

BES STORAGE RING BEAMLINE SUMMARY

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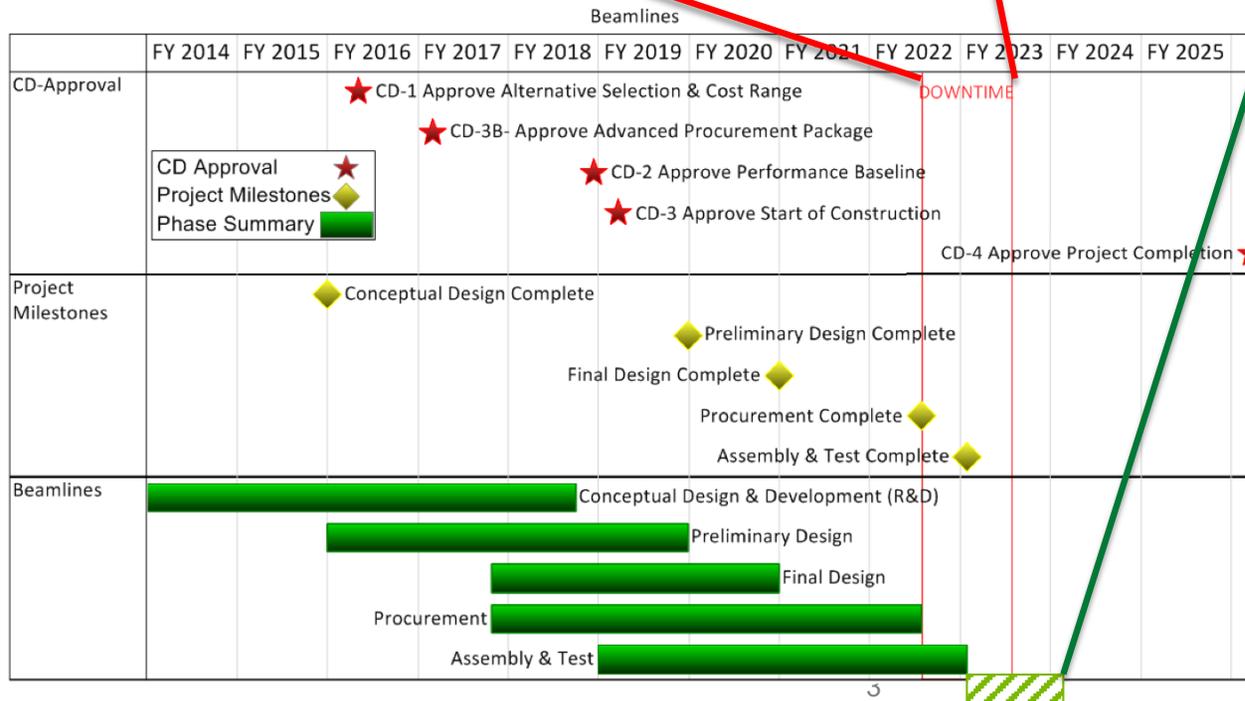
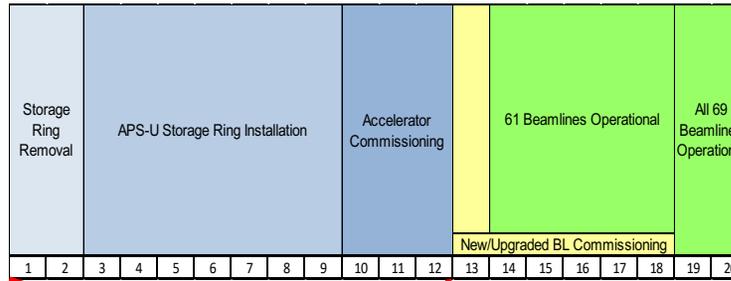
5-WAY MEETING APRIL 2018



OUTLINE

- APS-U Schedule around the dark time
- What we did
 - Summarized all BES SR facility BLs
 - Looked at just ALS, NSLS II, and SSRL
 - Looked at PX (compare with Fischetti/McSweeney analysis)
- Displays of various roll-ups of the data
- Potential capacity for techniques that map onto APS techniques
- Summary

HIGH-LEVEL APS-U SCHEDULE



DOE/SC Status Review of the APS-U Project at ANL December 12-13, 2017

Not shown is the accelerator ramp-up schedule beyond the dark period.

