ALS Beamline 12.2.2

2014 COMPRES Annual Report

November 2013 – October 2014

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Overview

From a personnel standpoint, beamline 12.2.2 have gone through a tumultuous year, the net effects of which have been to put the beamline and staff in a stronger position in the coming years. Despite a DOE mandated 10% cut in ALS personnel costs which resulted in the loss of two 12.2.2 team members, the user experience has still steadily improved, with the addition of a Perkin Elmer detector, shutterless single crystal data collection and a complete redesign and rebuilding of the laser heating system, all of which were purchased or enabled by the ALS. 2013 was a banner year for publications, with 32 peer-reviewed outputs, seven of these being ALS highlights. COMPRES related users continue to dominate the General User proposal process, with their allocations consuming 60% or more of the available beamtime.

DOE science funding has been flat in recent years, with no end to the budgetary strangulation in sight. With these flat budgets being essentially reductions with respect to inflation, a reduction in force (RIF) occurred at the ALS in early 2014. Twenty ALS staff were either not renewed, or laid off, including Jason Knight and Bora Kalkan. The decisions were made solely on the basis of seniority, and not on the caliber of employees. Despite the obvious blow to beamline morale, the loss of such potent technical knowledge was also potentially detrimental to beamline operations. Thankfully, ALS management realized that 12.2.2 was far too mechanically intricate to leave without competent engineering/technical support; Knight was able to work with his successor, Andrew Doran, for three months, to guide him in the important technical aspects of the beamline. Doran is an experienced member of the ALS's technical staff, and has worked with complicated endstations in his career, most recently at the photoelectron emission microscopy (PEEM) beamline. The impending loss of Kalkan was also delayed for four months, thanks to support from LLNL and COMPRES. During this extension, Kalkan developed algorithms that would, once integrated into the beamline LabView suite, enable amorphous scattering users to analyze their data in a rapid, user-friendly manner. This work, with associated codes, is presently in preparation for submission to the Journal of Synchrotron Radiation. With Kalkan's departure, the vacancy at the beamline scientist position was filled by Martin Kunz, who is well known to the COMPRES community. Alastair MacDowell is continuing in his role as beamline manager, which has been critical in the face of the RIF.

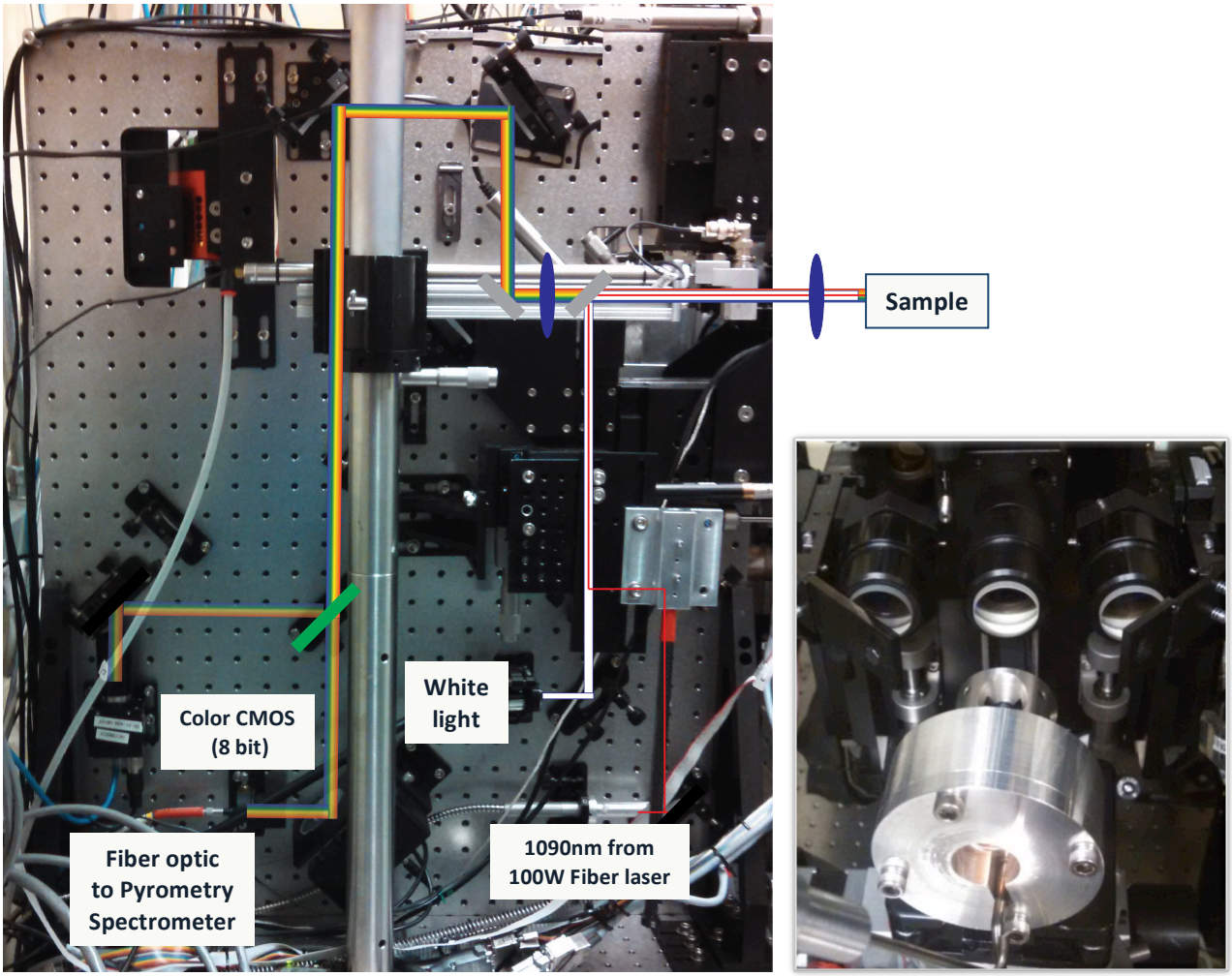


Figure 1-At Left, a labeled image of downstream side of the new laser heating system. The upstream side is nearly identical, with the addition of a scond fiber optic which delivers light to the ruby spectrometer. At right is a close up view of the 90° optics for radial laser heating. For scale, the spaces between holes on the breadboard are 1".

In terms of experimental infrastructure, Beamline 12.2.2 has had the capabilities to do laser heating for the greater part of 10 years, but getting quality data was, at times, a heroic endeavor. The original design of the system (inherited from prior management) was located on a secondary table mounted on posts above the main optical table, and was subject to high levels of vibration, cramping of experiments on the lower level, inaccessibility of the optics, and overall mechanical inconvenience and instability. In short, it was a horrible design. Multiple fixes to the original system had been attempted: a larger, heavier laser table, supporting struts filled with Zanite, and fiber lasers instead of a conventional YAG, with the heavy components on the floor. The vibrations were never eliminated, and were still statistically significant, meaning the X-ray beam was unlikely to consistently probe the center of the hot spot. The laser heating situation on 12.2.2 has now been dramatically changed. A more compact laser system has been designed, built, commissioned, and completely paid for by the ALS. The two-sided

system, shown above in Figure 1, has been built on a vertically oriented laser table behind the sample stages. The new system also allows for laser heating of radial samples, with the addition of optics at the 90 ° position (Figure 1, right) and additional optics can be inserted at 270 ° for double sided heating during radial diffraction. As described in our highlights, this system has now been used by multiple user groups, and the reviews are very positive: the hot spot is much more stable and consistent.

Single crystal high pressure work has a mandate among the COMPRES community, and at 12.2.2, great strides have been made in the last year. The Perkin Elmer flat panel detector has successfully been adapted to collect continuously during a single-crystal rotational scan. This has improved the rate of data collection by as much as a factor of 135: that is, one shutterless 1 second data collection on the Perkin Elmer is 135 times faster than the same scan on the MAR345 (1.33 minutes versus 3 hours). This enhanced capability allows for smaller step sizes, and better diffraction data. Previously, a user had to choose data collection parameters that would fit within their allotted beamtime, with little ability to optimize for quality. Using a small angular step (>1°) per image was unheard of, because such a scan could take 12 hours using the MAR. Now users can collect data multiple times with each data set optimized for different goals- a quick scan with wide images for unit cell determination, and a slower scan with narrow step sizes for better integration statistics. More users have collected single crystal data this year, and this program looks like it will continue to grow, with more single crystal proposals getting allocated time for 2015 (the final schedule for the first part of 2015 is unavailable at the time of this report, but the facility has communicated with successful proposers).

Scientific Highlights

This year, we choose two highlights that illustrate technical advancements made over the last year. First, as an illustration of our role as a community facility whose reach extends beyond simply supplying users with x-rays (and skilled help, and preparation facilities, and infrastructure, and often supplies), we note that our new laser-heating system was deployed during recent two-bunch time as a tool to monitor and characterize temperature gradients within the diamond anvil cell (Figure 2). This highlight is chosen simply because we believe that it amply illustrates the caliber of our redesigned and rebuilt laser-heating system, as well as our current temperature measurement system—and that one of our primary future tasks identified in last year's report has been accomplished. Moreover, it illustrates that our laser-heating system is available during x-ray beam downtimes to facilitate COMPRES user science outside of the standard GU proposal framework.

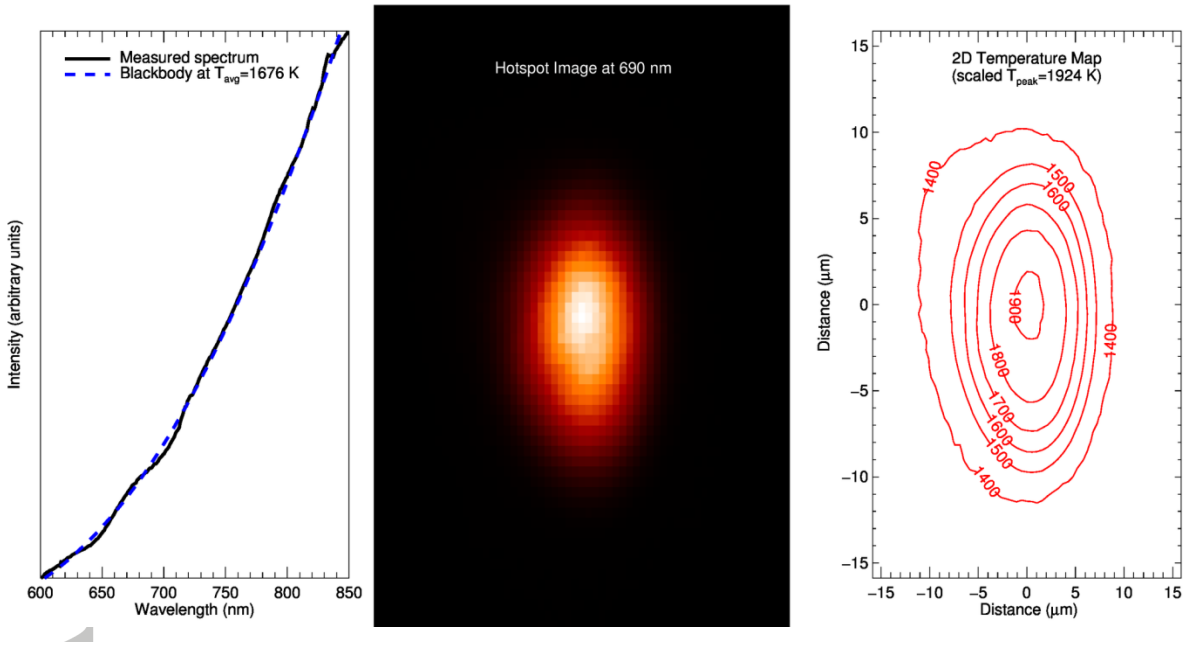


Figure 2. Measurement of a 2-D radial temperature distribution in AgI laser-heated at 17.2 GPa in the diamond anvil cell. From Rainey and Kavner, JGR, in press (doi: 10.1002/2014JB011267). At left is a spectrum (with fit: blue dotted line) at an average T of 1676 K; center shows the intensity distribution at 690 nm; and the right shows an inverted temperature distribution.

