wwPDB EM Validation Summary Report

Jan 22, 2026 – 02:28 PM EST

PDB ID	:	9MFW / pdb_00009mfw
EMDB ID	:	EMD-48240
Title	:	Motor domain with ADP AAA1 and ADP AAA3 from yeast full-length dynein-1 in 0.1 mM ATP condition
Authors	:	Geohring, I.C.; Chai, P.; Iyer, B.R.
Deposited on	:	2024-12-10
Resolution	:	4.10 Å(reported)

This is a wwPDB EM Validation Summary Report for a publicly released PDB entry.

We welcome your comments at *validation@mail.wwpdb.org*
A user guide is available at
https://www.wwpdb.org/validation/2017/EMValidationReportHelp
with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references ⓘ) were used in the production of this report:

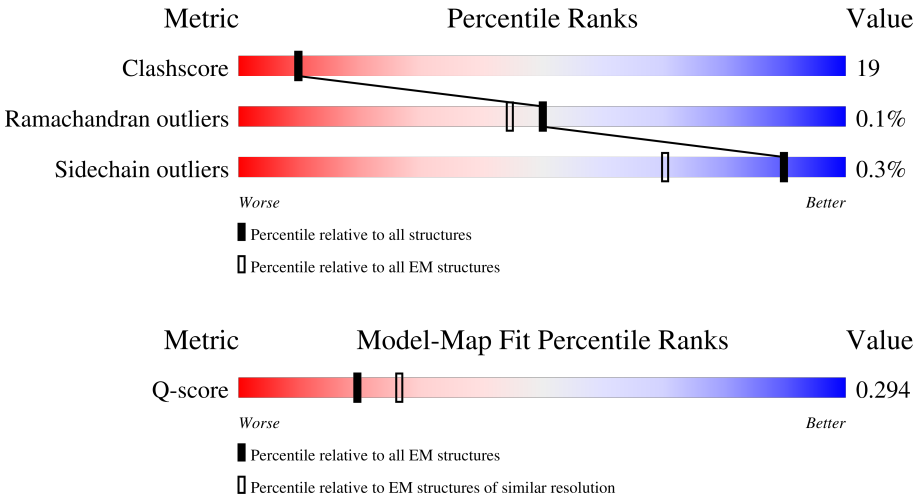
EMDB validation analysis	:	0.0.1.dev129
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.47

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 4.10 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	210492	15764	-
Ramachandran outliers	207382	16835	-
Sidechain outliers	206894	16415	-
Q-score	-	25397	6458 (3.60 - 4.60)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the bar indicate the fraction of residues that contain outliers for >=3, 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	4092	12% 39% 24% 37%

2 Entry composition

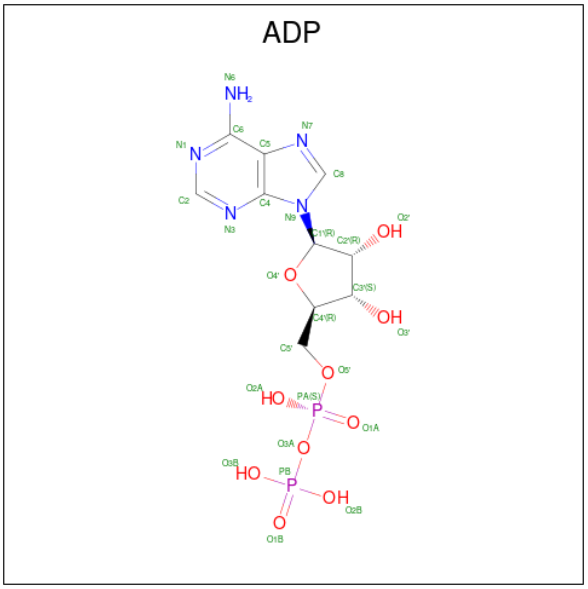
There are 3 unique types of molecules in this entry. The entry contains 21037 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called Dynein heavy chain, cytoplasmic.