WHAT DID WE DO?

- Data from ALS, APS, NSLS-II and SSRL were collected in this exercise.
 - LCLS would contribute only 1 BL (until perhaps FY21) plus their capabilities do not directly map on the the SR beamlines so for the time they are excluded
 - At this time the summary data does not specifically call out BLs specializing in time-resolved techniques. The number of BLs that have associated infrastructure for time-resolved studies (lasers, pump/probe, etc.) is not too large.

- Data were collected for FY17, FY19, FY21 and each fiscal year had 4 columns

ID BL Count FY21 (capacity)	BM BL Count FY21 (capacity)	ID Ops Count FY21 (being used)	BM Ops Count FY21 (being used)
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- ID and BM “**Count**” (white headers): sum (= 1) of the fractions of each technique on the BL (*reflects capacity*)
 - ID and BM “**Ops Count**” (yellow headers): the fraction of the time the BL is actually used for each technique and sum is less than or equal to 1 (*reflects fraction being used*)
- Data in the BM and ID “**Ops Count**” column (*being used*) came from:
 - Actual numbers (ALS and some of APS values)
 - Estimates of fraction of capacity currently being used (SSRL and some of APS values – 80% was number used for the estimated usage)
 - Projected values based on current data (NSLS-II)

ROLL UP

BES Beamline Portfolio FY17 - FY21												
	Total ID BL Count FY17	Total BM BL Count FY17	Total ID Ops Count FY17	Total BM Ops Count FY17	Total ID BL Count FY19	Total BM BL Count FY19	Total ID Ops Count FY19	Total BM Ops Count FY19	Total ID BL Count FY21	Total BM BL Count FY21	Total ID Ops Count FY21	Total BM Ops Count FY21
Spectroscopy	27.33	17.70	24.07	14.60	31.33	21.95	27.74	19.24	31.08	21.85	28.76	18.87
01 - Low Energy Spectroscopy (E < 200 eV)	3.75	0.75	3.55	0.65	3.75	2.55	3.55	1.73	3.75	2.55	3.55	1.73
01.1 IR Spectroscopy						1.55		0.93		1.55		0.93
01.2 IR Ellipsometry						0.25		0.15		0.25		0.15
01.3 Photoemission/ARPES	3.25	0.50	3.05	0.40	3.25	0.50	3.05	0.40	3.25	0.50	3.05	0.40
01.4 UV/VUV Spectroscopy	0.50	0.00	0.50	0.00	0.50	0.00	0.50	0.00	0.50	0.00	0.50	0.00
02 - Soft X-Ray Spectroscopy (200 eV < E < 5000 eV)	7.93	6.85	6.30	6.32	11.38	7.30	9.33	6.67	11.13	7.30	10.30	6.97
02.1 Soft X-rays (200 eV < E < 2000 eV)	7.03	4.15	5.56	3.82	9.63	4.38	8.34	3.99	9.38	4.38	8.84	4.14
02.2 - Tender X-rays (2000 eV < E < 5000 eV)	0.90	2.70	0.74	2.51	1.75	2.93	1.00	2.68	1.75	2.93	1.46	2.83
03 - Hard X-ray Spectroscopy (E > 5000 eV)	13.90	7.60	12.47	5.48	14.45	7.60	13.11	7.09	14.45	7.50	13.16	7.17
03.1 Hard X-ray Spectroscopy (E > 5000 eV)												
04 - Optics/Calibration/Metrology	1.75	2.50	1.75	2.15	1.75	4.50	1.75	3.75	1.75	4.50	1.75	3.00
