupled device (CCD)



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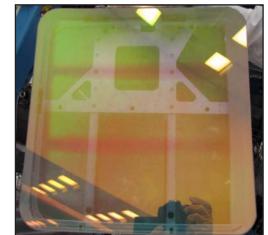
Laser damage and target debris can significantly impact transmission of the final optics

• This is of particular concern on the OAP's because of their close proximity to target chamber center (TCC)

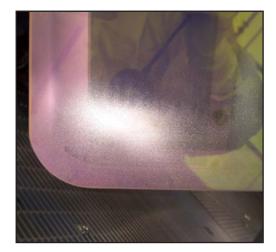
Images of off-axis parabolas in use on OMEGA EP



Laser damage to coating



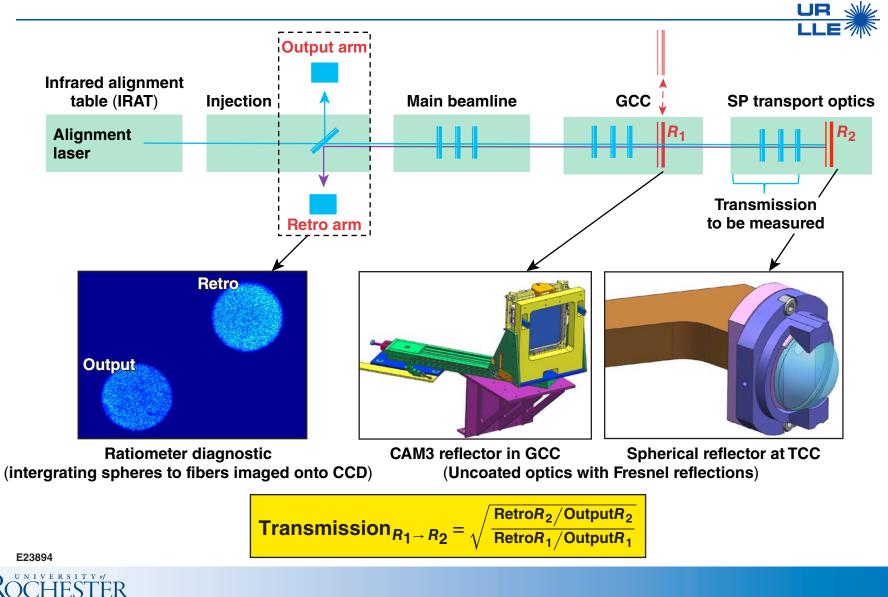
Imprint from "laser cleaning" effect



Contamination from target shot debris



A ratiometer technique has been implemented to characterize transmission through the final OMEGA EP short-pulse optics



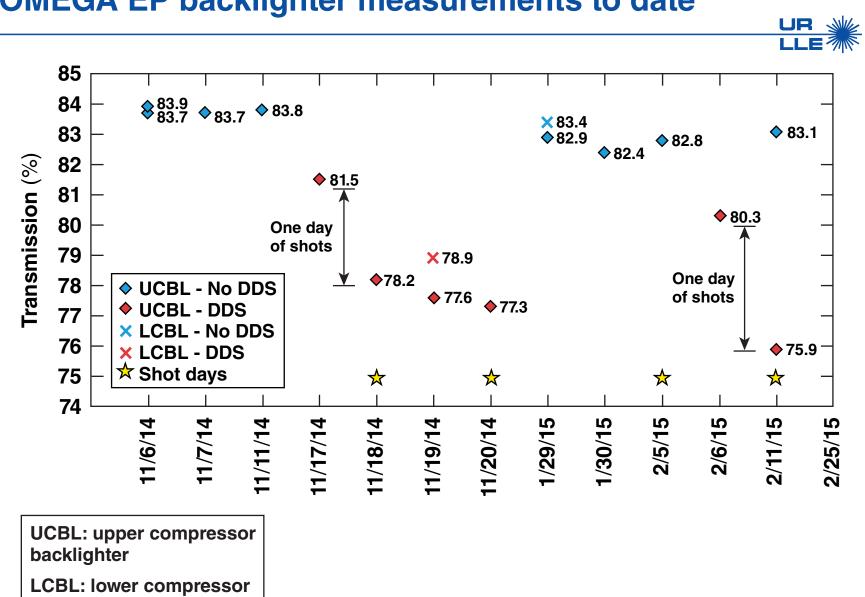
Short-pulse ratiometer measurements are now acquired for all target campaigns

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- Initial measurements are acquired in advance of shots as part of short-pulse transport and focusing process
- Measurements are taken after all target shot days
 - process takes ~45 min after conclusion of shots
- Additional measurements required before and after disposable debris shield (DDS) installation/removal

Data was gathered for seven shot days, starting in the first quarter of FY15.





