

OMEGA Performance Metrics and Status Update on OLOG Recommendations



S. J. STAGNITTO, W. R. DONALDSON, E. HILL, M. LABUZETA, M. MILLECCHIA AND S. F. B. MORSE

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Summary

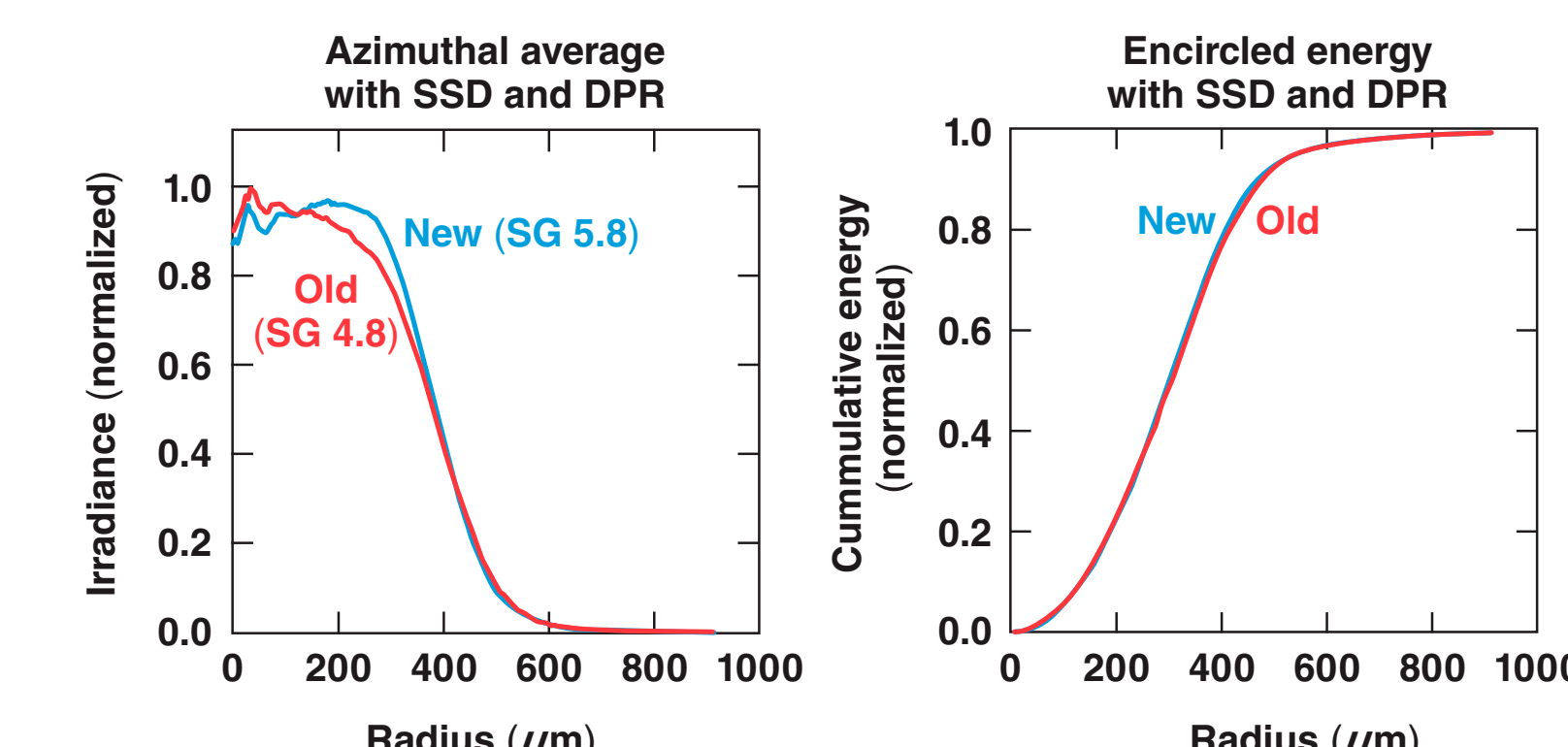
OMEGA 60 Continues to Perform at a High Level While Responding to Various User Recommendations

- Availability delays continuing to decrease as a result of optimized facility scheduling and reduced reconfiguration times
- Improved beam-timing measurement accuracy for long (>10-ns) delays has been a long-standing user request
 - 35-ns capability was added to the 60-beam P510 streak camera system
 - scope measurement in development will provide increased precision and 35- to 200-ns capability
- Additional SG8 phase plates were acquired and characterized
- The precision UV pulse-shape (PUVP) diagnostic will provide higher-bandwidth pulse-shape data for a single beam fed by each leg and will be available in FY13

Phase 1 of the Driver Reconfiguration Project will be Complete by the End of Q3 FY12

- Backlighter driver large-aperture ring amplifier (LARA) will be seeded with the main regen
 - improved stability
 - improved spatial profile
 - additional diagnostics
 - will lead to higher and more-consistent UV on-target energy
- Phase 2 of the driver reconfiguration project is part of the FY13–FY17 cooperative agreement renewal and will provide increased flexibility in irradiation capability
 - SSD driver in three legs
 - SSD driver in two legs and narrowband driver in one leg
 - SSD driver in one leg and narrowband driver in one or two legs
 - narrowband driver in three legs

The OLOG-Requested SG8 Phase Plates were Validated Using OMEGA's Equivalent Target Plane Diagnostic