04.1 Optics		0.35		0.35		0.75		0.67		0.75		0.67
04.2 Detector Calibration		0.70		0.45		1.10		0.77		1.10		0.77
04.3 At-wavelength Metrology	1.75	1.45	1.75	1.35	1.75	2.65	1.75	2.31	1.75	2.65	1.75	1.56
04.4 In-Situ (At-Wavelength) Figuring	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Scattering/Diffraction	51.53	26.65	42.27	23.53	54.78	26.65	48.09	24.14	54.53	26.75	48.62	24.31
05 X-ray Diffraction (ordered systems)	12.85	11.25	11.12	10.70	14.05	11.25	13.08	10.85	14.05	11.35	13.18	10.97
05.1 Hard X-rays (5000 eV < E < 30000 eV)	10.40	7.05	9.11	6.50	11.00	7.05	10.24	6.65	11.00	7.15	10.24	6.77
05.2 High Energy X-rays (E > 30000 eV)	2.45	4.20	2.01	4.20	3.05	4.20	2.84	4.20	3.05	4.20	2.94	4.20
06 MX, footprinting (ordered systems)	20.50	10.20	15.10	8.38	22.50	10.20	18.20	8.54	22.50	10.20	18.50	8.54
06.1 Macromolecular Crystallography (ordered systems)	20.50	9.50	15.10	7.94	22.50	9.50	18.20	7.94	22.50	9.50	18.50	7.94
06.2 X-ray footprinting (non-ordered systems)	0.00	0.70	0.00	0.44	0.00	0.70	0.00	0.60	0.00	0.70	0.00	0.60
07 Hard X-ray Scattering (E > 5000 eV)	14.50	4.45	12.78	3.70	14.95	4.45	13.91	4.00	14.95	4.45	14.25	4.05
07.1 Hard X-rays (5000 eV < E < 30000 eV)	11.20	4.45	9.63	3.70	11.60	4.45	10.78	4.00	11.60	4.45	10.98	4.05
07.2 High Energy X-rays (E > 30000 eV)	3.30	0.00	3.15	0.00	3.35	0.00	3.13	0.00	3.35	0.00	3.27	0.00
08 Soft X-Ray Scattering (200 eV < E < 5000 eV)	3.68	0.75	3.27	0.75	3.28	0.75	2.91	0.75	3.03	0.75	2.69	0.75
08.1 Soft X-rays (200 eV < E < 2000 eV)	3.68	0.25	3.27	0.25	3.28	0.25	2.91	0.25	3.03	0.25	2.69	0.25
08.2 - Tender X-rays (2000 eV < E < 5000 eV)	0.00	0.50	0.00	0.50	0.00	0.50	0.00	0.50	0.00	0.50	0.00	0.50
Imaging	14.13	16.65	12.58	11.09	16.88	16.40	15.51	12.57	17.38	16.40	16.42	12.72
09- Hard X-ray Imaging (E > 5000 eV)	10.35	8.50	9.56	5.21	12.15	8.50	11.17	6.01	12.15	8.50	11.37	6.06
09.1 Hard X-rays (5000 eV < E < 30000 eV)	10.05	8.50	9.26	5.21	11.50	8.50	10.52	6.01	11.50	8.50	10.72	6.06
09.2 High Energy X-rays (E > 30000 eV)	0.30	0.00	0.30	0.00	0.65	0.00	0.65	0.00	0.65	0.00	0.65	0.00
10- Soft X-ray Imaging (200 eV < E < 5000 eV)	3.78	5.40	3.02	3.63	4.73	4.95	4.35	3.69	5.23	4.95	5.05	3.79
10.1 Soft X-rays (200 eV < E < 2000 eV)	3.78	4.14	3.02	3.01	4.58	4.05	4.30	3.03	5.08	4.05	4.92	3.05
10.2 - Tender x-rays (2000 eV < E < 5000 eV)	0.00	1.26	0.00	0.62	0.15	0.90	0.05	0.66	0.15	0.90	0.13	0.74
11- IR Imaging	0.00	2.75	0.00	2.25	0.00	2.95	0.00	2.87	0.00	2.95	0.00	2.87
11.1 Nano-spectroscopy	0.00	2.75	0.00	2.25	0.00	2.95	0.00	2.87	0.00	2.95	0.00	2.87
TOTALS (ID, BM)	93.00	61.00	78.92	49.21	103.00	65.00	91.35	55.94	103.00	65.00	93.80	55.89
TOTAL	154.00	128.13	168.00	147.29	168.00	149.69						