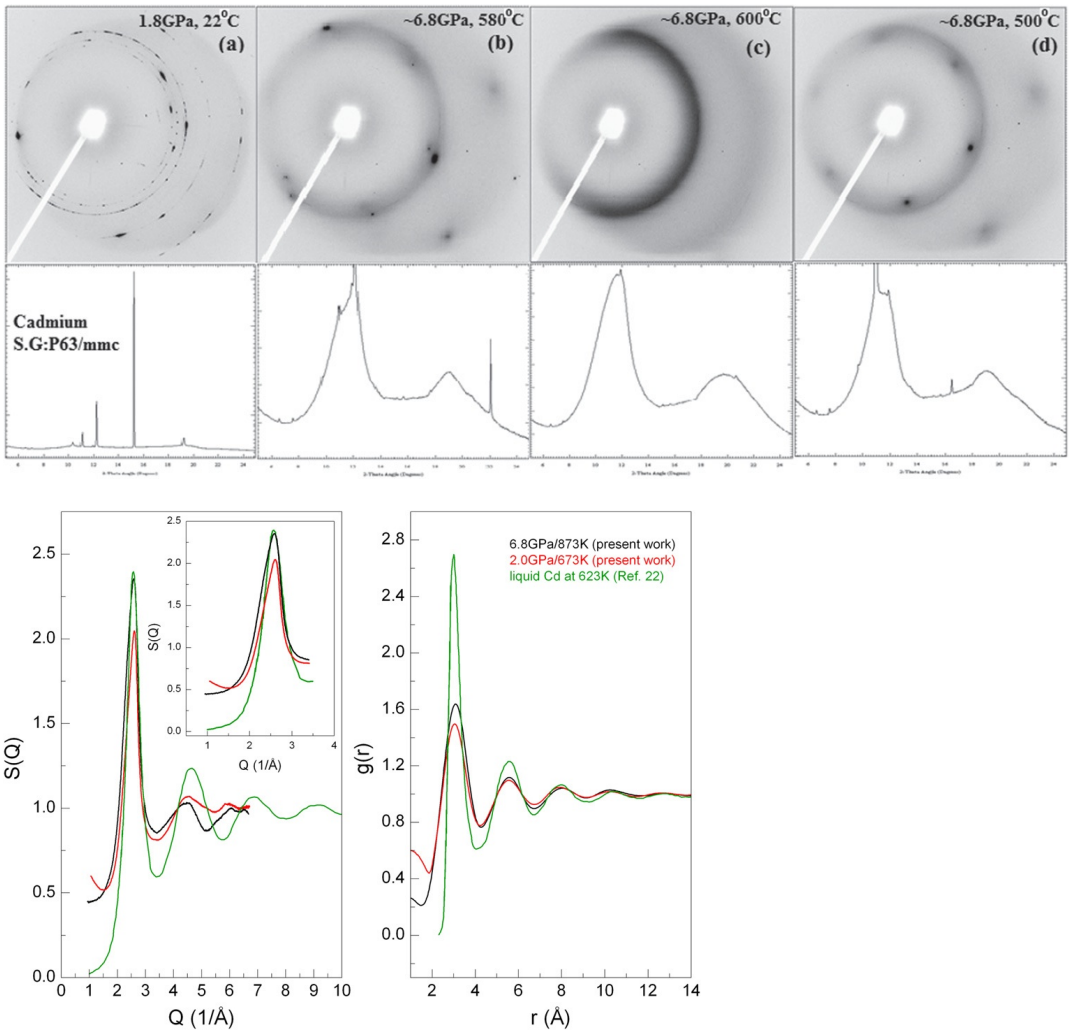
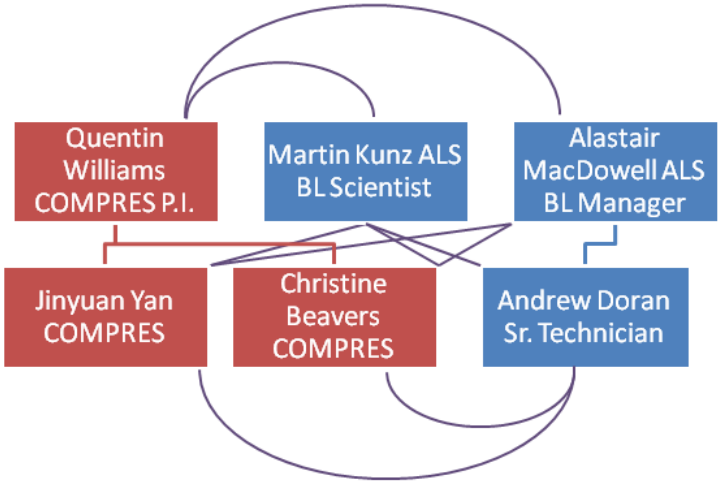


Fig. 3 (Top) X-ray diffraction of melting and freezing Cd at 6.8 GPa and ca. 873 K; (Bottom) Structure factors (right) and radial distribution functions (left) of liquid Cd at 6.8 and 2.3 GPa, relative to previous ambient pressure, high-temperature data of Waseda (1980).

Our second example (Fig. 3: Raju et al., Materials Research Express, 2014) represents work facilitated by short-term COMPRES funding to extend B. Kalkan's tenure at the ALS. This work combines two long-term interests at the 12.2.2: the high-pressure structure of amorphous materials, coupled with our external heating capabilities. In this instance, the pressure dependence of the structure of liquid Cd was probed. While not a geophysical material, per se, its respectable atomic number and intrinsic scientific interest associated with shifts in its electronic structure motivated its study as a trial for deriving structure factors and radial distribution functions for high temperature molten metals at the ALS. Indeed, we believe that this work illustrates the feasibility of conducting simultaneous externally heated and laser-heated experiments on molten metals within the diamond cell: a capability with prospectively major geophysical applications.

Beamline Personnel



Our current beamline management structure is pictured above, with COMPRES-affiliated staff in red and ALS staff in blue. Purple lines indicate advisory interactions. COMPRES staff report to Williams, Kunz reports to ESG group leader Howard Padmore (not in org. chart), and Doran reports to MacDowell.

Beamline 12.2.2 is staffed with a diverse group whose technical expertises span a broad swath of X-ray science. MacDowell is a longtime beamline builder with great insight into optical design and optimization. Kunz is a well-known scientist in the high pressure community, and his return to 12.2.2 gives a strong mineral physics voice to the beamline. Doran is an experienced engineer who has managed large design and fabrication projects on other beamlines, and is also very familiar with beamlines of similar controls complexity to 12.2.2. Beavers brings single crystal and other crystallographic knowledge, as well as a chemist's perspective to many topics, including chemical

hygiene on and around the beamline. Yan has demonstrated ability in Labview programming, in addition to his laser heating and high pressure diffraction experience.

User support is divided amongst Kunz, Beavers and Yan according to the user's needs and the staff member's interests and collaborations. Typical user support encompasses the initial training for hutch and endstation use, as well as data analysis and quality assessment, and can also include reviewing results and readying them for publication. In addition to user support, every staff member has responsibilities which facilitate the operation and evolution of the beamline.

Alastair MacDowell, the beamline manager, has in past years been heavily involved in day-to-day operations, but is now transitioning to being primarily responsible for the quality of the X-rays produced by the beamline, as well as his managerial duties. He has identified beamline optical upgrades as a viable option for increasing flux and brightness, and is working with management to make this a part of a long term plan. He is also working with the controls group to implement a beam position monitor, which would allow for fast monochromator scans. MacDowell has also been integral in the transition to Martin Kunz as beamline scientist and in integrating Kunz and Doran into the 12.2.2 team.

As the beamline scientist, Kunz has taken charge over most of the beamline day-to day operations and the scientific direction. He is the primary point of contact for the beamline, and as such, he is the coordinator for user needs. He has been active in the commissioning, characterization and calibration of the new laser heating system. He has advocated for moving the high pressure program further instrumentally, by procuring BX90 cells for use with single-crystal samples on 12.2.2, and for making a case to ALS management for a single crystal diffractometer.

Doran has performed admirably in his first six months on 12.2.2 and his newfound interest in high pressure work suggests he will continue to grow into his position. He is responsible for maintaining and upgrading the gas loader and laser miller. He is developing, in concert with ALS management, a recharge system for the laser miller, to ensure that this valuable resource is maintained at a high level. This COMPRES-owned apparatus requires sporadic maintenance and replacement parts, and recharge from non-COMPRES users will provide a fiscal cushion that will ensure that unforeseen expenses, which would otherwise be covered by COMPRES resources, can be mitigated. Doran is also involved in the single-crystal diffractometer bid; his technical design skills are currently focused on determining the available space for a new instrument. He has also adapted the radiant heating system, previously designed by Kalkan, for the new endstation space requirements.

The single crystal program on 12.2.2, and its continued improvement are the primary responsibilities of Beavers. Over the last year, she has worked closely with the ALS controls division to integrate the Perkin Elmer detector into endstation operations. This effort has yielded single crystal data collection software that is fast, user friendly and crystallographically correct. She is dedicated to creating a positive user experience by removing barriers to success. One major barrier to

success in single crystal structure solution is the inadequate diffractometry, so she is leading the drive to compete for funding for a new diffractometer.

In addition to his user support role, Yan has demonstrated ability in Labview in this past year, and has become responsible for the automation he implemented on the off-line Ruby spectrometer. This helpful addition has streamlined checking pressure, and can be synchronized to the sample position on the beamline. He is also responsible for coding Kalkan's PDF algorithms into executable code for beamline users. In a development vein, he is working on coupling our resistive heating capabilities with our new BX90 cells.

The successful synergy of the COMPRES program and ALS staff on 12.2.2 relies heavily on the infrastructure and people present at the ALS. Without the contributions of the ALS Controls group, the single crystal program would not have proceeded in the current timeframe. Without engineering support provided by Doran and others, upgrades to the beamline would be impossible. The continued support of the beamline by COMPRES in turn demonstrates a high level of commitment to ALS management, and ensures a continued mineral physics focus on the beamline. A fitting quote on this is taken from last year's report:

"For reference, were COMPRES support discontinued (for whatever reason), the high-pressure/geosciences emphasis of 12.2.2 would be re-evaluated, and it would be fully anticipated that the ALS staff commitment would be redeployed away from geosciences-oriented projects (both materials science and environmental science-related applications could be notably enhanced at 12.2.2 in such a scenario). In this context, the COMPRES effort leverages a VERY large staff salary match from the ALS for the high-pressure enterprise at LBNL."

The organization of the beamline staff predominately occurs during weekly meetings, now usually on Monday afternoons. In these work planning meetings, maintenance tasks and upgrade projects are discussed and prioritized. User needs for the upcoming week are also clarified, as well as any questions on support. Every staff member is asked to give feedback on their progress on existing projects. This meeting provides a valuable channel for all staff to communicate freely, and has created a more cohesive team.

ALS/12.2.2 Approved Programs

COMPRES' triannual request for renewal of its Approved Program at the ALS was submitted by Jay Bass, as COMPRES President, in June of 2014. In lieu of our extant allocation of 35%, the new AP request was for a minimum/guaranteed allocation of 50% of the GU beamtime: this percentage is more in accord with the COMPRES community's usage of the beamline, which typically exceeds 60% of available shifts. We do not know the status of the request for

increased guaranteed time at this moment (we are certain that the AP itself will be approved)—our current AP expires in December, and we expect to hear in the very near term.