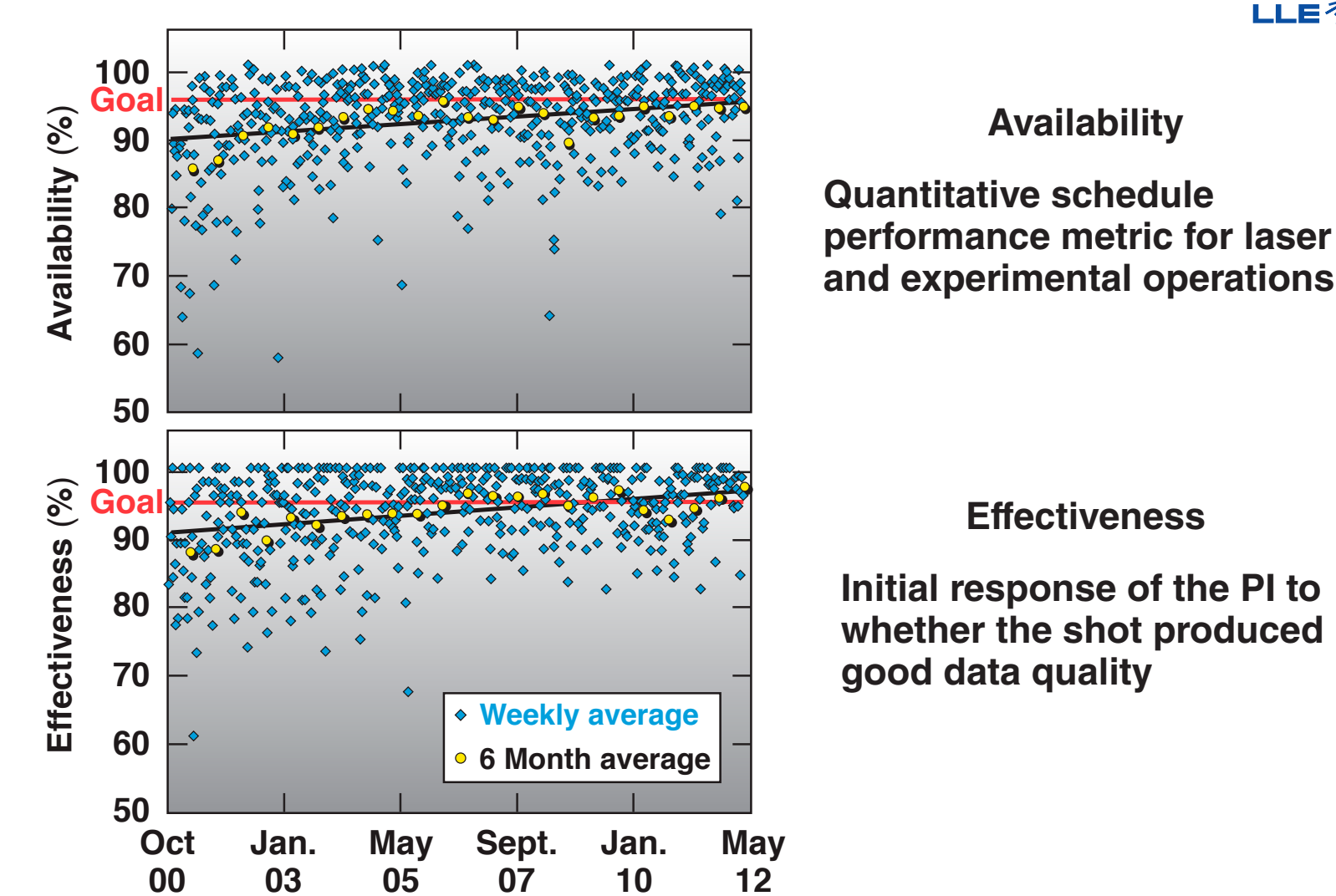


Four of the ten SG8 phase plates have been delivered, coated, mounted, and tested. The remaining six will be available by the end of the third quarter.

The OMEGA Pulse-Shape Web Page is Evolving to Provide More Information to the User Community

- Pulse shapes have evolved to have more features than the nomenclature supported
- Pulse shapes will continue to be grouped by features and have a non-unique pulse shape "parent" name
- All pulse-shape "children" have a unique identifier (Pulse Shape Request number)
- Web page will help the user find a pulse shape by feature and includes historical shot data

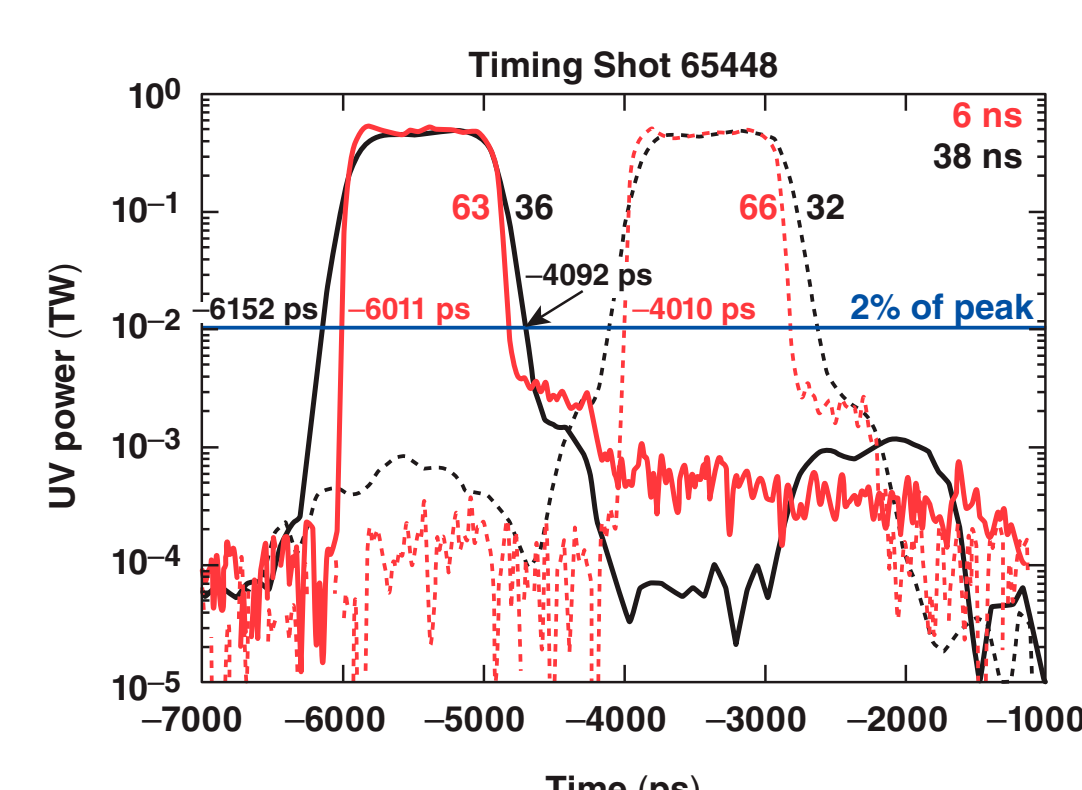
Most Weeks OMEGA Meets or Exceeds the 95% Availability and Effectiveness Goals



Availability
Quantitative schedule performance metric for laser and experimental operations