THE SUMMARY FOR ALL FOUR BES SR SOURCES

Capacity	FY17	FY19	FY21
BES BM Beamlines	61	65	65
BES ID Beamlines	93	103	103
BES Total	154	168	168

Usage	FY17	FY19	FY21
BES BM Beamlines	49.2	55.9	55.9
BES ID Beamlines	78.9	91.3	93.8
BES Total	128.1	147.3	149.7

- Growth in capacity levels out in FY19 to 168 beamlines.
- All facilities except APS plan to bring addition BLs into operation by FY21.
- BES SR facilities will operate 168 beamlines by FY19 with about a 90% efficiency level.

LOOKING AT JUST ALS, NSLS-II, AND SSRL IN FY21

Beamline: Technique & Source	Capacity FY21 (ALS NSLS-II SSRL)	Usage FY21 (ALS NSLS-II SSRL)	Potential Increase (ALS NSLS-II SSRL)	APS Usage FY21
Spectroscopy ID	22.5	20.2	2.3	8.5
Spectroscopy BM	16.9	13.9	3.0	5.0
Scattering ID	24.0	21.2	2.8	27.5
Scattering BM	14.7	14.0	0.7	10.3
Imaging ID	9.5	8.5	1.0	7.9
Imaging BM	12.4	10.6	1.8	2.1
Total	100.0	88.4	11.6	61.3

- With full staffing/funding approximately 11.6 BL equivalents could be made available at ALS, NSLS-II, and SSRL in FY21.
- If APS goes dark at the end of FY21, approximately 61.3 BL equivalents will be turned off.
- Unfortunately, the potential increased capacity from ALS, NSLS-II, and SSRL do not map well onto the techniques that will turn off (see later slide).

SPECTROSCOPY

	BES Total (being used)		APS (being used)		% Loss (of used BLs)	
	Total BES ID Ops Count FY21	Total BES BM Ops Count FY21	APS ID Ops Count FY21	APS BM Ops Count FY21	% of IDs Lost During Dark Time	% of BMs Lost During Dark Time
Spectroscopy	28.76	18.87	8.55	5.00	30%	27%
01 - Low Energy Spectroscopy (E < 200 eV)	3.55	1.73				
01.1 IR Spectroscopy		0.93				
01.2 IR Ellipsometry		0.15				
01.3 Photoemission/ARPES	3.05	0.40				
01.4 UV/VUV Spectroscopy	0.50					
02 - Soft X-Ray Spectroscopy (200 eV < E < 5000 eV)	10.30	6.97	1.30	0.50	13%	7%
02.1 Soft X-rays (200 eV < E < 2000 eV)	8.84	4.14	1.20		14%	0%
02.1.2 XPS/ARPES	2.80	1.00	0.50		18%	
02.1.3 Dichroism	0.95	1.00	0.70		74%	
02.2 - Tender X-rays (2000 eV < E < 5000 eV)	1.46	2.83	0.10	0.50	7%	18%
02.2.1 XAS/NEXAFS	1.12	1.83	0.10	0.50	9%	27%
03 - Hard X-ray Spectroscopy (E > 5000 eV)	13.16	7.17	7.25	4.00	55%	56%
03.1 Hard X-ray Spectroscopy (E > 5000 eV)						
03.1.1 XAS/EXAFS	7.24	7.17	3.25	4.00	45%	56%
03.1.2 XES (0.5 eV < ΔE < 10 eV)	0.64		0.05		8%	
03.1.3 X-ray Dichroism	0.70		0.70		100%	
03.1.4 RIXS (10 meV < ΔE < 100 meV)	1.32		1.00		76%	
03.1.5 HERIX (1 meV < ΔE)	1.95		1.10		56%	
03.1.6 Mossbauer (ΔE < 1 micro-eV)	0.90		0.90		100%	
03.1.7 Raman (100 meV < ΔE < 1000 meV)	0.41		0.25		61%	
04 - Optics/Calibration/Metrology	1.75	3.00	0.00	0.50		17%
04.1 Optics		0.67		0.20		30%
04.2 Detector Calibration		0.77		0.10		13%
04.3 At-wavelength Metrology	1.75	1.56		0.20		13%