At the same time, the single crystal Approved Program of Oliver Tschauner (10% of 12.2.2 GU beamtime, which utilized support from the COMPRES staff) reached the end of its cycle, and was converted to a multiple cycle General User proposal (with less time allotted). In new developments, HPStar applied for an Approved Program, for which they were approved for 10% of GU time: accompanying the AP status will be the deployment of two HPStar post-docs at the ALS, and some infrastructure resources for the sample preparation laboratory. It is unclear at this time what the level of interfacing will be between COMPRES staff and the HPStar enterprise, beyond noting that there is a natural relationship, since one of the primary supervisors of the HPStar effort is Bin Chen, previously employed by COMPRES at the ALS (and, the Director of HPStar is a reasonably prominent member of the COMPRES community). Their primary interest may lie towards radial diffraction, and

Beamline Operations

Beamline operations over the past year have been generally smooth. There was one major planned maintenance outage that spanned from May 5th to July 8th (2014) which, with last year's February 3rd to April 8th (2013) outage, may prove to have a difficult-to-resolve impact on our beamline's net productivity. But, these outages are part of the ongoing maintenance and improvements taking place on the 20-year old facility. The positive part of this latest outage, with respect to 12.2.2, is that it allowed continuous access to the hutch so that the old laser-heating system could be torn out and salvaged, and the new one built and installed. Thus, the beamline staff took advantage of this outage to substantially upgrade our capabilities.

With respect to oversubscription statistics, our long-standing trend of shorter beamtime requests continues (Fig. 4), with a new all-time low in this last year of 8.8 shifts per request. This is an important trend, as it allows us to accommodate more user groups, and illustrates the recognition by users that they can accomplish their scientific goals at 12.2.2 in less time than was required previously. It does, however, mean that the numerator in our oversubscription ratio has gotten smaller with time—the average proposal's request for time is close to half what it was four years ago, and this can be viewed as the major cause of the diminution in our oversubscription rate.

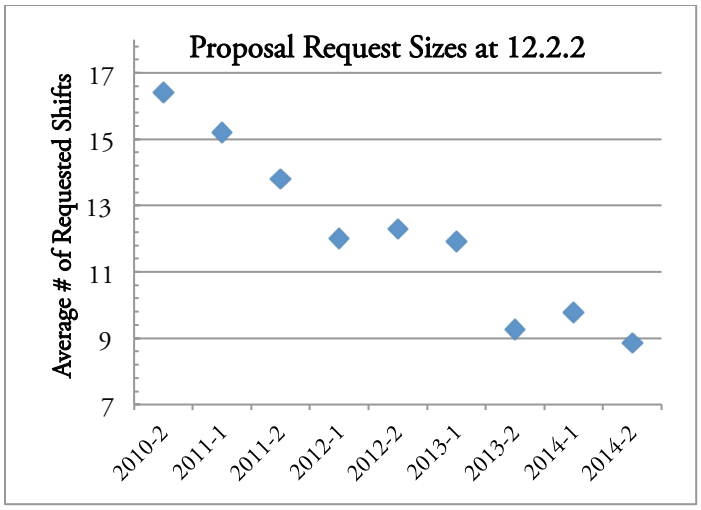


Figure 4. Beamtime request sizes at 12.2.2

Our beamtime allocations and schedules are given in Appendices 2 and 3. The numerical description of General User allocations over the last two years is:

215 8-hour shifts available and 539 requested in Jan.-Jul., 2013 (39.9% available/requested; 2.51x oversubscription rate---22 proposals given time, 47 proposals total). **NOTE:** Because of the February-March Ring Upgrade Outage, this is a **7-month cycle**—this is by design to spread out between cycles the depletion in user time from the outage!

204 8-hour shifts available and 473 requested for Aug.-Dec., 2013 (43.1% available/requested; 2.32 oversubscription rate---21 proposals given time, 51 proposals total). **NOTE:** Because of the February-March Ring Upgrade Outage, this is a **5-month cycle**!

215 8-hour shifts available and 440 requested in Jan.-Jul., 2014 (48.8% available/requested; 2.04x oversubscription rate---26 proposals given time, 45 proposals total).

196 8-hour shifts available and 328 requested in Aug.-Dec., 2014 (59.8% available/requested; 1.67x oversubscription rate---26 proposals given time, 45 proposals total).

Performance Metrics

The table below shows the different groups, their time allotments, their country, and their funding sources over the last year. These are subdivided into the three beamtime cycles that are spanned by the report period.

We had 26-29 distinct groups visit the ALS from 11/13-11/14. The uncertainty is produced by how different groups are counted: Is Hummer part of the Kavner group? Is Godwal part of the Jeanloz group? Is Z.X. Shen part of the W. Mao group? As researchers, they each authored their own successful beamline proposals. Whether folks in research positions, who work extensively with certain PI's, count as independent users/groups is a difficult issue. For reference, last year (2013) we had 33 groups (and we counted researchers).

If we count it as 29 users, 24 of these were from U.S. universities, 3 from government labs, and 2 were foreign (1 from Germany, 1 from China). If it's 26, 21 were from universities. In 2013, we had users from 23 universities, 9 with government labs, and one with CIW. We are unclear on why our government lab user base has contracted.

Our total different human users were ~68, with ~32 graduate students. No undergraduates were logged in.

In the Aug. 1-Dec. 31, 2013 cycle, the COMPRES time out of the General User pool was 64%, and 68% if the single-crystal Approved Program run by Oliver Tschauner is included as COMPRES time (we believe that this inclusion is appropriate, as his AP time was generally supported by COMPRES staff).

In the 1 January-31 July 2014 cycle, COMPRES time was 64% of the General User Time; In the 1 Aug. to 31 Dec. 2014 cycle, COMPRES user time was 60% of the GU time.

Each of these is, obviously, far in excess of the 35% minimum of time allotted through our Approved Program.

ALS 12.2.2	2013-2	11/1/13-12/31/13											
PI Name	# days	Beam time	COMPRES User ©	Funding Source	Country	NSF-EAR	NSF-DMR	NSF-Chem	DOE	DOD	NSF-China	NNSA	Foreign
Kalkan	6	11/1-11/3; 11/25-11/27		DOE	USA				1				
Karundasa	2.33	11/6-11/8; 11/16		NSF-Chem	USA			1					
Iota	3	11/8-11/11		DOE	USA				1				
Tschauner	3	11/12-11/15	C	NNSA/DOE	USA				1			1	
ZX Shen	2.66	11/15-11/16;12/17-12/19		DOE-BES	USA				1				
Williams	2.66	11/17;12/13-12/15	C	NSF-EAR	USA	1							
McClusky	3.66	11/21-11/25		NSF-DMR	USA		1						
Alivisatos	0.66	12/4-12/5		DOE-MSE	USA				1				
Jeanloz	1	12/5-12/6	C	DOE	USA				1				
Shim	3	12/6-12/9	C	NSF-EAR	USA	1							
Dzivenko	3	12/10-12/13		Foreign (NSF)	USA								1
Wenk	3	12/16-12/17; 12/19-12/21	C	NSF-EAR	USA	1							
Godwal	1.66	12/21-12/22	C	DOE	USA				1				
			46.15%										
	2014-1	1/1/14-7/31/14											
PI Name	# days	Beam Time											
W. Mao	8	1/10-1/12; 3/19-3/23; 7/16-7/18	C	NSF-EAR	USA	1							
Somorjai	3.66	1/14-1/15; 2/11-2/12; 2/13-2/14; 4/22-4/23		DOE-BES	USA				1				
Alivisatos	0.66	1/15-1/16		DOE-MSE	USA				1				
Williams	8.33	1/17-1/19; 2/12-2/13; 2/15-2/16; 2/20-2/21; 2/28-3/1; 4/8-4/9	C	NSF-EAR	USA	1							
Karundasa	4	1/30-1/31; 2/14-2/15; 4/30-5/2		NSF-Chem	USA			1					
Montiero	1.66	1/8-1/10		DOE	USA				1				
Kalkan	3	2/21-2/24		DOE	USA				1				
Tschauner	4.33	2/5-2/7; 2/25-2/28	C	NNSA/DOE	USA				1			1	
Tolbert	3	3/25-3/28	C	NSF-DMR	USA		1						
Zeng (W.Mao)	2	3/28-3/30	C	NSF-EAR	USA	1							
Bin Chen (HP*)	4	4/17-4/21		Foreign (NSF)	China						1		
Yang	4	4/23-4/27		NSF-DMR	USA		1						
Ciezak-Jenkins	4	4/3-4/7		DOD	USA					1			
Yoo	4.33	4/9-4/13		DOE	USA				1				
Reagan (W.Mao)	2.33	5/2-5/4	C	NSF-EAR	USA	1							
Miyagi	3.66	7/11-7/16	C	NSF-EAR	USA	1							
Wenk	4.66	7/18-7/20; 7/28-7/30	C	NSF-EAR	USA	1							
McClusky	3.66	7/23-7/27		NSF-DMR	USA		1						
Hummer	2	7/30-8/1	C	NSF-EAR	USA	1							
			47.37%										
ALS 12.2.2	2014-2	8/1/14-11/1/14											
PI Name	# days	Beam Time											
Bin Chen(Hi)	2	9/19-9/21	C	NSF-EAR	USA	1							
Bin Chen(HP*)	2.66	9/17-9/19; 9/21-9/22		Foreign (NSF)	China						1		
Ciezak-Jenkins	3.66	9/4-9/8		DOD	USA					1			
Clearfield	1	10/17-10/18		NSF-Chem	USA			1					
Crowhurst	1.33	8/2-8/3		NNSA/DOE	USA				1			1	
Deemyad	1.66	8/29-8/30		NSF-DMR	USA		1						
Jeanloz	4	8/26-8/28; 9/9-9/11	C	DOE	USA				1				
Karundasa	2	9/26-9/27; 10/29-10/30		NSF-Chem	USA			1					
Kavner	3	8/11-8/15	C	NSF-EAR	USA	1							
Lavina	2.66	10/14-10/17	C	NNSA/DOE	USA				1			1	
Long	3.66	8/20-8/22; 9/24-9/26		NSF-Chem	USA			1					
McClusky	3.33	10/3-10/5; 10/19; 10/30-10/31		NSF-DMR	USA		1						
Montiero	1	10/18-10/19		DOE	USA				1				
Tolbert	2.66	9/12-9/14	C	NSF-DMR	USA		1						
Tschauner	4	8/23-8/25; 10/11-10/13	C	NNSA/DOE	USA				1			1	
W.Mao	4	9/27-9/29; 10/31-11/2	C	NSF-EAR	USA	1							
Willams	4.33	8/1-8/2; 8/22-8/23; 9/11-9/12; 10/28-10/29	C	NSF-EAR	USA	1							
			44.44%										

Beamline Development/Planned Activities

Our main focus for the coming year will be to lay the groundwork for acquiring the high-level single-crystal diffractometer that we have come to appreciate is needed to substantially move our single-crystal effort forward. We are actively lobbying ALS to acquire this instrument; should this effort not succeed, we expect to prepare an EAR/IF proposal, potentially in tandem with COMPRES. Our improvement of control software at the beamline continues, primarily in response to user suggestions/requests: this is an ongoing activity that we fully expect will continue.

Beamline Community Activities

The COMPRES staff members have described their activities under a separate request for input from them, and COMPRES is referred to the 12.2.2 beamline scientists' reports for more information. Among community outreach, Beavers Co-Chaired this year's annual American Crystallographic Association meeting in Albuquerque. As our single-crystal effort matures, we expect that we will host a workshop on high P/T single crystal experiments: such workshops are often held in conjunction with the ALS annual Users Meeting, and we are tentatively targeting the Fall, 2015 Users Meeting for such a workshop.