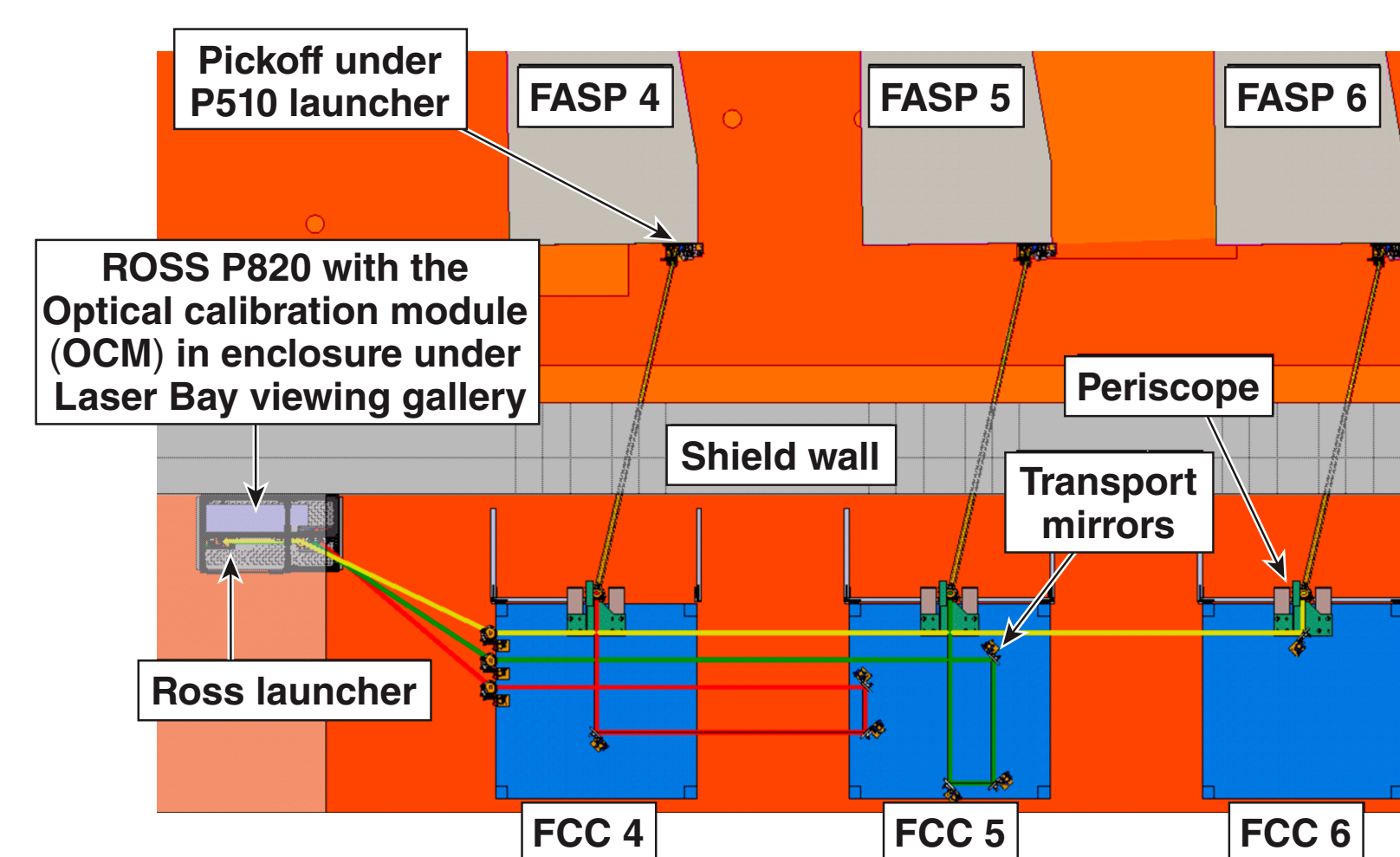
Effectiveness
Initial response of the PI to whether the shot produced good data quality

A Slow P510 Sweep Speed was Implemented for Measuring Long Driver-to-Driver Timing Offsets



- Pulse broadening with the 35-ns sweep speed reduces the timing measurement accuracy
- Extensive post-processing can reduce the error, but is generally not supported

The PUVP Diagnostic Measures the Free-Propagated Sample Beam from each of the Three Legs

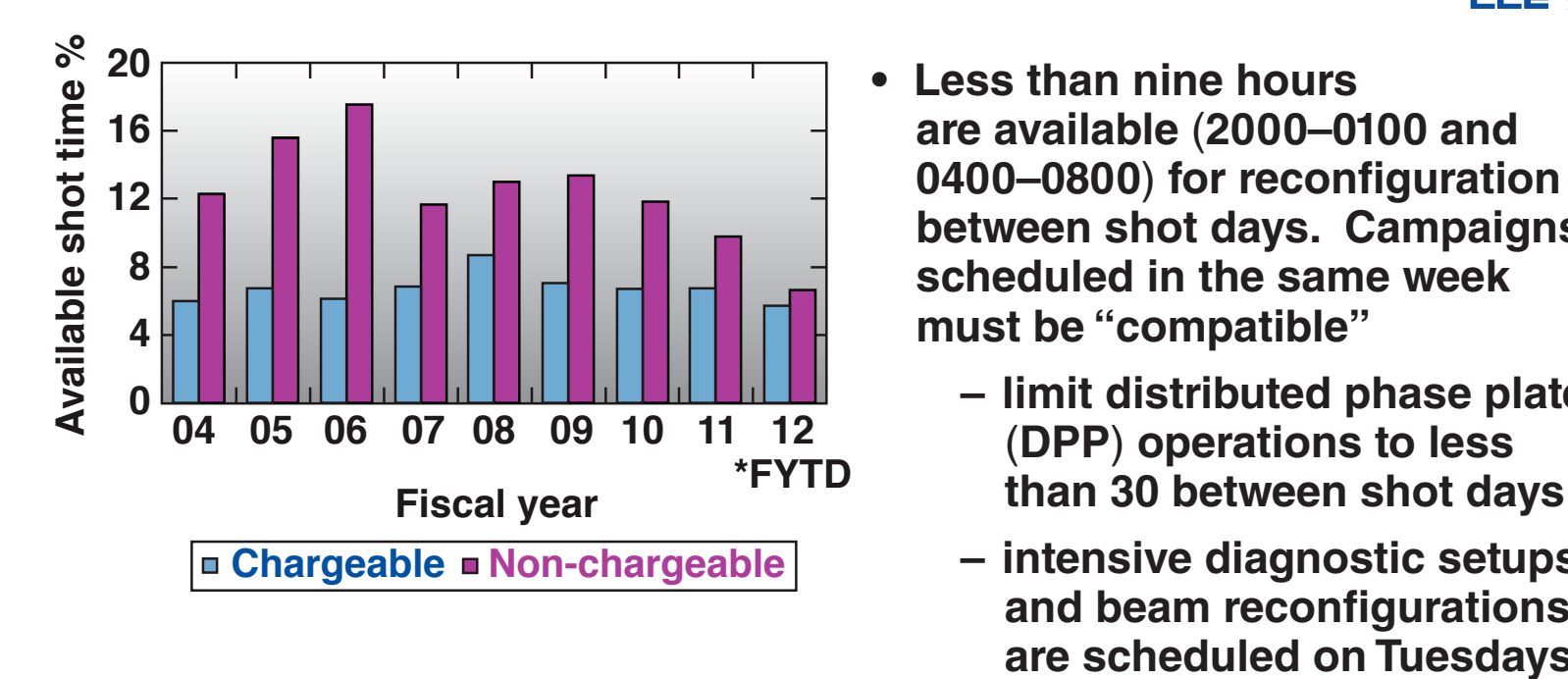


The Naming Convention Simplifies Pulse-Shape Selection

- Anatomy of a pulse-shape name

Pulse-shape family: HE180401T
High energy, low adiabat Pickets: triple picket
Pulse length: 1.8 ns Version number
Foot contrast (if applicable): 4:1
- Common pulse-shape families
 - square/super-gaussian (SG)
 - ramp (RM) and reverse ramp (RR)
 - low adiabat (LA)
 - high energy, low adiabat (HE)
 - fast-ignition spike (FIS)
 - short pulse/picket only
 - picosecond pulses (PS)
 - double picket (DP)
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Optimized Facility Scheduling and Reduced Reconfiguration Delays Have Increased Available Shot Time