4-ID-D 46 users

3-ID 74 users

The red boxes on the right hand side indicate the APS BL where that work is performed and the user number (unique users for that BL in FY17). For fractional BLs, the number shown is the prorated value of total unique users.

IMAGING

		BES Total (being used)	
		Total BES ID Ops Count FY21	Total BES BM Ops Count FY21
Imaging		16.12	12.72
09- Hard X-ray Imaging (E > 5000 eV)		11.07	6.06
09.1 Hard X-rays (5000 eV < E < 30000 eV)		10.72	6.06
09.1.1 Micro/Nano-probe		5.86	2.75
09.1.1.1 Fluorescence Microscopy		3.80	1.10
09.1.1.2 Diffraction Microscopy		1.65	1.00
09.1.2 Full Field		2.92	3.31
09.1.2.1 TXM		1.87	
09.1.2.2 Topography			0.70
09.1.2.3 Micro-tomography			1.95
09.1.2.4 Fluorescence Tomography		0.30	
09.1.2.5 Radiography		0.75	0.66
09.1.3 Coherent Diffraction Imaging		1.94	
09.1.3.1 Coherent Diffraction Imaging		0.10	
09.1.3.2 BCDI		1.00	
09.1.3.3 Ptychography		0.67	
09.2 High Energy X-rays (E > 30000 eV)		0.35	0.00
09.2.1 Micro/Nanoprobe		0.30	
10- Soft X-ray Imaging (200 eV < E < 5000 eV)		5.05	3.79
10.1 Soft X-rays (200 eV < E < 2000 eV)		4.92	3.05
10.1.1 Micro/Nanoprobe		2.58	1.05
10.1.1.3 Photoemission Microscopy		1.58	
10.2 - Tender x-rays (2000 eV < E < 5000 eV)		0.13	0.74
11- IR Imaging		0.00	2.87
11.1 Nano-spectroscopy		0.00	2.87

		APS (being used)	
		APS ID Ops Count FY21	APS BM Ops Count FY21
		7.60	2.10
		7.40	2.10
		7.10	2.10
		4.15	0.10
		2.50	0.10
		1.65	
		1.35	2.00
		0.30	
			0.70
			0.80
		0.30	
		0.75	0.50
		1.60	
		0.10	
		1.00	
		0.50	
		0.30	
		0.30	
		0.20	
		0.20	
		0.20	

		% Loss (of used BLs)	
		% of IDs Lost During Dark Time	% of BMs Lost During Dark Time
		47%	17%
		67%	35%
		66%	35%
		71%	4%
		66%	9%
		100%	
		46%	
		16%	
			100%
			41%
		100%	
		100%	76%
		82%	
		100%	
		100%	
		75%	
		86%	
		100%	
		4%	
		4%	
		8%	
		13%	

- 34-ID-D 68 users
- 1-BM Few users
- Small community
- 32-ID 128 users
- Small community
- 34-ID-C 76 users
- 1-ID 41 users