Budget Justification for Next Cycle:

Personnel: The balance of our budget for next year is, as is typical, to support the COMPRES-funded staff. Augmentations are requested for each COMPRES employee: both are up for step-level increases in rank (or step-and-a-half for excellent performance), and UC has given 3% cost of living augmentations the last two years. Beavers is presently at Assistant Researcher Step IV, and Yan is at Assoc. Specialist Step IV (N.B. Research personnel at UC come in three flavors: Specialist, Project Scientist, and Researcher, each of which are in turn divided into Assistant, Associate, and Full ranks with 5-6 steps per level—advancement in step occurs after 2 years at the Assistant and Associate levels, and after 3 years at the Full level). We request a modest augmentation in funding to move the Yan position from UC's Specialist to Project Scientist series. The Specialist level is primarily for Programming and Engineering applications, while Project Scientist is for directed scientific research. We believe that this is an appropriate reclassification of his position: his accomplishments of the last year are detailed in his own report. Fringe benefits on both positions are requested.

Supplies and Expendables: Funding is requested for expendables utilized by users at the beamline. This includes items such as replacement parts for equipment utilized by users, such as the new gas-loading apparatus, the laser miller (which we hope to move off the books during the coming year

with a new recharge system), sample preparation equipment, our ruby fluorescence apparatuses, gasket materials, and locally-made external heaters).

Travel: A budget for travel is requested. This will be utilized primarily for the beamline scientists to attend meetings (including the COMPRES meeting: these are important for their professional development, their knowledge of new techniques, and for acquiring new potential users of the beamline) and to occasionally visit other major facilities to share best practices and to exchange expertise.

Equipment: We request 6.4 K for a high-level computer workstation for control and analysis of our single crystal diffraction experiments. This system (quote attached at the end of this document) has proven to be a very considerable asset at beamline 11.3.1, markedly facilitating both data collection and analysis.

Beamline Support from the Facility: The staff support provided by the ALS is discussed above, and comprises 2.00 FTE (split between MacDowell, Kunz and Doran) devoted to the 12.2.2 high-pressure enterprise. In terms of infrastructure, a Bruker P200 CCD is also on extended loan from the facility (this is a large-ticket item---~200 K). And, the ALS provided the totality of support (ultimately ca. 280 K) for our APS/UChicago-made gas-loading apparatus. We are trying to engineer either partial or full funding of a new diffractometer from the ALS: we do not know yet if these efforts will be successful in the face of competing priorities, but the possibility is being seriously entertained. The capital commitments provided by the ALS are in addition to the many day-to-day supplies for the beamline and users (optics, replacement parts, spare cells) that are funded by the ALS at the multiple tens-of-K/yr level. Additionally, software development (from the programmer pool at the ALS) to help with the single-crystal enterprise has been funded through the Experimental Systems Group at the ALS. This support from the ALS, comprising both manpower and experimental infrastructure, more than matches the COMPRES investment in the facility, and we believe exceeds that of any other COMPRES-funded facility (and perhaps all other COMPRES facilities) by *any* metric. In short, the West Coast COMPRES enterprise has engaged in a highly successful partnership with the ALS: one that has produced both high levels of staffing and equipment infrastructure, each of which are directed towards generating productive user experiences.

University of California Santa Cruz
Office of Sponsored Projects
Detailed Budget

Printed on 11/7/2014

SC# 20120051 **Budget #** 99 **Budget Prepared Date** 11/5/2014
Title Revision of Year 4 **Budget Revised Date**
Project Sub Award: Renewal of Funding for COMPRES III **Status** Awarded

PI Name Quentin Williams **Agency** University of Illinois, The **Preparer** Lynn Crowder
Start Date 06/1/2012 **C&G Officer** Riley Jordan
End Date 05/31/2017
Location Other **IC Rate** 26.00% **IC Type** MTDC

		1	2	3	4	TOTAL:
Salaries						
Name/Title	**Salary Type/Level**					
Williams, Q PI	PROFFULL IX Months/Time%	$0	$0	$0	$0	$0
Christine Beavers ASSOC RESEARCHER	RESASST V Months/Time%	$0 100%	$0 100%	$0 100%	$90,100 12.00 100%	$90,100
YAN, J Project Scientist	ProjSciAssoc III Months/Time%	$0 100%	$0 100%	$0 100%	$72,924 12.00 100%	$72,924
	Salaries	$0	$0	$0	$163,024	$163,024
Fringe						
Name/Title	**Salary Type/Level**					
Williams, Q PI	PROFFULL IX 13.5%	$0	$0	$0	$0	$0
Christine Beavers ASSOC RESEARCHER	RESASST V 42%	$0	$0	$0	$37,842	$37,842
YAN, J Project Scientist	ProjSciAssoc III 58%	$0	$0	$0	$42,296	$42,296
	Fringe	$0	$0	$0	$80,138	$80,138
	Salaries and Fringe	$0	$0	$0	$243,162	$243,162
Domestic Travel						
Name	**Destination**					
Researchers	Meetings, Facilities Visits	$0	$0	$0	$5,500	$5,500
	Domestic Travel	$0	$0	$0	$5,500	$5,500
	Total Travel	$0	$0	$0	$5,500	$5,500
Permanent Equipment						
Description						
1 - High level Computer Station for Single Crystal X-Ray Deffraction		$0	$0	$0	$6,400	$6,400
	Permanent Equipment	$0	$0	$0	$6,400	$6,400
Other Direct Costs						
Type	**Description**					
Material & Supplies	Expendable Supp for Users		$0	$0	$8,500	$8,500
	Other Direct Costs		$0	$0	$8,500	$8,500
	Total Other Direct Costs	$0	$0	$0	$14,900	$14,900

Fees:	Non-Resident Tuition:					
	Graduate Student Health Insurance:					
	Graduate Student Fees:					
	Graduate Fee Override:					
	Total Graduate Fees:					
	Total Other Direct Costs:		$0	$0	$8,500	$8,500
Totals:	**Direct Costs Base:**	$0	$0	$0	$263,562	$263,562
	Direct Cost Override:					
	Total Direct Costs:	$0	$0	$0	$263,562	$263,562
	Indirect Cost Base:	$0	$0	$0	$257,162	$257,162
	Indirect Cost Base Override:					
	IC Rate:	0.2600	0.2600	0.2600	0.2600	
	Non-Std Indirect Costs:					
	Total Indirect Costs:	$0	$0	$0	$66,862	$66,862
	TOTAL BUDGET:	$0	$0	$0	$330,424	$330,424

Appendix 1: Publications for 2013 and 2014

2013 Publications and Theses(36)

Refereed Journal Articles (32)

1. Alayoglu, S., K. An, G.M. Melaet, S. Chen, F. Bernardi, L. W. Wang, A.E. Lindeman, N. Musselwhite, J. Guo, Z. Liu, M.A. Marcus, and G. Somorjai, "Pt-mediated Reversible Reduction and Expansion of CeO_2 in Pt Nanoparticle/mesoporous CeO_2: In-situ X-ray Spectroscopy and Diffraction Studies under Redox (H_2 and O_2) Atmospheres," *Journal of Physical Chemistry C* **117**(50), 26608-26616 (2013). (doi:10.1021/jp407280e) 9.3.2, 7.0.1.1, 10.3.2, 12.2.2

2. Chae, S.R., J. Moon, S. Yoon, S. Bae, P. Levitz, R.P. Winarski, and P. Monteiro, "Advanced Nanoscale Characterization of Cement Based Materials Using X-Ray Synchrotron Radiation: A Review," *International Journal of Concrete Structures and Materials* **7**(2), 95-110 (2013). (doi:10.1007/s40069-013-0036-1) 12.3.2, 5.3.2.1, 5.3.2.2, 12.2.2

3. Clark, S.M., K. Jeon, J-Y. Chen, and C-S. Yoo, "Few-layer graphene under high pressure: Raman and X-ray diffraction studies," *Solid State Commun.* **154**, 15-18 (2013). (doi:10.1016/j.ssc.2012.10.002) 12.2.2

4. Dera, P.K., K. Zhuravlev, V. Prakapenka, M. Rivers, G.J. Finkelstein, O. Grubor-Urosevic, O. Tschauner, S.M. Clark, and R.T. Downs, "High-pressure single-crystal micro- X-ray diffraction (SCmXRD) analysis with GSE_ADA/RSV software," *High Pressure Research* **33**(3), 466-484 (2013). (doi:10.1080/08957959.2013.806504) 12.2.2

5. Du, Z., L. Miyagi, G. Amulele, and K.K. Lee, "Efficient graphite ring heater suitable for diamond-anvil cells to 1300 K," *Rev. Sci. Instrum.* **84**, 024502 (2013). (doi:10.1063/1.4792395) 12.2.2

6. Edwards, T.G., I. Hung, Z. Gan, B. Kalkan, S. Raoux, and S. Sen, "Structural transformations in amorphous crystalline phase change of Ga-Sb alloys," *J. Appl. Phys.* **114**, 233512 (2013). (doi:10.1063/1.4854575) 12.2.2

7. Farfan, G.A., E. Boulard, S. Wang, and W.L. Mao, "Bonding and electronic changes in rhodochrosite at high pressure," *Am. Mineral.* **98**(10), 1817-1823 (2013). (doi:10.2138/am.2013.4497) 12.2.2

8. Fernandez-Martinez, A., B. Kalkan, S.M. Clark, and G. Waychunas, "Pressure-Induced Polyamorphism and Formation of Aragonitic Amorphous Calcium Carbonate," *Angewandte Chemie International Edition* **52**(32), 8354-8357 (2013). (doi:10.1002/anie.201302974) 12.2.2

9. Fischer, R.A., A.J. Campbell, D.M. Reaman, N.A. Miller, D.L. Heinz, P.K. Dera, and V. Prakapenka, "Phase relations in the Fe-FeSi system at high pressures and temperatures," *Earth and Planetary Science Letters* **373**, 54-64 (2013). (doi:10.1016/j.epsl.2013.04.035) 12.2.2

10. Geballe, Z.M., S.V. Raju, B.K. Godwal, and R. Jeanloz, "Clapeyron slope reversal in the melting curve of AuGa2 at 5.5 GPa," *Journal of Physics Condensed Matter* **25**(41), 415401 (2013). (doi:doi:10.1088/0953-8984/25/41/415401) 12.2.2

11. Gleason, A.E., W.L. Mao, and J.Y. Zhao, "Sound velocities for hexagonally close-packed iron compressed hydrostatically to 136 GPa from phonon density of states," *Geophys. Res. Lett.* **40**(12), 2983-2987 (2013). (doi:10.1002/grl.50588) 12.2.2

12. Gleason, A.E., and M.L. Mao, "Strength of iron at core pressures and evidence for a weak Earths inner core," *Nature Geoscience* **6**, 571-574 (2013). (doi:10.1038/NGEO1808) 12.2.2

13. Gleason, A.E., C.E. Quiroga, A. Suzuki, R. Pentcheva, and W.L. Mao, "Symmetrization driven spin transition in e-FeOOH at high pressure," *Earth and Planetary Science Letters* **379**, 49-55 (2013). (doi:10.1016/j.epsl.2013.08.012) 12.2.2

14. Godwal, B.K., S. Stackhouse, J. Yan, S. Speziale, B. Militzer, and R. Jeanloz, "Codetermination of crystal structures at high pressure: Combined application of theory and experiment to the intermetallic compound AuGa2," *Physical Review B: Condensed Matter and Materials Physics* **87**(10), 100101-1 (2013). (doi:10.1103/PhysRevB.87.100101) 12.2.2