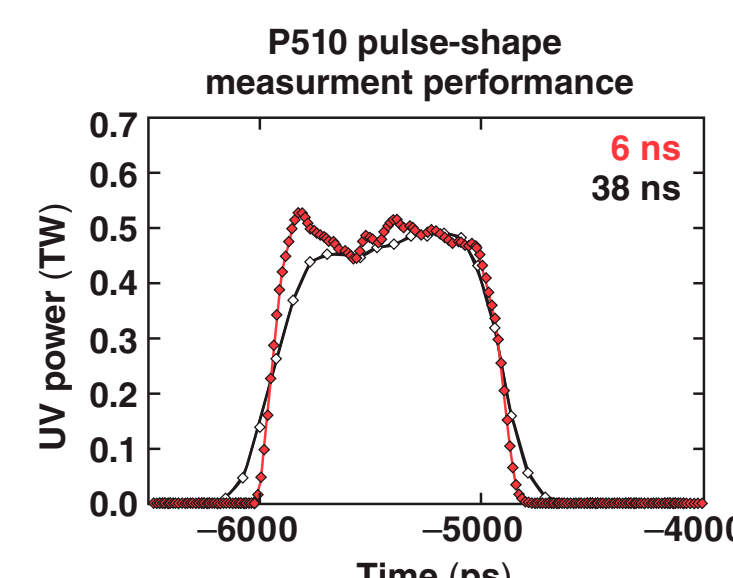


- Less than nine hours are available (2000–0100 and 0400–0800) for reconfiguration between shot days. Campaigns scheduled in the same week must be "compatible"
 - limit distributed phase plate (DPP) operations to less than 30 between shot days
 - intensive diagnostic setups and beam reconfigurations are scheduled on Tuesdays

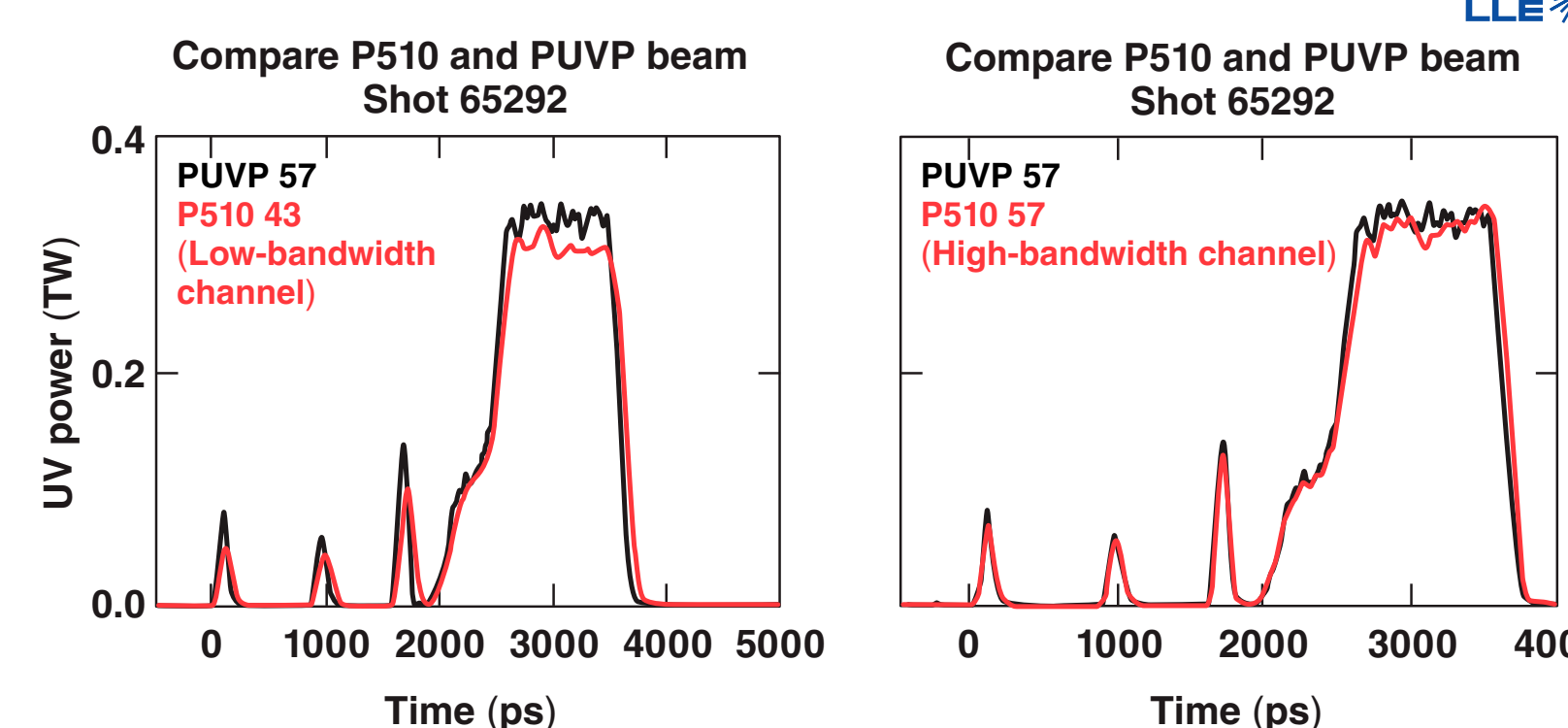
- Short-pulse and dual-driver configurations are typically scheduled at the start of the day
- Planned mid-day experiment reconfigurations must be less than 2 h

A New Capability will be Deployed to Improve Measurement Accuracy Long of Driver-to-Driver Timing Offsets in FY13

- Will be accurate to better than 100 ps with delays exceeding hundreds of nanoseconds
- The diagnostic utilizes an existing 15-GHz front-end scope
 - current use is to optimize triple-picket pulse shapes
 - will replace front-end streak camera in FY13
- Data from the 15-GHz scope will be incorporated into the P510 report
- P510 6-ns sweep speed provides the best-possible pulse-shape measurement