SCATTERING

	BES Total (being used)		APS (being used)		% Loss (of used BLs)	
	Total BES ID Ops Count FY21	Total BES BM Ops Count FY21	APS ID Ops Count FY21	APS BM Ops Count FY21	% of IDs Lost During Dark Time	% of BMs Lost During Dark Time
Scattering/Diffraction	48.92	24.31	27.45	10.34	56%	43%
05 X-ray Diffraction (ordered systems)	13.18	10.97	9.45	7.90	72%	72%
05.1 Hard X-rays (5000 eV < E < 30000 eV)	10.24	6.77	7.70	3.70	75%	55%
05.1.1 General Diffraction	2.61	2.80	1.65	1.40	63%	50%
05.1.2 X-Ray Powder Diffraction	0.10	1.30	0.10	1.10	100%	85%
05.1.2.1 Monochromatic Powder	0.10	1.30	0.10	1.10	100%	85%
05.1.3 Micro-Beam Diffraction	5.70	2.47	4.90	1.20	86%	49%
05.1.3.1 High Pressure	2.25	1.80	2.25	0.80	100%	44%
05.1.3.2 High Mag Field	0.44	0.00	0.30		69%	
05.1.3.3 Surface/Interface	2.19	0.67	1.85	0.40	84%	60%
05.1.3.4 Shock Physics/HED	0.50		0.50		100%	
05.1.5 Resonant/Magnetic Scattering	1.43		1.05		73%	
05.2 High Energy X-rays (E > 30000 eV)	2.94	4.20	1.75	4.20	60%	100%
05.2.1 General Diffraction	0.50		0.50	0.00	100%	
05.2.2 X-Ray Powder Diffraction	0.65	1.50		1.50		100%
05.2.2.1 Monochromatic Powder	0.65	1.00		1.00		100%
05.2.2.2 Energy Dispersive		0.50		0.50		100%
05.2.3 Micro-Beam Diffraction	1.33	2.70	1.25	2.70	94%	100%
05.2.3.1 High Pressure	0.93	2.70	0.85	2.70	91%	100%
05.2.3.3 Surface/Interface	0.40		0.40		100%	
06 MX, footprinting (ordered systems)	18.50	8.54	8.60	1.64	46%	19%
06.1 Macromolecular Crystallography (ordered systems)	18.50	7.94	8.60	1.64	46%	21%
06.1.1 MX (beam > 20 microns)	4.92	7.94	0.32	1.64	7%	21%
06.1.2 MX (beam < 20 microns)	11.78		8.18		69%	
06.1.4 Serial Crystallography	0.10		0.10		100%	
07 Hard X-ray Scattering (E > 5000 eV)	14.55	4.05	9.00	0.80	62%	20%
07.1 Hard X-rays (5000 eV < E < 30000 eV)	10.98	4.05	6.50	0.80	59%	20%
07.1.1 SAXS/WAXS/GISAXS/solution	7.94	3.20	4.65	0.35	59%	11%
07.1.1.1 SAXS	3.90	1.12	3.35	0.35	86%	31%
07.1.1.3 GISAXS	1.19	0.82	0.80		67%	
07.1.1.5 USAXS	0.50		0.50		100%	
07.1.2 XPCS	2.15		1.20		56%	
07.1.3 Liquid Surface Scattering	0.84		0.60		72%	
07.1.5 Reflectivity	0.05	0.85	0.05	0.45	100%	53%
07.2 High Energy X-rays (E > 30000 eV)	3.57	0.00	2.50	0.00	70%	
07.2.1 SAXS/WAXS/GISAXS/solution	0.94		0.80		85%	
07.2.1.2 WAXS	0.80		0.80		100%	
07.2.4 PDF/Diffuse	2.64		1.70		65%	
08 Soft X-Ray Scattering (200 eV < E < 5000 eV)	2.69	0.75	0.60		22%	
08.1 Soft X-rays (200 eV < E < 2000 eV)	2.69	0.25	0.60		22%	
08.1.3 Reflectivity	0.79	0.25	0.60		76%	
08.2 - Tender X-rays (2000 eV < E < 5000 eV)		0.50	0.00			