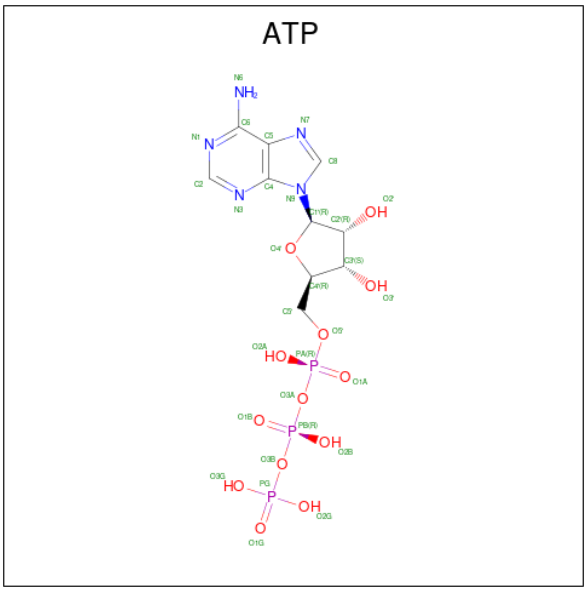
Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	2583	20925	13431	3476	3920	98	0	0

- Molecule 2 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: $C_{10}H_{15}N_5O_{10}P_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					AltConf
			Total	C	N	O	P	
2	A	1	27	10	5	10	2	0
			Total	C	N	O	P	
2	A	1	27	10	5	10	2	0
			Total	C	N	O	P	
2	A	1	27	10	5	10	2	0

- Molecule 3 is ADENOSINE-5'-TRIPHOSPHATE (CCD ID: ATP) (formula: $C_{10}H_{16}N_5O_{13}P_3$) (labeled as "Ligand of Interest" by depositor).



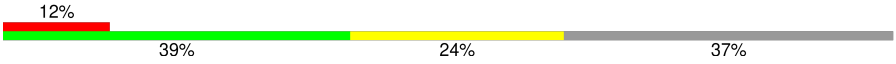
Mol	Chain	Residues	Atoms					AltConf
3	A	1	Total	C	N	O	P	0
			31	10	5	13	3	

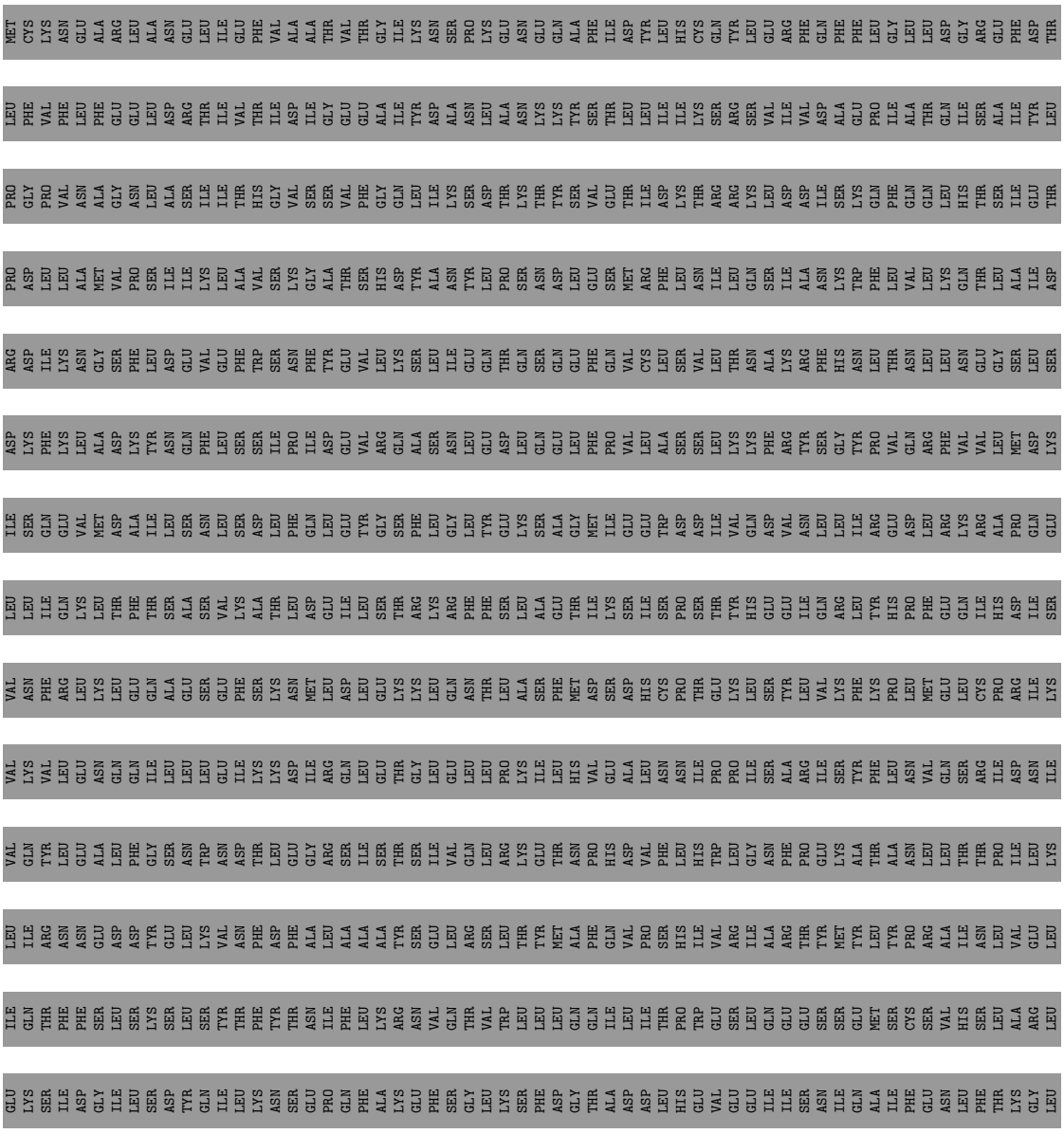
3 Residue-property plots (i)