15. Hausrath, E.M., and O. Tschauner, "Natural Fumarolic Alteration of Fluorapatite, Olivine, and Basaltic Glass, and Implications for Habitable Environments on Mars," *Astrobiology* **13**(11), 1049-1064 (2013). (doi:10.1089/ast.2013.0985) 12.2.2

16. Jackson, M.D., S.R. Chae, S.R. Mulcahy, C. Meral, R. Taylor, P. LI, J. Moon, S. Yoon, A.H. Emwas, G. Vola, H. Wenk, and P. Monteiro, "Unlocking the secrets of Al-tobermorite in Roman seawater concrete," *Am. Mineral.* **98**(10), 1669-1687 (2013). (doi:10.2138/am.2013.4484) 5.3.2.1, 5.3.2.2, 12.2.2

17. Jackson, M.D., J. Moon, E. Gotti, R. Taylor, S.R. Chae, M. Kunz, A.H. Emwas, C. Meral, P. Guttmann, P. Levitz, H. Wenk, and P.JM. Monteiro, "Material and Elastic Properties of Al-Tobermorite in Ancient Roman Seawater Concrete," *Journal of the American Ceramic Society* **96**(8), 2598-2606 (2013). (doi:10.1111/jace.12407) 12.3.2, 12.2.2

18. Juarez-Arellano, E.A., B. Winkler, A. Friedrich, L. Bayarjargal, W.H. Morgenroth, M. Kunz, and V. Milman, "In situ study of the formation of rhenium borides from the elements at high-(p, T) conditions: Extreme incompressibility of Re7B3 and formation of new phases," *Solid State Sciences* **25**, 85-92 (2013). (doi: 10.1016/j.solidstatesciences.2013.07.020) 12.2.2, 12.3.2

19. Kalavathi, S., S.V. Raju, Q. Williams, P.Ch. Sahu, V.S. Sastry, and H.K. Sahu, "Pressure-induced frustration in charge ordered spinel AlV2O4," *Journal of Physics Condensed Matter* **25**, 292201 (2013). (doi:10.1088/0953-8984/25/29/292201) 12.2.2

20. Kalkan, B., T.G. Edwards, and S. Sen, "Nature of metastable amorphous-to-crystalline reversible phase transformations in GaSb," *J. Chem. Phys.* **139**, 084507 (2013). (doi:10.1063/1.4818805) 12.2.2

21. Lei, J., B. Chen, S. Guo, K. Wang, L. T, E. Khosravi, J. Yan, S.V. Raju, and S. Yang, "Structural and mechanical stability of dilute yttrium doped chromium," *Applied Physics Letters* **102**, 021901-1-021901-4 (2013). (doi:10.1063/1.4775596) 12.2.2

22. Miyagi, L., W. Kanitpanyacharoen, S. Raju, P.M. Kaercher, J. Knight, A. McDowell, H. Wenk, Q. Williams, and E.Z. Alarcon, "Combined resistive and laser heating technique for in-situ radial x-ray diffraction in the diamond anvil cell at high pressure and temperature," *Rev. Sci. Instrum.* **84**(2), 025118 (2013). (doi:10.1063/1.4793398) 12.2.2

23. Moon, J., S. Speziale, C. Meral, B. Kalkan, S.M. Clark, and P.J.M. Monteiro, "Determination of the elastic properties of amorphous materials: Case study of alkali silica reaction gel," *Cement Concrete Res.* **54**, 55-60 (2013). (doi:10.1016/j.cemconres.2013.08.012) 12.2.2

24. Palaich, S.E., C.E. Manning, E. Schauble, and A. Kavner, "Spectroscopic and X-ray diffraction investigation of the behavior of hanksite and tychite at high pressures, and a model for the compressibility of sulfate minerals," *Am. Mineral.* **98**, 1543-1549 (2013). (doi:10.213&/am.2013.4384) 12.2.2

25. Rasmussen, A.M., S.T. Teklemichael, E. Mafi, Y. Gu, and M.D. McCluskey, "Pressure-induced phase transformation of In2Se3," *Applied Physics Letters* **102**(6), 062105 (2013). (doi:10.1063/1.4792313) 12.2.2

26. Tschauner, O., S.N. Luo, Y. Chen, A. McDowell, J. Knight, and S.M. Clark, "Shock synthesis of Lanthanum-III-pernitride," *High Pressure Research* **33**(1), 202-207 (2013). (doi:10.1080/08957959.2012.761214) 12.2.2

27. Tschauner, O., B. Kiefer, F. Tetard, K. Tait, J. Bourguille, A. Zerr, P.K. Dera, A. McDowell, J. Knight, and S.M. Clark, "Elastic moduli and hardness of highly incompressible

platinum perpnictide PtAs[sub 2]," *Applied Physics Letters* **103**(10), 101901 (2013). (doi:10.1063/1.4819143) 12.2.2

28. Wang, S., S. Hirai, M.C. Shapiro, S.C. Riggs, T.H. Geballe, W.L. Mao, and I.R. Fisher, "Pressure-induced symmetry breaking in tetragonal CsAuI3," *Physical Review B: Condensed Matter and Materials Physics* **87**(5), 054104 (2013). (doi:10.1103/PhysRevB.87.054104) 12.2.2

29. Wenk, H., P.M. Kaercher, W. Kanitpanyacharoen, E. Zepeda-Alarcon, and Y. Wan, "Orientation Relations During the α-omega Phase Transition of Zirconium: In Situ Texture Observations at High Pressure and Temperature," *Physical Review Letters* **111**(19), 195701 (2013). (doi:10.1103/PhysRevLett.111.195701) 12.2.2

30. Zeng, Q.S., W. Mao, H. Sheng, and Z. Zeng, "The effect of composition on pressure-induced devitrification in metallic glasses," *Applied Physics Letters* **102**(17), 171905 (2013). (doi:10.1063/1.4803539) 12.2.2

31. Zhang, D., J. Jackson, B. Chen, W. Sturhahn, J. Zhao, J. Yan, and R. Caracas, "Elasticity and lattice dynamics of enstatite at high pressure," *Journal of Geophysical Research* **118**(8), 4071-4082 (2013). (doi:10.1002/jgrb.50303) 12.2.2

32. Zhao, Z., S. Wang, H. Zhang, and W.L. Mao, "Pressure-induced structural transitions and metallization in Ag2Te," *Physical Review B: Condensed Matter and Materials Physics* **88**(2), 024120 (2013). (doi:10.1103/PhysRevB.88.024120) 12.2.2

Refereed Conference Proceedings (0)

Theses (M.S., Ph.D., etc.) (3)

1. Lin, Y., "Bonding and structures of light element energy systems under extreme conditions," doctoral dissertation, Stanford University, Stanford, CA/USA, 2013, advisor Wendy L Mao. 12.2.2

2. Moon, J., "Experimental and Theoretical Studies on Mechanical Properties of Complex Oxides in Concrete," doctoral dissertation, University of California at Berkeley, Berkeley, CA, 2013, advisor Paulo J.M. Monteiro. 12.2.2

3. Xie, M., "High Pressure Studies of Ultra-Incompressible, Superhard Metal Borides," doctoral dissertation, UCLA, Los Angeles, CA/US, 2013, advisor Sarah H. Tolbert. 12.2.2

Non-refereed Publications (magazine article, book review, etc.) (1)

1. Braun, A., "The ins and outs of hydrogen," **EuroFocus**(18), 85-87 (2013).

2014 Publications and Theses to Date (17)

Refereed Journal Articles (17)

1. Abdul-Jabbar, N.M., B. Kalkan, G-Y. Huang, A.A. MacDowell, R. Gronsky, E.D. Bourret-Courchesne, and B.D. Wirth, "The role of stoichiometric vacancy periodicity in pressure-induced amorphization of the Ga2SeTe2 semiconductor alloy," *Applied Physics Letters* **105**, 051908 (2014). (doi:10.1063/1.4892549) 12.2.2

2. Adcock, C., E. Hausrath, P.M. Forster, O. Tschauner, and K. Sefein, "Synthesis and characterization of the Mars-relevant phosphate minerals Fe- and Mg-whitlockite and merrillite and a possible mechanism that maintains charge balance during whitlockite to merrillite transformation," *Am. Mineral.* **99**(7), 1221-1232 (2014). (doi:10.2138/am.2014.4688) 12.2.2

3. Bae, S., C. Meral, J.e. Oh, J. Moon, M. Kunz, and P.J.M. Monteiro, "Characterization of morphology and hydration products of high-volume fly ash paste by monochromatic scanning x-ray micro-diffraction (μ-SXRD)," *Cement Contrete Res.* **59**, 155-164 (May 2014). (doi:10.1016/j.cemconres.2014.03.001) 12.3.2, 12.2.2

4. Bayarjargal, L., B. Winkler, A. Friedrick, and E.A. Juarez-Arellano, "Synthesis of TaC and Ta2C from tantalum and graphite in the laser-heated diamond anvil cell," , 000 (July 2014). (doi:10.1007/s11434-014-0546-5) 12.2.2

5. Chen, B., K.M. Lutker, J. Lei, J. Yan, S. Yang, and H. Mao, "Detecting Grain Rotation at the Nanoscale," *Proc. Natl. Acad. Sci. USA* **111**(9), 3350-3353 (2014). (doi:10.1073/pnas.1324184111) 12.2.2, 12.3.2

6. Fischer, R.A., A.J. Campbell, R. Caracas, D.M. Reaman, D.L. Heinz, P. Dera, and V.B. Prakapenka, "Equations of state in the Fe-FeSi system at high pressures and temperatures," **119**(4), 2810-2827 (2014). (doi:10.1002/2013JB010898) 12.2.2

7. Hargis, C.W., J. Moon, B. Lothenbach, F. Winnefeld, H. Wenk, and P.J.M. Monteiro, "Calcium Sulfoaluminate Sodalite ($Ca_4Al_6O_{12}SO_4$) Crystal Structure Evaluation and Bulk Modulus Determination," *Journal of the American Ceramic Society* **97**(3), 892-898 (2014). (doi:10.1111/jace.12700) 12.2.2

8. Kalkan, B., R.P. Dias, C.S. Yoo, S.M. Clark, and S. Sen, "Polyamorphism and Pressure-Induced Metallization at the Rigidity Percolation Threshold in Densified GeSe4 Glass," *Journal of Physical Chemistry C* **118**(10), 5110-5121 (2014). (doi:10.1021/jp4108602) 12.2.2

9. Melaet, G.M., W.T. Ralston, C.S. Li, S. Alayoglu, K. An, N. Musselwhite, B. Kalkan, and G.A. Samorjai, "Evidence of Highly Active Cobalt Oxide Catalyst for the Fischer-Tropsch Synthesis and CO_2 Hydrogenation," *Journal of the American Chemical Society* **136**(6), 2260-2263 (2014). (doi:10.1021/ja412447q) 12.2.2, 10.3.2, 8.0.1.4

10. Moon, J., S. Bae, K. Celik, S. Yoon, K.H. Kim, K.S. Kim, and P.J.M. Montiero, "Characterization of natural pozzolan-based geopolymeric binders," *Cement and Concrete Composites* **53**, 97-104 (October 2014). (doi:10.1016/j.cemconcomp.2014.06.010) 12.2.2

11. Musaev, O.R., J. Yan, V. Dusevich, J.M. Wrobel, and M.B. Kruger, "Ni nanoparticles fabricated by laser ablation in water," *Applied Physics A: Materials Science & Processing* **116**(2), 735-739 (2014). (doi: 10.1007/s00339-014-8569-y) 12.2.2

12. Raju, S.V., Z.M. Geballe, B.K. Godwal, B. Kalkan, Q. Williams, and R. Jeanloz, "High pressure and temperature structure of liquid and solid Cd: Implications for the melting curve of Cd," *Materials Research Express* **1**, 046502 (2014). (doi:10.1088/2053-1591/1/4/046502) 12.2.2