- ID small community but 11-BM has 296 users
- 16-ID - 239 users (2 BLs)
- 35-ID - starting GU program
- 6-ID-D 43 users
- 17-BM 95 users
- 6-BM 40 users
- 16-BM-B 67 users
16-BM-D 154 users
13-BM 140 users
- 1-ID 55 users
- Small community
- 9-ID 70 users
- Small community
- 1-ID 41 users
11-ID-C 79 users

POTENTIAL BL INCREASE

Spectroscopy	
01 - Low Energy Spectroscopy (E < 200 eV)	
01.1 IR Spectroscopy	
01.2 IR Ellipsometry	
01.3 Photoemission/ARPES	
01.4 UV/VUV Spectroscopy	
02 - Soft X-Ray Spectroscopy (200 eV < E < 5000 eV)	
02.1 Soft X-rays (200 eV < E < 2000 eV)	
02.2 - Tender X-rays (2000 eV < E < 5000 eV)	
03 - Hard X-ray Spectroscopy (E > 5000 eV)	
03.1 Hard X-ray Spectroscopy (E > 5000 eV)	
04 - Optics/Calibration/Metrology	
04.1 Optics	
04.2 Detector Calibration	
04.3 At-wavelength Metrology	
04.4 In-Situ (At-Wavelength) Figuring	
Scattering/Diffraction	
05 X-ray Diffraction (ordered systems)	
05.1 Hard X-rays (5000 eV < E < 30000 eV)	
05.2 High Energy X-rays (E > 30000 eV)	
06 MX, footprinting (ordered systems)	
06.1 Macromolecular Crystallography (ordered systems)	
06.2 X-ray footprinting (non-ordered systems)	
07 Hard X-ray Scattering (E > 5000 eV)	
07.1 Hard X-rays (5000 eV < E < 30000 eV)	
07.2 High Energy X-rays (E > 30000 eV)	
08 Soft X-Ray Scattering (200 eV < E < 5000 eV)	
08.1 Soft X-rays (200 eV < E < 2000 eV)	
08.2 - Tender X-rays (2000 eV < E < 5000 eV)	
Imaging	
09- Hard X-ray Imaging (E > 5000 eV)	
09.1 Hard X-rays (5000 eV < E < 30000 eV)	
09.2 High Energy X-rays (E > 30000 eV)	
10- Soft X-ray Imaging (200 eV < E < 5000 eV)	
10.1 Soft X-rays (200 eV < E < 2000 eV)	
10.2 - Tender x-rays (2000 eV < E < 5000 eV)	
11- IR Imaging	
11.1 Nano-spectroscopy	
TOTALS (ID, BM)	
TOTAL	

ALS + NSLS II + SSRL for FY21			
Total ID BL Count FY21 (capacity)	Total BM BL Count FY21 (capacity)	Total ID Ops Count FY21 (being used)	Total BM Ops Count FY21 (being used)
22.53	16.85	20.21	13.87
3.75	2.55	3.55	1.73
	1.55		0.93
	0.25		0.15
3.25	0.50	3.05	0.40
0.50		0.50	
9.83	6.80	9.00	6.47
8.18	4.38	7.64	4.14
1.65	2.43	1.36	2.33
7.20	3.50	5.91	3.17
1.75	4.00	1.75	2.50
	0.55		0.47
	1.00		0.67
1.75	2.45	1.75	1.36
23.98	14.75	21.17	13.97
4.60	3.30	3.73	3.07
3.30	3.30	2.54	3.07
1.30		1.19	
11.00	7.20	9.90	6.90
11.00	6.50	9.90	6.30
0.00	0.70	0.00	0.60
5.95	3.50	5.25	3.25
5.10	3.50	4.48	3.25
0.85		0.77	
2.43	0.75	2.09	0.75
2.43	0.25	2.09	0.25
	0.50		0.50
9.48	12.40	8.52	10.62
4.45	4.50	3.67	3.96
4.40	4.50	3.62	3.96
0.05		0.05	
5.03	4.95	4.85	3.79
4.88	4.05	4.72	3.05
0.15	0.90	0.13	0.74
	2.95		2.87
	2.95		2.87
56.00	44.00	49.90	38.45
100.00		88.35	