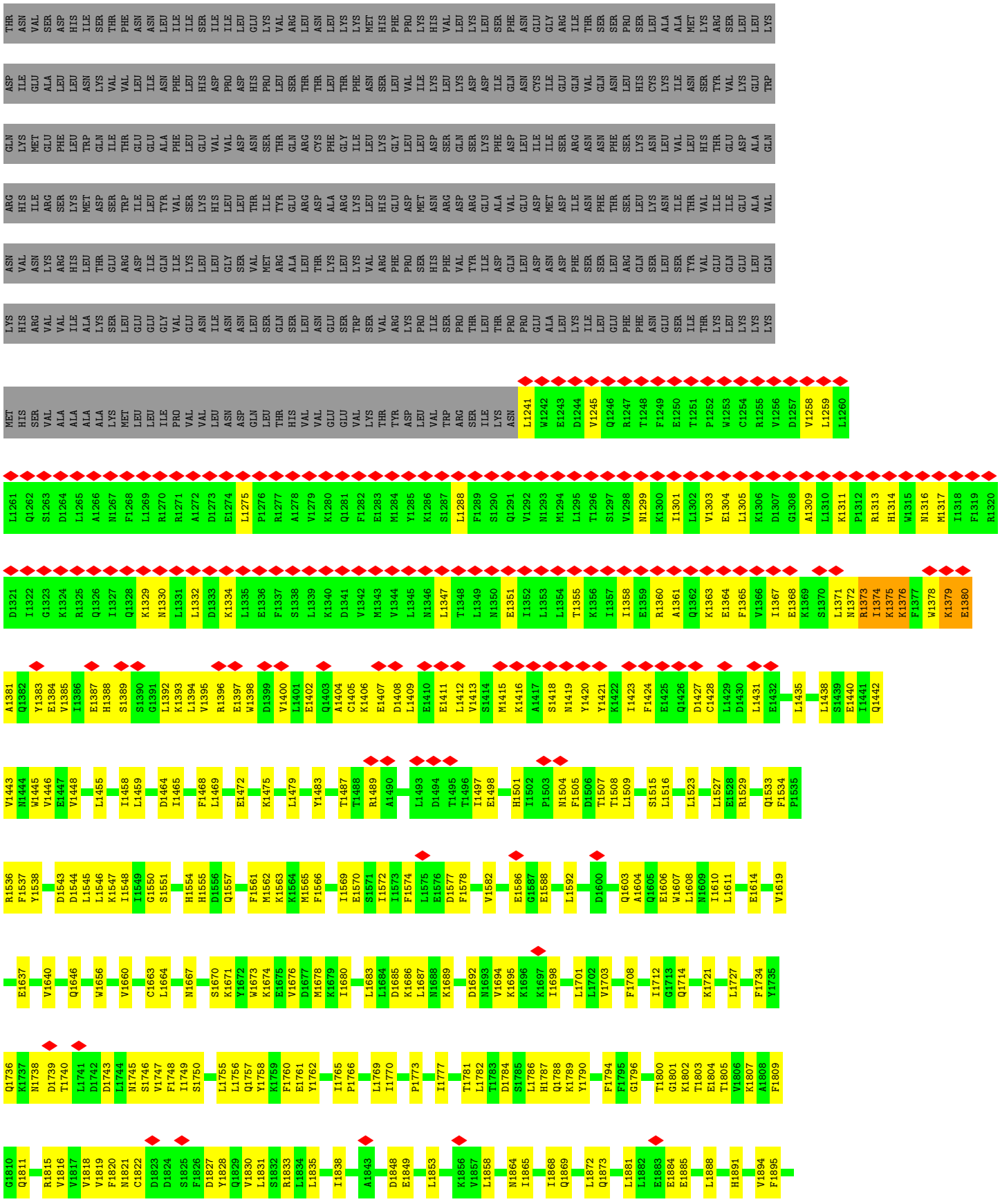
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion in map density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