Considerable Bandwidth Improvement is Realized by Eliminating Fiber Transport to the Streak Camera



- Free-space propagation to a ROSS streak camera with a P820 tube provides enhanced diagnostic measurement capability
 - faster rise time
 - peak picket amplitude
 - reduced pulse broadening

A New PI Operations Web Page will Provide a Central Location for Critical LLE Reference Material

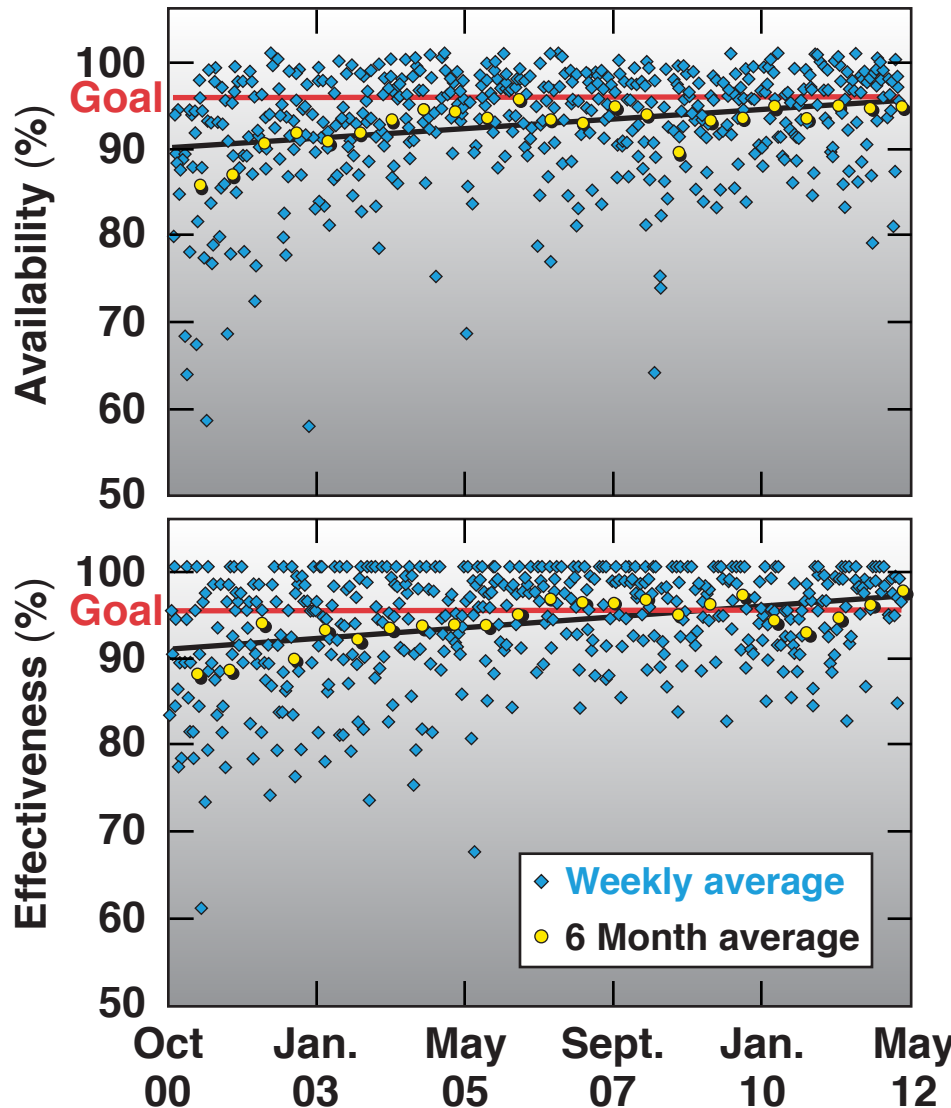
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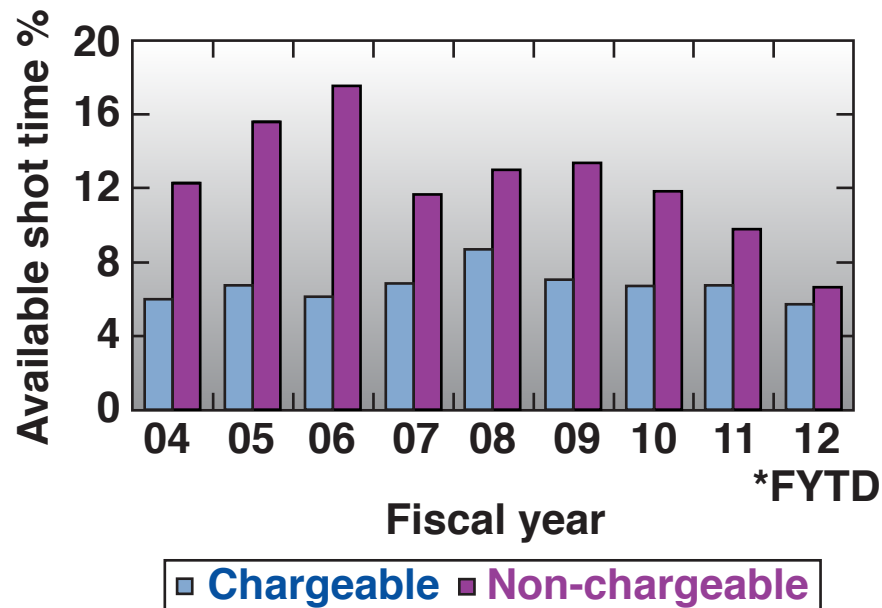
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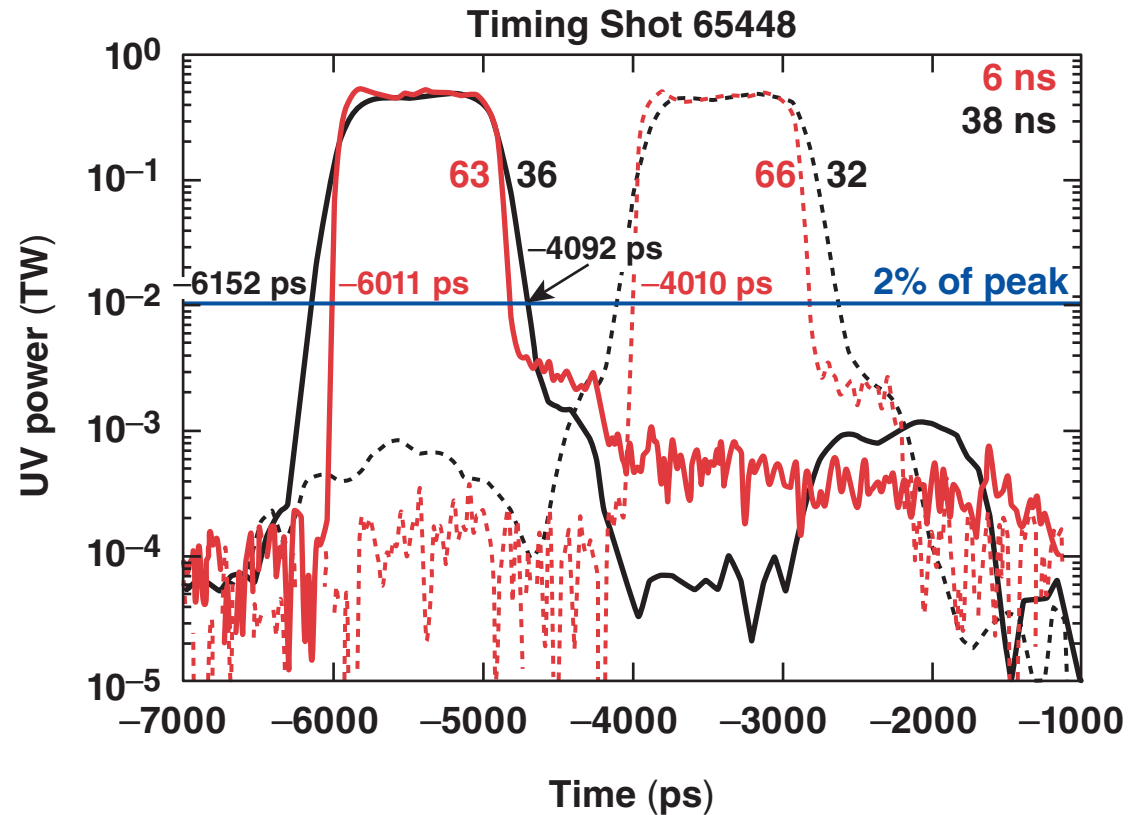
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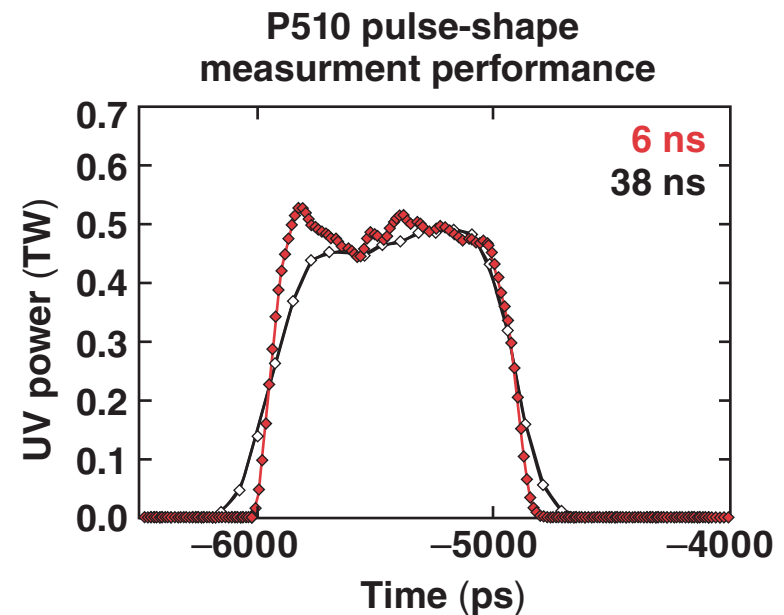