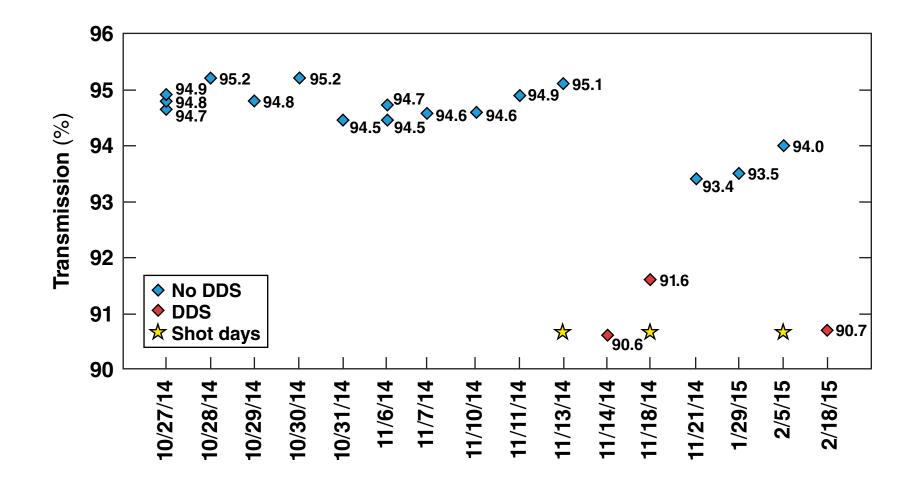
OMEGA EP backlighter measurements to date

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backlighter

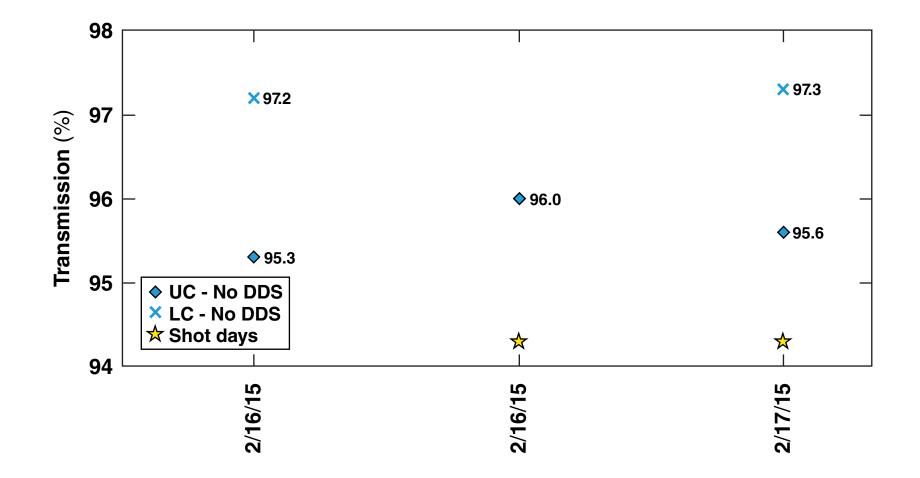


OMEGA EP sidelighter measurements to date





OMEGA EP to OMEGA (joint shot) measurements to date





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Transmission data will be used to provide more-accurate on-target energy estimates and assess campaign impact on short-pulse optics

- A larger set of shot day measurements is required to validate the performance of the short-pulse ratiometer
- Transmission data are stored in shot database tables
- Results will be applied to reported "SP On Target" energy
- DDS use requirements for follow up campaigns will be derived from this data

Beamline Energy Report										
Log Number:	20301	at	10-Feb-2015	17:40:03						
Beam	1		2		3		4			
Shot Type	6		7		6		6			
	Energy	Units	Energy	Units	Energy	Units	Energy	Units		
Inj. ED	48.1	mJ	265.5	mJ	11.8	mJ	70.7	mJ		
Inj. NF	68.0	mJ	241.6	mJ	11.0	mJ	72.0	mJ		
IRDP NF	-370.8	J	1017.3	J	526.5	J	13381.2	J		
SPDP NF			826.4	J						
HCD Energy			589.1	J						
UV Cal	2664.2	J			470.4	J	2563.6	J		
HED Total	2486.8	J			472.5	J	2523.0	J		
HED R	758.0	J			332.2	J	756.4	J		
HED G	36.1	J			19.4	J	46.6	J		
HED B	1692.8	J			120.9	J	1719.9	J		
UV NF					121.2	J	1677.6	J		
SP On Target			801.6	J)						
UV On Target	1545.3	J			110.4	J	1570.0	J		

A similar diagnostic for OMEGA EP UV beams is in development.