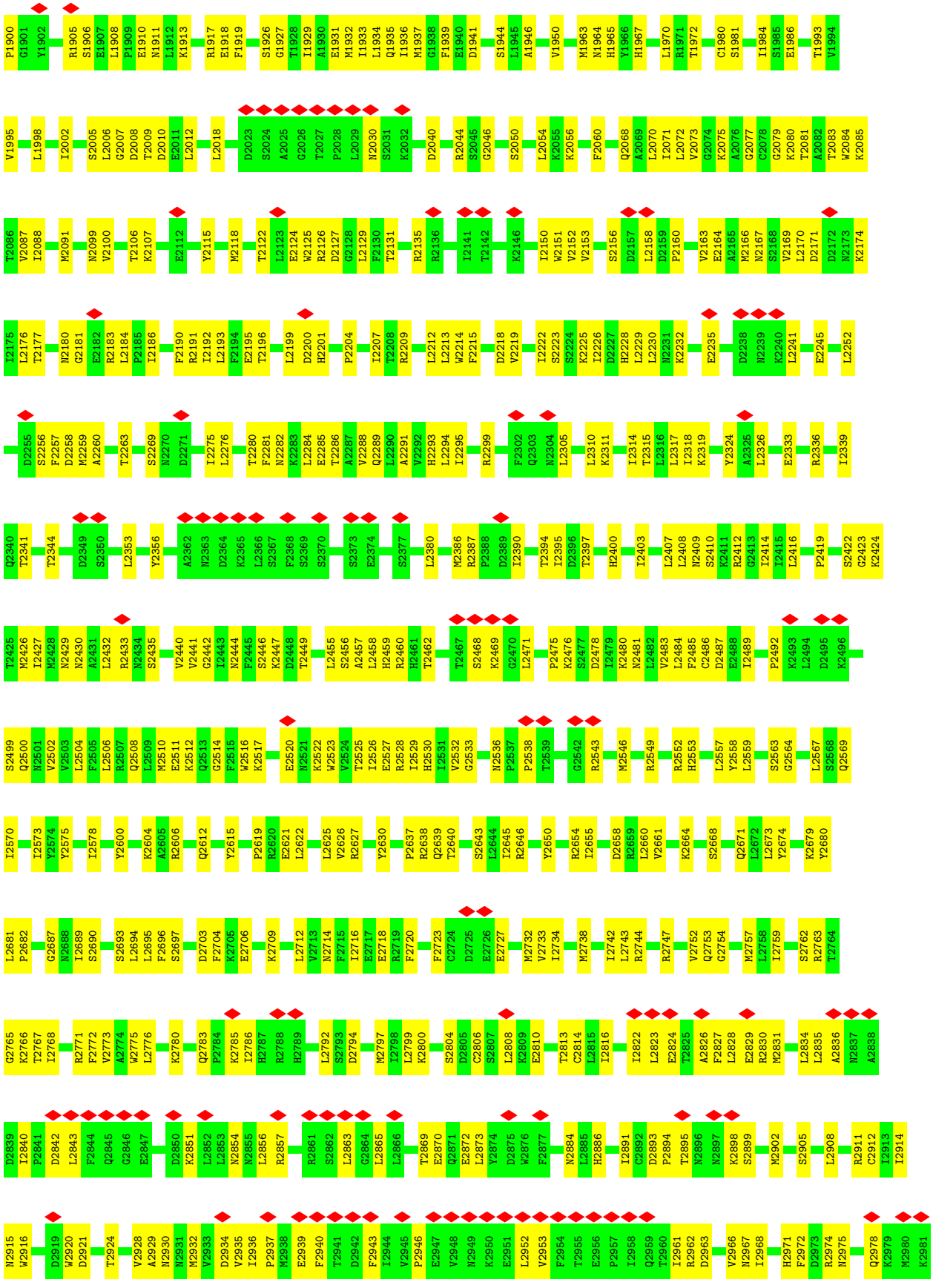
- Molecule 1: Dynein heavy chain, cytoplasmic