13. Tan, D., W. Zhou, W. Ouyang, Z.M. Mi, L. Kong, W. Xiao, K. Zhu, and B. Chen, "Growth of magnesium aluminate nanocrystallites," *CrystEngComm* **16**, 1579-1583 (2014). (doi:10.1039/c3ce41718b) 12.2.2

14. Tongay, S., H. Sahin, C. Ko, A. Luce, W. Fan, K. Liu, J. Zhou, Y. Huang, C. Ho, J. Yan, D. Ogletree, S. Aloni, J. Ji, S. Li, J. Li, F. Peeters, and J. Wu, "Monolayer behaviour in bulk ReS2 due to electronic and vibrational decoupling," *Nature Communications* **5**(6252), 1 (2014). (doi:10.1038/ncomms4252) 12.2.2

15. Tu, V., E. Hausrath, O. Tschauner, V. Iota, and G.W. Egeland, "Dissolution rates of amorphous Al- and Fe-phosphates and their relevance to phosphate mobility on Mars ," *Am. Mineral.* **99**(7), 1206 (2014). (doi:10.2138/am.2014.4613) 12.2.2

16. Wang, S., J. Zhang, J. Yan, X.J. Chen, V. Struzhkin, W. Tabis, N. Barisic, M.K. Chan, C. Dorrow, X. Zhao, M. Greven, W.L. Mao, and T. Geballe, "Strain derivatives of Tc in

HgBa2CuO4+δ: The CuO2 plane alone is not enough," *Physical Review B: Condensed Matter and Materials Physics* **89**, 024515 (2014). (doi:10.1103/PhysRevB.89.024515) 12.2.2

17. Xie, M., R. Mohammadi, C.L. Turner, R.B. Kaner, A. Kavner, and S.H. Tolbert, "Lattice stress states of superhard tungsten tetraboride from radial x-ray diffraction under nonhydrostatic compression," *Physical Review B: Condensed Matter and Materials Physics* **90**, 104104 (2014). (doi:http://dx.doi.org/10.1103/PhysRevB.90.104104) 12.2.2

Refereed Conference Proceedings (0)

Theses (M.S., Ph.D., etc.) (0)

Non-refereed Publications (magazine article, book review, etc.)(0)

Appendix 2: Successful Proposals and their Allocated Beamtime

ALS Shifts Allocation (2013-2 August-December)

Proposal #	Investigator	Title	Organization	BL	Final Rating	Shf Req	Shf Allo	Shf Tot	Other Beamlines	Allocation Notes	Ind	PartF	Propri	2B	CC
	Lavina, B	High Pressure Study of Fe4O5	University of Nevada Las Vegas	12.2.2		2	6	6							
	Ciezak-Jenkins, J	High-Pressure Structural Characterization of the Extended Solids of Carbon Monoxide	US Army Research Laboratory	12.2.2		9	9	15							
	Karunadasa, H	Hybrid Materials for Anisotropic Compressibility and Reversible Piezochromism	Stanford University	12.2.2		12	12	27							
	Wenk, H	Deformation and Phase Transformations at High Pressure and Temperature	University of California Berkeley	12.2.2	.	15	15	42							
	Mao, W	Carbonates stability in the lower mantle	Stanford University	12.2.2		9	9	51							
	Somorjai, G	Realtime Nucleation/Growth Kinetics and Structural Dynamics of Sub-2 nm Pt-based Bimetallic Colloida	University of California Berkeley	12.2.2		8	9	60	10.3.2						
	Williams, Q	Resistive heating developments at BL 12.2.2 and its applications in axial and radial XRD experiments	University of California Santa Cruz	12.2.2		12	12	72							
	Dzivenko, D	High-pressure high-temperature synthesis of the ternary B-C-N systems	Technische Universität Darmstadt, Germany	12.2.2		9	9	81							
	Williams, Q	Iron phase transition investigation at high temperature by laser heating at beamline 12.2.2	University of California Santa Cruz	12.2.2		15	12	93							
	Shen, Z	X-ray Diffraction Study of Pressure-induced Structural Evolution of Metal Diamondoid Chalcogenides	Stanford University	12.2.2		15	12	105							
	Tolbert, S	HIGH PRESSURE STUDIES OF ULTRA-INCOMPRESSIBLE, SUPERHARD METAL BORIDES	University of California Los Angeles	12.2.2		9	9	114							
	Shim, S	Phase Transition and Compressibility of Minerals in Subducting Oceanic Crust	Arizona State University	12.2.2		12	12	126							
	Godwal, B	Melting curve and structure of amorphous and liquid AuIn2 at high pressures	University of California Berkeley	12.2.2		12	12	138							
	Zeng, Q	The Effect of Composition on Pressure-Induced Devitrification in Metallic Glass	Stanford University	12.2.2		6	6	144							
	Miyagi, L	Deformation and Texture Development of post-Perovskite Analogs	Yale University	12.2.2		12	12	156							
	Bourret-Courchesne, E	The role of structural vacancies on phase-change phenomena of Ga2SeTe2	Lawrence Berkeley National Laboratory	12.2.2		11	12	168							
	McCluskey, M	Phase transformations of In2Se3 under pressure	Washington State University	12.2.2		12	9	177							
	Iota, V	Low temperature/high pressure X-ray absorption of strongly correlated electron systems: A New Facility for ALS 12.2.2	University of Nevada Las Vegas	12.2.2		15	9	186							
	Mao, W	Structural study of pressure-induced valence transition of CsAuI3 at elevated temperature	Stanford University	12.2.2		9	6	192							
	Zhang, L	Disproportionation of (Mg,Fe)SiO3 into MgSiO3 perovskite and an Fe-rich hexagonal silicate	Carnegie Institute of Washington	12.2.2		8	6	198							
	Smyth, J	Structure and bulk modulus of hydrous perovskite	University of Colorado at Boulder	12.2.2		6	6	204							

1 Tuesday, May 7, 2013

30 Proposals of the 51 submitted were not allocated time during this period. 210 shifts were available in the General User pool and 473 were requested (2.25 x oversubscribed). 135 shifts of GU time were allocated to COMPRES users, or 64%. 26 additional shifts were allocated to the Tschauner-Single Crystal AP which, if counted as COMPRES-affiliated time, would mean that 161 shifts out of 236, or 68% of 12.2.2 user-available time was used by COMPRES. 41 additional shifts are allocated for ALS beamline scientists (27 shifts) or Director's Discretionary Time: 9 of the latter 14 DD shifts were allocated to Jeanloz (7 shifts) and H. Zhang (2 shifts) of the Banfield group, with the 5 balance (in mid-November) going to Beavers.

ALS Shifts Allocation (2014-1 January-July)

Investigator	Title	Organization	BL	Final Rating	Shf Req	Shf Alloc	Shf Tot	
Ciezak-Jenkins, J	High-Pressure Structural Characterization of the Extended Solids of Carbon Monoxide	US Army Research Laboratory	12.2.2		12	0	0	
Ciezak-Jenkins, J	High-Pressure Single Crystal Diffraction of the Extended Solids of Carbon Monoxide and Nitrogen/Hydrogen Binary Mixtures	US Army Research Laboratory	12.2.2		12	12	12	
Karunadasa, H	Hybrid Materials for Anisotropic Compressibility and Reversible Piezochromism	Stanford University	12.2.2		12	12	24	
Wenk, H	Deformation and Phase Transformations at High Pressure and Temperature	University of California Berkeley	12.2.2		15	15	39	
Mao, W	Carbonates stability in the lower mantle	Stanford University	12.2.2		9	6	45	
Somorjai, G	Realtime Nucleation/Growth Kinetics and Structural Dynamics of Sub-2 nm Pt-based Bimetallic Colloids	University of California Berkeley	12.2.2		8	8	53	
Williams, Q	Resistive heating developments at BL 12.2.2 and its applications in axial and radial XRD experiments	University of California Santa Cruz	12.2.2		9	9	62	
Williams, Q	Single-Crystal X-ray Diffraction of Lawsonite and Topaz at Simultaneous High Pressures and Temperatu	University of California Santa Cruz	12.2.2		6	6	68	
Williams, Q	Iron phase transition investigation at high temperature by laser heating at beamline 12.2.2	University of California Santa Cruz	12.2.2		9	9	77	
Mao, W	Study on pressure induced "superlubric" transition and metallization in MoSe2	Stanford University	12.2.2		6	6	83	
Tschauner, O	Single Crystal Diffraction under Extreme Conditions	University of Nevada Las Vegas	12.2.2		0	12	95	
Somorjai, G	Peculiar Structural Behavior of CoCu Alloy Nanoparticles (NPs) under the influence of Redox Gases	University of California Berkeley	12.2.2		6	3	98	
Mao, W	Effect of pressure on structure and phase transition of electrochemically derived Li-Si materials	Stanford University	12.2.2		9	6	104	
Zeng, Q	The Effect of Composition on Pressure-Induced Devitrification in Metallic Glass	Stanford University	12.2.2		6	6	110	
Miyagi, L	Deformation and Texture Development of post-Perovskite Analogs	University of Utah	12.2.2		12	12	122	
McCluskey, M	Phase transformations of In2Se3 under pressure	Washington State University	12.2.2		12	12	134	
Yoo, C	Structural Studies of Halogen-Containing Compounds under Extreme Conditions	Washington State University	12.2.2		15	12	146	
Godwal, B	Structural and metallic phase transitions of PbCl2 and SnCl2 at pressures up to ~100 GPa.	University of California Berkeley	12.2.2		6	6	152	
Yang, S	Texturing of Nanocrystals	Southern University and A&M College	12.2.2		24	12	164	
Mao, W	Study on Pressure Induced Structural Transitions in a proposed Dirac semi-metal Na3Bi	Stanford University	12.2.2		6	6	170	
Godwal, B	Melting curve and structure of amorphous and liquid AuIn2 at high pressures	University of California Berkeley	12.2.2		12	6	176	
Chen, B	Texturing at Nanoscale	HPSTAR	12.2.2		12	12	188	
Monteiro, P	Atomistic structures and structural mechanism of amorphous alkali-silicate reaction gel	University of California Berkeley	12.2.2		6	6	194	
Reagan, M	Pressure Induced Structural Changes of FeOOH	Stanford University	12.2.2		6	6	200	
Hummer, D	Crystal chemistry of ferric iron perovskites at high P-T using in situ single crystal diffraction	University of California Los Angeles	12.2.2		6	6	206	
Tolbert, S	HIGH PRESSURE STUDIES OF ULTRA-INCOMPRESSIBLE, SUPERHARD METAL BORIDES	University of California Los Angeles	12.2.2		9	9	215	