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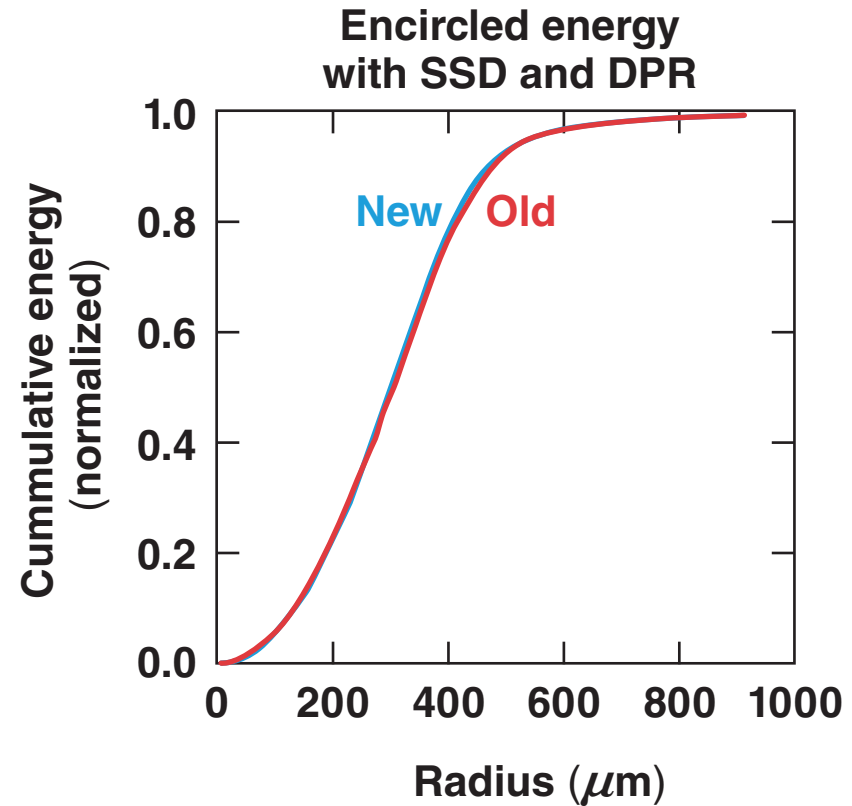
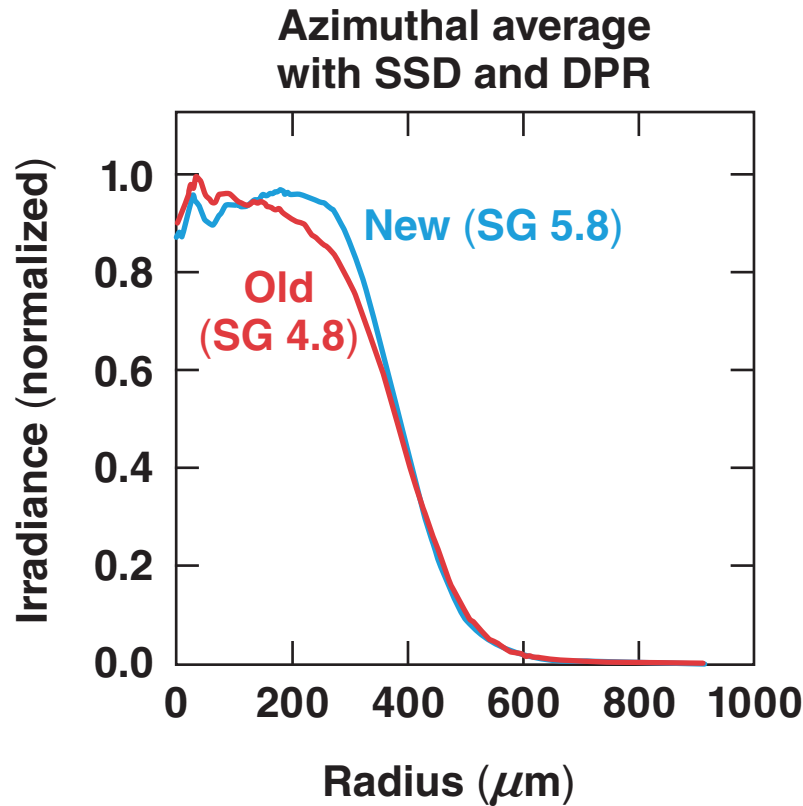
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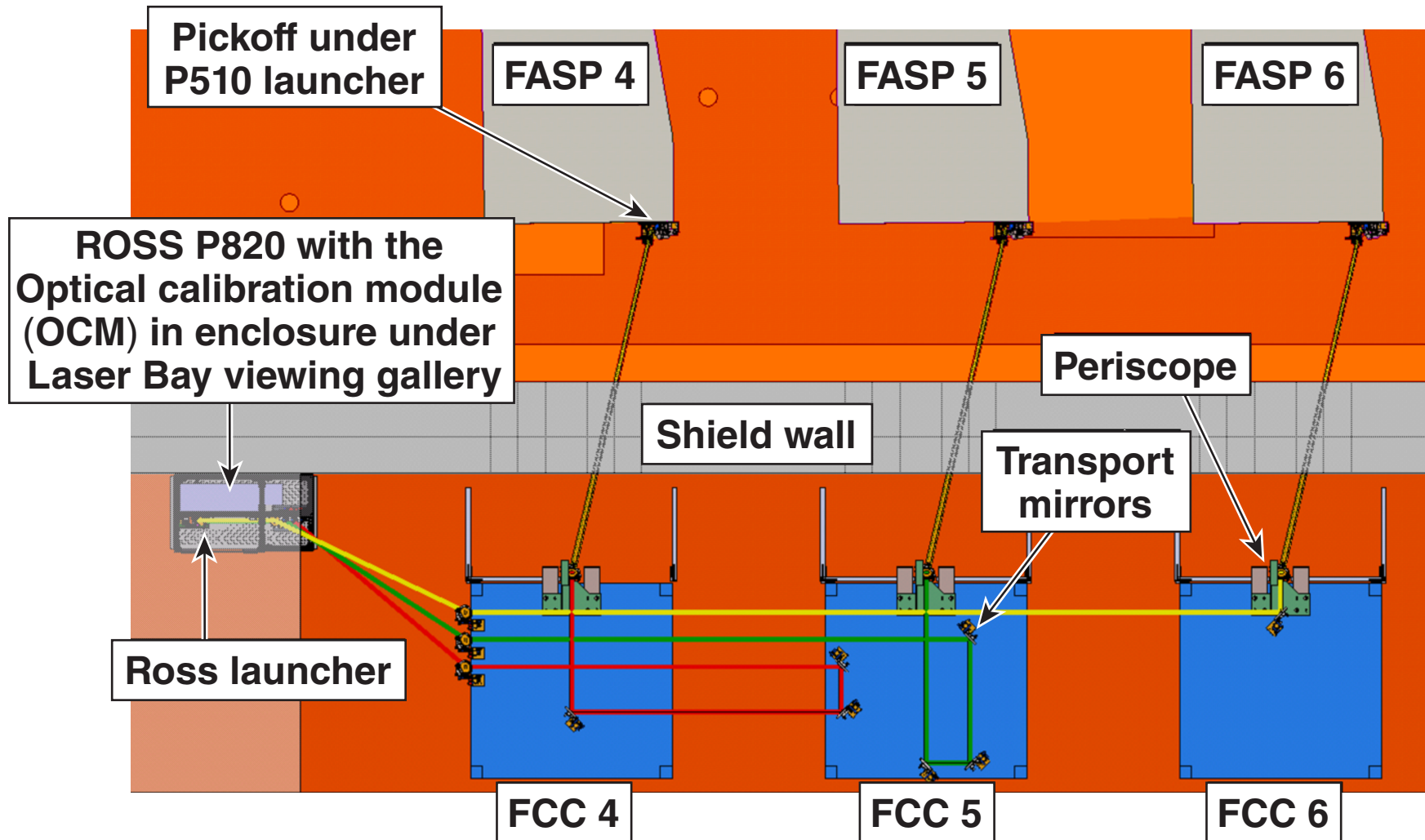