Potential Increase	
ID BLs (capacity - being used)	BM BLs (capacity - being used)
2.32	2.99
0.20	0.82
	0.62
	0.10
0.20	0.10
0.83	0.34
0.55	0.24
0.29	0.10
1.29	0.33
	1.50
	0.08
	0.33
	1.09
2.81	0.78
0.87	0.23
0.76	0.23
0.11	
1.10	0.30
1.10	0.20
	0.10
0.70	0.25
0.62	0.25
0.08	
0.35	
0.35	
0.96	1.79
0.78	0.54
0.78	0.54
0.18	1.17
0.16	1.01
0.02	0.16
	0.08
	0.08
6.10	5.55
11.65	

APS for FY21	
APS ID Ops Count FY21 (being used)	APS BM Ops Count FY21 (being used)
8.55	5.00
1.30	0.50
1.20	
0.10	0.50
7.25	4.00
	0.50
	0.20
	0.10
	0.20
27.45	10.34
9.45	7.90
7.70	3.70
1.75	4.20
8.60	1.64
8.60	1.64
9.00	0.80
6.50	0.80
2.50	
0.60	
0.60	
7.90	2.10
7.70	2.10
7.10	2.10
0.60	
0.20	
0.20	
43.90	17.44
61.34	

There is a potential 11.6 BL increase (6.1 IDs and 5.5 BMs).

Considering the overlap with APS techniques, the potential reduces to 9.1 (5.9 IDs and 3.2 BMs).

PROTEIN CRYSTALLOGRAPHY

	Capacity BM FY21	Usage BM FY21	Potential Increase BM	Capacity ID FY21	Usage ID FY21	Potential Increase ID
ALS	5.5	5.5	0	4.0	4.0	0
NSLS-II	0	0	0	3.0	2.7	0.3
SSRL	1.0	0.8	0.2	4.0	3.2	0.8
Total	6.5	6.3	0.2	11.0	9.9	1.1
APS		1.64			8.6	

- If APS goes dark at the end of FY21, approximately 1.64 BM BL equivalents and 8.6 ID BL equivalents will be turned off.
- With full staffing/funding approximately 0.2 BM BL equivalents and 1.1 ID BL equivalents could be made available at NSLS-II, and SSRL in FY21.

SUMMARY

- When APS shuts down, 68 beamlines (47 IDs and 21 BMs) will go off line – that’s about 40% of the BLs at the suite of BES storage rings
 - Operationally equivalent to 61.3 BLs (43.9 IDs and 17.4 BMs) when actual usage considered
- With full staffing/funding approximately 11.6 BL equivalents could be made available at ALS, NSLS-II, and SSRL in FY21/FY22.
 - However, not a perfect mapping onto what techniques will be lost at the APS. Seems like about 9 BL equivalents map onto the APS techniques
- Spectroscopy
 - Overall about 50% of the hard x-ray spectroscopy capability will be lost during the dark period
 - 100% of hard x-ray dichroism (46 users) and Mossbauer spectroscopy (74 users) capabilities will be lost
- Scattering
 - Hard x-ray powder diffraction community will take a big hit as the APS mail-in on 11-BM supports a large community (almost 400 unique users in FY17 on 11-BM and 17-BM)
 - USAXS (70 users) and high energy WAXS (120 users) capabilities will go away
- Imaging
 - CDI and BCDI will take a big hit as will the hard energy imaging programs such as radiography
 - Diffraction microscopy capabilities in both hard (68 users) and high-energy (41 users) will be lost

Note: Some hard/high-energy capabilities that do not require coherence (diff micro, WAXS. Etc.) will be available at CHESS, but capacity is unknown and access may depend on the new operations model CHESS is developing.

QUESTIONS

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