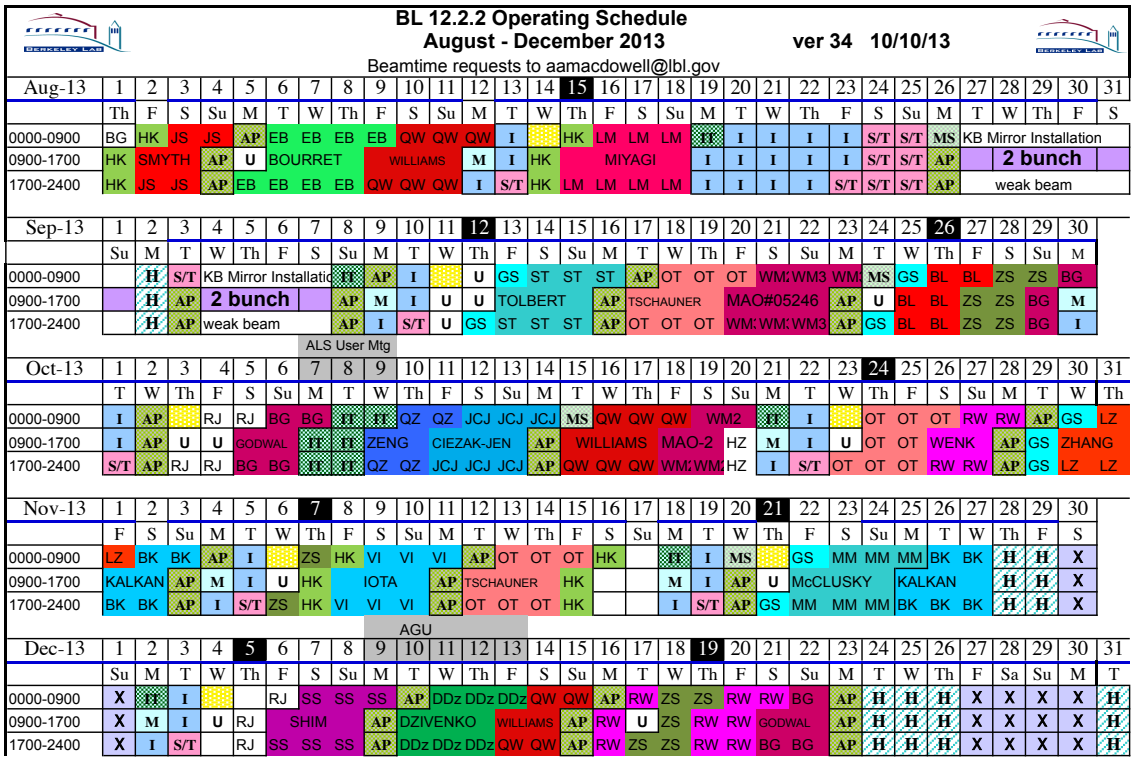
19 Proposals of the 45 submitted were not allocated time during this period. 215 shifts were available in the General User pool and 440 were requested (2.04 x oversubscribed). 138 shifts of GU time were allocated to COMPRES users, or 64%. 41 additional shifts are allocated for ALS beamline scientists (28 shifts) or Director's Discretionary Time (13 shifts).

ALS Shifts Allocation (2014-2 August - December)

Investigator	Title	Organization	BL	Final Rating	Shf Req	Shf Alloc	Shf Tot	Other Beamlines	Allocation Notes	Inc
Lavina, B	High Pressure Study of Fe4O5	University of Nevada Las Vegas	12.2.2		9	9	9			
Ciezak-Jenkins, J	High-Pressure Single Crystal Diffraction of the Extended Solids of Carbon Monoxide and Nitrogen/Hydrogen Binary Mixtures	US Army Research Laboratory	12.2.2		12	12	21			
Chen, B	Thermal equation of state of CaSiO3 perovskite under lower mantle conditions	University of Hawaii at Manoa	12.2.2		6	6	27			
Karunadasa, H	Hybrid Materials for Anisotropic Compressibility and Reversible Piezochromism	Stanford University	12.2.2		12	12	39			
Long, J	High-pressure synthesis and structural investigation of lanthanide diazenides	University of California Berkeley	12.2.2		12	12	51			
Williams, Q	Resistive heating developments at BL 12.2.2 and its applications in axial and radial XRD experiments	University of California Santa Cruz	12.2.2		12	9	60			
Dzivenko, D	High-pressure high-temperature synthesis of the ternary B-C-N systems	Technische Universität Darmstadt	12.2.2		9	9	69			
Williams, Q	Single-Crystal X-ray Diffraction of Lawsonite and Topaz at Simultaneous High Pressures and Temperatu	University of California Santa Cruz	12.2.2		6	6	75			
Williams, Q	Iron phase transition investigation at high temperature by laser heating at beamline 12.2.2	University of California Santa Cruz	12.2.2		9	9	84			
Tolbert, S	HIGH PRESSURE STUDIES OF ULTRA-INCOMPRESSIBLE, SUPERHARD METALS	University of California Los Angeles	12.2.2		18	15	99			
Mao, W	Study on pressure induced "superlubric" transition and metallization in MoSe2	Stanford University	12.2.2		6	6	105			
Tschauner, O	Single Crystal Diffraction under Extreme Conditions	University of Nevada Las Vegas	12.2.2		12	12	117		This Approved Program was converted into a General User Proposal. Beamtime is allocated as a general user proposal. The proposal will remain active for 2 years. Beam time requests will need to be submitted each cycle. Feedback from the Approved Program review will be sent separately in a letter from the ALS Division Director.	
Jeanloz, R	Multi-ferropericlase single-crystal XRD experiments under whole lower mantle pressures	University of California Berkeley	12.2.2		6	0	117			
Miyagi, L	Deformation and Texture Development of post-Perovskite Analogs	University of Utah	12.2.2		12	12	129			
McCluskey, M	Phase transformations of In2Se3 under pressure	Washington State University	12.2.2		12	12	141			
Jeanloz, R	Multi-ferropericlase single-crystal X-ray diffraction experiments at lower-mantle pressures	University of California Berkeley	12.2.2		12	12	153			
Godwal, B	Structural and metallic phase transitions of PbCl2 and SnCl2 at pressures up to ~100 GPa.	University of California Berkeley	12.2.2		6	6	159			
Mao, W	Study on Pressure Induced Structural Transitions in a proposed Dirac semi-metal Na3Bi	Stanford University	12.2.2		6	6	165			
Godwal, B	Melting curve and structure of amorphous and liquid AuIn2 at high pressures	University of California Berkeley	12.2.2		12	9	174			
Monteiro, P	Atomistic structures and structural mechanism of amorphous alkali-silicate reaction gel	University of California Berkeley	12.2.2		6	6	180			
Liu, G	Size effect of interface embrittlement in nano Ni-S system under high pressure	HPSTAR	12.2.2		9	0	180			
Clearfield, A	Structural investigation of metal phosphonates under applied pressure	Texas A&M University	12.2.2		3	3	183	11.3.1		
Crowhurst, J	In situ x-ray diffraction study of the decomposition products of high nitrogen content precursors	Lawrence Livermore National Laboratory	12.2.2		3	3	186			
Kumar, R	High pressure structural studies on Ge2Sb2Te5 at high temperatures	University of Nevada Las Vegas	12.2.2		8	6	192			
deemyad, s	Structures of Lithium-rich intermetallics under pressure	University of Utah	12.2.2		5	4	196			

12 Proposals of the 37 submitted were not allocated time during this period. 196 shifts were available in the General User pool and 328 were requested (1.67 x oversubscribed). 117 shifts of GU time were allocated to COMPRES users, or 60%. 10% of available beamtime was allocated to the HPSTAR AP. 39 additional shifts are allocated for ALS beamline scientists (18 shifts) or Director's Discretionary Time(13shifts)

Appendix 3: The beamtime schedules for last year's cycles



BL 12.2.2 Operating Schedule
August - December 2013 ver 34 10/10/13
Beamtime requests to aamacdowell@lbl.gov

Aug-13	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S
0000-0900	BG	HK	JS	JS	AP	EB	EB	EB	EB	QW	QW	QW	I		HK	LM	LM	LM	IT	I	I	I	I	S/T	S/T	MS	KB Mirror Installation				
0900-1700	HK	SMYTH		AP	U	BOURRET				WILLIAMS		M	I	HK	MIYAGI				I	I	I	I	I	S/T	S/T	AP		2 bunch			
1700-2400	HK	JS	JS	AP	EB	EB	EB	EB	QW	QW	QW	I	S/T	HK	LM	LM	LM	LM	I	I	I	I	S/T	S/T	S/T	AP	weak beam				

Sep-13	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	
0000-0900		H	S/T	KB Mirror Installatio				IT	AP	I		U	GS	ST	ST	ST	AP	OT	OT	OT	WM:	WM3	WM:	MS	GS	BL	BL	ZS	ZS	BG	
0900-1700		H	AP	2 bunch				AP	M	I	U	U	TOLBERT			AP	TSCHAUNER			MAO#05246			AP	U	BL	BL	ZS	ZS	BG	M	
1700-2400		H	AP	weak beam				AP	I	S/T	U	GS	ST	ST	ST	AP	OT	OT	OT	WM:	WM:	WM3	AP	GS	BL	BL	ZS	ZS	BG	I	

ALS User Mtg

Oct-13	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th
0000-0900	I	AP		RJ	RJ	BG	BG	IT	IT	QZ	QZ	JCJ	JCJ	JCJ	MS	QW	QW	QW	WM2		IT	I		OT	OT	OT	RW	RW	AP	GS	LZ
0900-1700	I	AP	U	U	GODWAL		IT	IT	ZENG		CIEZAK-JEN			AP	WILLIAMS			MAO-2		HZ	M	I	U	OT	OT	WENK		AP	GS	ZHANG	
1700-2400	S/T	AP	RJ	RJ	BG	BG	IT	IT	QZ	QZ	JCJ	JCJ	JCJ	AP	QW	QW	QW	WM:	WM2	HZ	I	S/T	OT	OT	OT	RW	RW	AP	GS	LZ	LZ

Nov-13	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	
0000-0900	LZ	BK	BK	AP	I		ZS	HK	VI	VI	VI	AP	OT	OT	OT	HK		IT	I	MS		GS	MM	MM	MM	BK	BK	H	H	X	
0900-1700	KALKAN		AP	M	I	U	HK	IOTA			AP	TSCHAUNER			HK			M	I	AP	U	McCLUSKY			KALKAN			H	H	X	
1700-2400	BK	BK	AP	I	S/T	ZS	HK	VI	VI	VI	AP	OT	OT	OT	HK			I	S/T	AP	GS	MM	MM	MM	BK	BK	BK	H	H	X	

AGU

Dec-13	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	Sa	Su	M	T
0000-0900	X	IT	I			RJ	SS	SS	SS	AP	DDz	DDz	DDz	QW	QW	AP	RW	ZS	ZS	RW	RW	BG	AP	H	H	H	X	X	X	X	H
0900-1700	X	M	I	U	RJ	SHIM			AP	DZIVENKO			WILLIAMS		AP	RW	U	ZS	RW	RW	GODWAL		AP	H	H	H	X	X	X	X	H
1700-2400	X	I	S/T		RJ	SS	SS	SS	AP	DDz	DDz	DDz	QW	QW	AP	RW	ZS	ZS	RW	RW	BG	BG	AP	H	H	H	X	X	X	X	H