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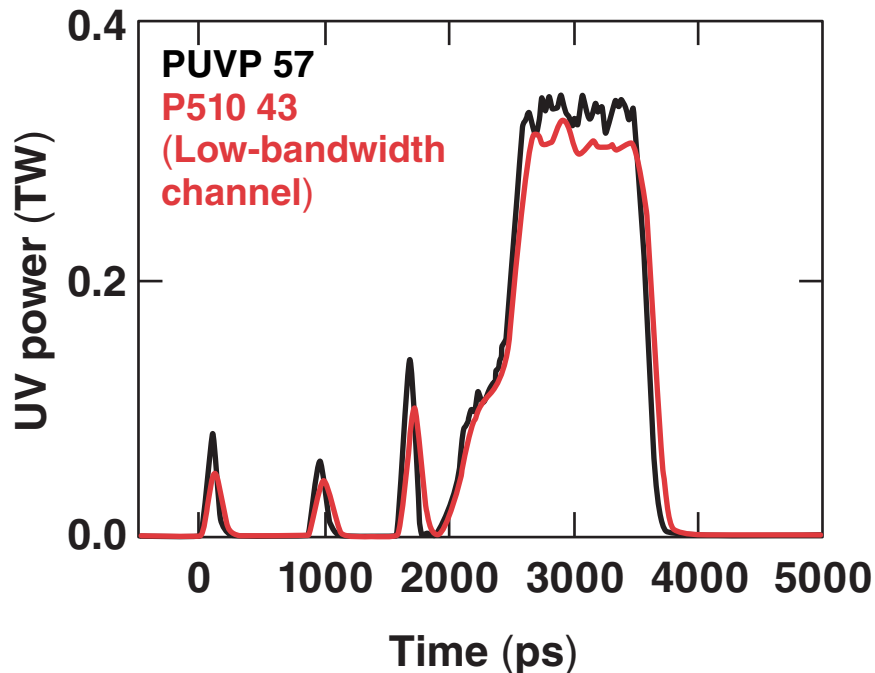
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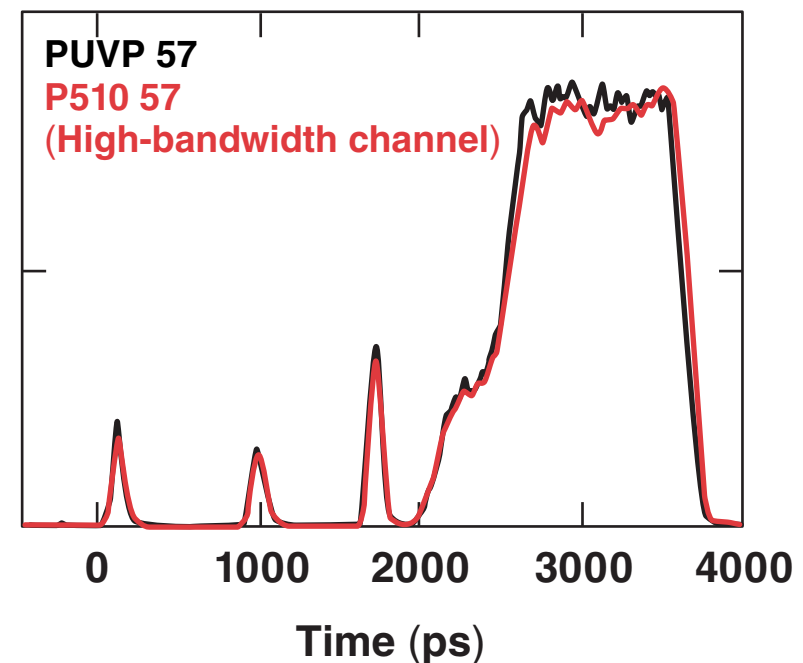
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Currently Active Omega Pulse Shapes