Key	Leader		Contact	Co-workers	ALS Proposal #	Start Date	Shifts Aug-Dec 2013 Allocate	Assign
C	Commisioning/Installation						0	
U	Upkeep/Maintenance	5%	aamacdowell@lbl.gov	jwknight@lbl.gov			14	13
BK	BL Scientist time	5%	Bora Kalkan	bkalkan@lbl.gov			14	14
APPROVED PROGRAM								Notes
OT	Oliver Tschauner UNLV	10%	olivert@physics.unlv.edu		ALS 04669	Jul 2011(3y)	26	26
GENERAL USER PROPOSALS								
MM	Matt McCluskey, Wash State		mattmcc@wsu.edu		ALS 05424	Jan 2013	9	9
GS	Gabor Somorjai UCB		somorjai@berkeley.edu	Selim Alayoglu" <salayoglu@lbl.	ALS 05644	Jan 2013	9	9
JCJ	Jennifer Ciezak-Jenkins, US Army Researc		jennifer.ciezak@us.army.mil		ALS 05357	Jul 2012	9	9
ST	Sarah Tolbert UCLA		tolbert@chem.ucla.edu	Miao Xie <mxie@chem.ucl	ALS 04773	Jan 2012	9	9
QZ	Qiaoshi Zeng, Stanford		qiaoshiz@stanford.edu		ALS 05335	Jul 2012	6	6
VI	Valentin Iota, UNLV		valiota@physics.unlv.edu	Corwin Booth, S.Clark	ALS 05349	Jul 2012	9	9
QW	Quentin Williams UCSC		quentw@pmc.ucsc.edu	Jinyuan Yan	ALS05576	Jan 2013	12	12
WM2	Wendy Mao Stanford		wmao@stanford.edu		ALS 04896	Jan 2012	6	6
WM3	Wendy Mao Stanford		wmao@stanford.edu	Eglantine Boulard <boulard@stanford	ALS 05246	Jul 2012	9	9
RW	Rudy Wenk UCB		wenk@berkeley.edu	Eloisa Zepeda Jane Kanitpanyacharoen	ALS 5361	Jul 2012	15	15
BL	Barbara Lavina UNLV		lavina@physcis.unlv.edu		ALS 05507	Jan 2013	6	6
SS	Sang-Heon Shim ASU		SHDShim@asu.edu		ALS 05630	Jan 2013	12	9
HK	Hemamala Karunadasa Stanford		hemamala@stanford.edu		ALS 05879	Jul 2013	12	12
QW	Quentin Williams UCSC		quentw@pmc.ucsc.edu	Jinyuan Yan, C.Beavers	ALS06080	Jul 2013	12	12
DDz	Dmytro Dzivenko, U Darmstadt,		dzivenko@materials.tu-darmstadt.de	S.Bhat	ALS 06086	Jul 2013	9	9
ZS	Zhi-Xun Shen		zxshen@stanford.edu	Hao Yan yanhao@stanford.edu	ALS 06003	Jul 2013	12	13
BG	Budhiram Godwal, UCB		<godwal@berkeley.edu>		ALS 05624	1 cycle	12	14
LM	Lowell Miyagi, U Utah		lowell.miyagi@utah.edu		ALS 05966	Jul 2013	12	11

BL 12.2.2 Operating Schedule, Advanced Light Source, LBNL

Jan - Dec 2014 ver 53 5/28/14

Beamtime requests to aamacdowell@lbl.gov

Jan-14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F
0000-0900	H	IT	I	S/T	BLC	BLC	SS		PM	PM	WM	WM	BC	MS	C	PA	GS	QW	QW	H	IT	I	AP		C	QW	PA	MS	C	RJ	HK
0900-1700	H	M	I	S/T	BLC	SS	BLC	U	PM	WM5		BC	AP	C	U	GS	QW	QW	QW	H	M	I	AP	U	QW	PA	AP	C	RJ	HK	BK
1700-2400	H	I	S/T	S/T	BLC	SS	BLC	PM	PM	WM	WM	BC	AP	C	PA	GS	QW	QW	QW	H	I	S/T	AP	C	QW	PA	AP	C	RJ	HK	BK

Feb-14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	
0000-0900	BK	BK	AP	I		OT	OT	BG	BG	RJ	MS	GS	QW	GS	HK	QW	H	IT	I		QW	BK	BK	BK	MS	OT	OT	OT	
0900-1700	BK	AP	M	I	U	OT	BG	BG	RJ	AP	GS	QW	GS	C	QW	QW	H	M	I	QW	BK	BK	BK	AP	U	OT	OT	QW2	
1700-2400	BK	AP	I	S/T	OT	OT	BG	BG	RJ	AP	GS	QW	GS	HK	QW	QW	H	I	S/T	QW	BK	BK	BK	AP	OT	OT	OT	QW2	

Mar-14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M
0000-0900	QW2	BG	IT	I	AP						MS						U7	I		WM	WM	WM4	WM	HK	AP	ST	ST	ST	QZ	QZ	AP
0900-1700	BG	BG	M	I	AP		2 bunch			AP			2 bunch				M	I	WM3		MW4		HK	AP	TOLBERT			ZENG		AP	M
1700-2400	BG	BG	I	S/T	AP					AP							I	S/T	WM	WM	WM	WM4	HK	AP	ST	ST	ST	QZ	QZ	AP	I

Apr-14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	Tu	W	Th	F	S	Su	M	T	W	
0000-0900	I		C	JCJ	JCJ	JCJ	JCJ	MS	QW	CY	CY	CY	CY	IT	I		JZ	BC	BC	BC	BC	MS	GS	SY	SY	SY	SY	AP	I		
0900-1700	I	U	JENKINS				AP	QW	U	YOO				M	I	C	BIN CHEN				AP	U	YANG				AP	M	I	HK	
1700-2400	S/T	C	JCJ	JCJ	JCJ	JCJ	AP	QW	CY	CY	CY	CY	CY	I	S/T	JZ	BC	BC	BC	BC	AP	GS	SY	SY	SY	SY	AP	I	S/T	HK	

May-14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S
0000-0900	HK	HK	MR	MR	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	H	I	I	I	I	I
0900-1700	HK	C	REAGA		I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	H	I	I	I	I	I
1700-2400	HK	MR	MR	MR	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	H	I	I	I	I	I

Jun-14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	
0000-0900	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	S/T	S/T	S/T	S/T
0900-1700	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	S/T	S/T	S/T	S/T
1700-2400	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	I	S/T	S/T	S/T	S/T	S/T

Jul-14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th
0000-0900	S/T	S/T	S/T	H	S/T	S/T	S/T	S/T	BLC	BLC	U	LM	LM	LM	AP	LM	WM	WM	RW	RW	IT	I		MM	MM	MM	MM	MS	RW	RW	DH
0900-1700	S/T	S/T	BLC	H	S/T	S/T	S/T	BLC	BLC	U	LM	LM	LM	AP	U	WM6		RW	RW	RW	M	I	U	MM	MM	MM	AP	RW	RW	DH	DH
1700-2400	S/T	S/T	BLC	H	S/T	S/T	S/T	BLC	BLC	U	LM	LM	LM	AP	LM	WM	WM	RW	RW	RW	I	S/T	MM	MM	MM	MM	AP	RW	RW	DH	DH

bl1222currentschedule : Jan 2014-Dec2014

BL 12.2.2 Operating Schedule, Advanced Light Source, LBNL — ver 58 7/16/14

July - Dec 2014 — Beamtime requests to aamacdowell@lbl.gov

Jul-14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th
0000-0900	S/T	S/T	S/T	H	S/T	S/T	S/T	S/T	BLC	BLC	U	LM	LM	LM	AP	LM	WM	WM	RW	RW	IT	I		MM	MM	MM	MM	MS	RW	RW	DH
0900-1700	S/T	S/T	BLC	H	S/T	S/T	S/T	BLC	BLC	U	MIYAGI			AP	U	MAO-6		WENK			M	I	U	McCLUSKY			AP	WENK		HUMMER	
1700-2400	S/T	S/T	BLC	H	S/T	S/T	S/T	BLC	BLC	U	LM	LM	LM	AP	LM	WM	WM	RW	RW	RW	I	S/T	MM	MM	MM	MM	AP	RW	RW	DH	DH
										2 BUNCH																					
Aug-14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su
0000-0900	DH	QW	JC	IT	I	MS					AK	AP	AK	AK	SC	SC		IT	I		JL	JL	QW	OT	OT	AP	RJ	RJ	IHR	SD	MS
0900-1700	QW1	QW	JC	M	I	AP					AK	AP	AK	AK	SC	SC		M	I	U	JL	QW1	OT	OT	AP	JEANLO		IHR	DEEMYAD		AP
1700-2400	QW1	JC	JC	I	S/T	AP					AK	AP	AK	AK	SC	SC		I	S/T	JL	JL	QW1	OT	OT	AP	RJ	RJ	IHR	SD	SD	AP
Sep-14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	
0000-0900	H	IT	I		JCJ	JCJ	JCJ	JCJ	AP	RJ	RJ	QW	ST	ST	IT	I		HPSTAR		BC-H	BC-H	HPS	MS	DD	JL	JL	HK	WM	WM	IT	
0900-1700	H	M	I	U	C-JENKINS			AP	JEANLO2	QW	TOLBERT				M	I	U	HPS	CHEN		HPS	AP	DD	LONG		HK	MAO 4		IT	IT	
1700-2400	H	I	S/T	JCJ	JCJ	JCJ	JCJ	AP	RJ	RJ	QW	ST	ST	ST	I	S/T	HPSTAR		BC-H	BC-H	HPS	AP	DD	JL	JL	HK	WM	WM	IT	IT	
						User Meeting																									
Oct-14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F
0000-0900	IT	MM	IHR		MM	IT	I	AP		IHR	IHR	OT	OT	MS	BL	BL	BL	AC	PM	IT	I	I	I	S/T	S/T	S/T		DD	QW	HK	MM
0900-1700	U	IHR	IHR	MM	PM	M	I	AP	U	IHR	OT	OT	AP	U	LAVINA		AC	PM	MM	M	I	I	I	S/T	S/T	S/T	U	QW	HK	MM	WM6
1700-2400	PM	IHR	IHR	MM	PM	I	S/T	AP	IHR	IHR	OT	OT	AP	BL	BL	BL	AC	PM	MM	I	I	I	S/T	S/T	S/T	S/T	DD	QW	HK	MM	WM6
Nov-14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	
0000-0900	WM6		AP	I		QW	HK	HPSTAR			AP	SB	SB	SB	RK	RK	IT	I	MS		BG1	BG1	SY	SY	BG2	BG2	H	H	X	X	
0900-1700	WM6	AP	M	I	QW	HK	HPSTAR			AP		BHAT		RK	RK	MM	M	I	AP	BG1	BG1	SY	SY	BG2	BG2	U	H	H	X	X	
1700-2400	WM6	AP	I	S/T	QW	HK	HPSTAR			AP	SB	SB	SB	RK	RK	MM	I	S/T	AP	BG1	BG1	SY	SY	BG2	BG2		H	H	X	X	
																AGU															
Dec-14	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	S	Su	M	T	W	Th	F	Sa	Su	M	T	W
0000-0900	IT	I			HK	ST	ST	ST	AP	HPSTAR	LM	LM	LM	IT	MS		HPS	MM	QW	QW	QW2	AP	H	H	H	X	X	X	X	H	
0900-1700	M	I	U	HK	U	TOLBERT		AP	HPSTAR		MIYAGI			M	AP	U	HPS	QW	QW	QW	DD	AP	H	H	H	X	X	X	X	H	
1700-2400	I	S/T		HK	ST	ST	ST	AP	HPSTAR	LM	LM	LM	LM	S/T	AP	HPS	MM	QW	QW	QW	DD	AP	H	H	H	X	X	X	X	H	

C	Commisioning/Installation					
U	Upkeep/Maintenance	5%	aamacdowell@lbl.gov	adoran@lbl.gov	Users generally st	
BK	BL Scientist time	5%	Bora Kalkan	bkalkan@lbl.gov	MK	M.Kunz (Aug-Dec)
HPSTAR	Bin Chen HPSTAR	10% AP	chenbin@hpstar.ac.cn			ALS(
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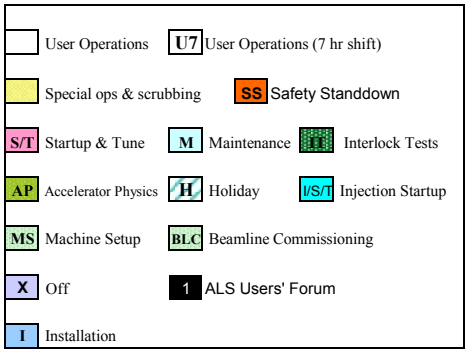

N.B. All COMPRES employees' competitively-allocated time for their research or on-line technique development is labeled under Williams. All of the times shown here are primarily for one of (or some combination of) Beavers or Yan.

Appendix 4: Quote for a High Level Computer Control System for Single-Crystal Diffraction Experiments