NOTE: Energies listed in the links shown below are design energies and are not representative of actual operating energies.

alpha2fm01	rm2204
dp2001d	rm2406
fs3300	r1001
fs2401p	r3401
he170301i	sq0301
he221901p	sq1018
he320201i	sq1604i
he340401i	1132
he363001p	1137
he380301i	1138
1153	1139
1172	1146
1189	1160
1213	1161
1217	1168
1225	1169
la241701p	1203

request_1181
request_1189
request_1202
request_1205
request_1206
request_1207
request_1211
request_1213
request_1217
request_1218
request_1219
request_1220
request_1221
request_1222
request_1223
request_1224
rm2204
rm2401
rm2601
rm2701
rm3101
rm3102
rm3103
rm3501

For Pulse Shape: he380301i

HE380301T

IR into crystals = 882
UV out of crystals = 465
Power Setting = 1
Conversion = 3ADT

Pulse Shape Energy History for HE380301T

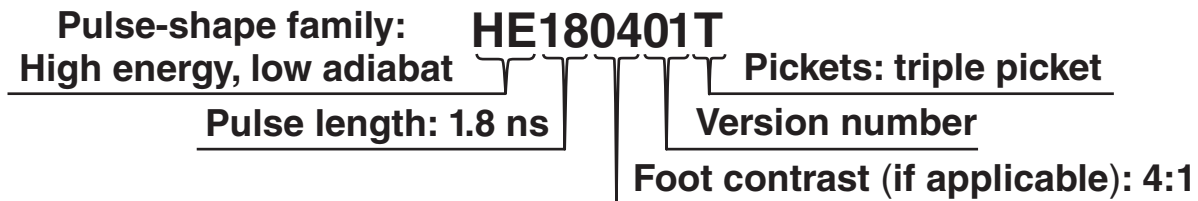
Energy	PS ID	Log	Date	Cell Input / Beam (J)	UV Beam (J)	Conv Eff %	Driver	SSD	Number of Beams on Target	Total UV on Target(s)
on-Target	55305	1	08-Mar-2012 20:37:07	928	418	52.26	SSD	DF	60	25063
on-Target	55306	1	08-Mar-2012 18:55:09	932	423	52.67	SSD	Ch	60	25379
on-Target	54665	1	12-Jan-2012 22:00:55	942	419	51.62	SSD	Ch	60	25162

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[LLE home](#)

PI Operations Page

General	Omega Facility	Omega Shot Related
<ul style="list-style-type: none"> • Points of Contact • PI Deliverable Timeline • OLUG recommendations and responses <ul style="list-style-type: none"> ◦ Search OLUG • NLUF Users Guide • Other User Facilities • Facility Access and Training <ul style="list-style-type: none"> ◦ PI Training Documentation <ul style="list-style-type: none"> ▪ OMEGA ▪ Diagnostics ▪ Target Fabrication ▪ XOPS ◦ Training Schedule ◦ Facility Access Training Videos • Operations Documents • Laser Facility Acronym List • Project Support • Project Status Summary • Design Review Meeting Schedule 	<ul style="list-style-type: none"> • Weekly Schedule • Quarterly Schedule • Facility watchbill • Diagnostic Status <ul style="list-style-type: none"> ◦ Effectiveness Report ◦ Discussion Forums ◦ Diagnostic FAQ ◦ TC Ports (Excel) 10/18/2011 	<ul style="list-style-type: none"> • Proposal Template <ul style="list-style-type: none"> ◦ Reports • Shot Request Form <ul style="list-style-type: none"> ◦ Reports (Station) ◦ Auditor • Shot Images and Reports • Target Request Form • Film Digitization Request • Pulse Shape <ul style="list-style-type: none"> ◦ Request New ◦ Pulse Shape Request Status • Experimental Effectiveness Assessment <ul style="list-style-type: none"> ◦ Detailed Effectiveness Ratings • Equivalent Target Plane Images <ul style="list-style-type: none"> ◦ XRFC Calibration
	EP Facility	EP Shot Related
	<ul style="list-style-type: none"> • Weekly Schedule • Quarterly Schedule • Facility watchbill • Facility Status <ul style="list-style-type: none"> ◦ Energy Performance 10/1/2011 ◦ Polarization Orientation 8/12/2011 • Diagnostic Status <ul style="list-style-type: none"> ◦ Effectiveness Report ◦ TC Ports (Excel) 11/22/2010 	<ul style="list-style-type: none"> • Proposal Template <ul style="list-style-type: none"> ◦ Reports • Shot Request Form <ul style="list-style-type: none"> ◦ Reports (Station) ◦ Auditor ◦ Configuration • Shot Images and Reports • Target Request Form • Film Digitization Request • Pulse Shape <ul style="list-style-type: none"> ◦ Request New ◦ In Fabrication • Experimental Effectiveness Assessment <ul style="list-style-type: none"> ◦ Detailed Effectiveness Ratings