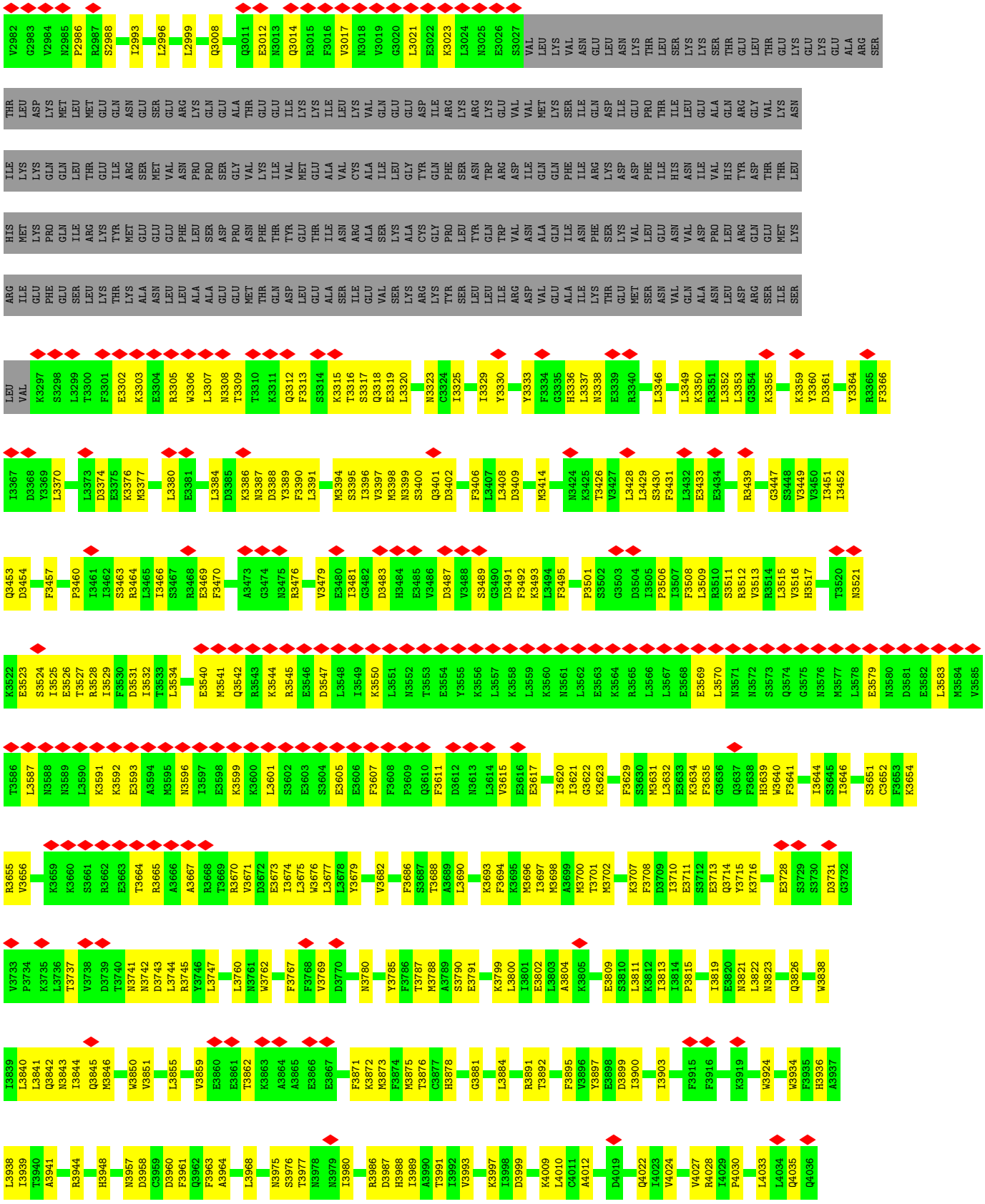
Chain A:








P1900 G1901 Y1902 R1905 S1906 E1907 L1908 P1909 E1910 N1911 L1912 K1913 R1917 E1918 F1919 S1926 G1927 T1928 I1929 A1930 E1931 M1932 I1933 L1934 Q1935 I1936 M1937 G1938 F1939 E1940 D1941 S1944 L1945 A1946 V1950 M1963 N1964 H1965 Y1966 H1967 L1970 R1971 T1972 C1980 S1981 I1984 S1985 E1986 T1993 V1994
V1995 L1998 I2002 S2005 L2006 G2007 D2008 T2009 D2010 E2011 L2012 L2018 D2023 S2024 A2025 G2026 T2027 P2028 L2029 N2030 S2031 K2032 D2040 R2044 S2045 G2046 S2050 L2054 K2055 K2056 F2060 Q2068 A2069 L2070 I2071 L2072 V2073 G2074 K2075 A2076 G2077 G2078 G2079 K2080 T2081 A2082 T2083 W2084 K2085
T2086 V2087 I2088 M2091 N2099 V2100 T2106 K2107 E2112 Y2115 M2118 T2122 L2123 E2124 W2125 R2126 D2127 G2128 L2129 F2130 T2131 R2135 R2136 I2141 T2142 K2146 I2150 W2151 V2152 V2153 S2156 D2157 L2158 D2159 P2160 V2163 E2164 A2165 M2166 N2167 S2168 V2169 L2170 D2171 D2172 N2173 K2174
I2175 L2176 T2177 N2180 G2181 E2182 R2183 L2184 P2185 I2186 F2190 R2191 I2192 L2193 F2194 E2195 T2196 L2199 D2200 H2201 P2204 I2207 T2208 R2209 L2212 L2213 W2214 F2215 D2218 V2219 I2222 S2223 S2224 K2225 I2226 D2227 H2228 L2229 L2230 N2231 K2232 E2235 D2238 N2239 K2240 L2241 E2245 L2252
D2255 S2256 F2257 D2258 M2259 A2260 T2263 S2269 N2270 D2271 I2275 L2276 T2280 F2281 N2282 K2283 L2284 E2285 T2286 A2287 V2288 Q2289 L2290 A2291 V2292 H2293 L2294 I2295 R2299 F2302 Q2303 N2304 L2305 L2310 K2311 I2314 T2315 L2316 L2317 I2318 K2319 Y2324 A2325 L2326 E2333 R2336 I2339
Q2340 T2341 T2344 D2349 S2350 L2353 Y2356 A2362 N2363 D2364 K2365 L2366 S2367 P2368 S2369 S2370 S2373 E2374 S2377 L2380 M2386 R2387 P2388 D2389 I2390 T2394 I2395 D2396 T2397 H2400 I2403 L2407 L2408 N2409 S2410 K2411 R2412 G2413 I2414 I2415 L2416 P2419 S2422 G2423 K2424
T2425 M2426 I2427 M2428 N2429 N2430 A2431 L2432 R2433 M2434 S2435 V2440 V2441 G2442 I2443 N2444 F2445 S2446 K2447 D2448 T2449 L2455 S2456 A2457 L2458 H2459 R2460 H2461 T2462 T2467 S2468 K2469 G2470 L2471 P2475 K2476 S2477 D2478 I2479 K2480 N2481 L2482 V2483 L2484 F2485 C2486 D2487 E2488 I2489 P2492 K2493 L2494 D2495 K2496
S2499 Q2500 N2501 V2502 V2503 L2504 F2505 L2506 R2507 Q2508 L2509 M2510 E2511 K2512 Q2513 G2514 F2515 W2516 K2517 E2520 N2521 K2522 W2523 V2524 T2525 I2526 E2527 R2528 I2529 H2530 T2531 V2532 G2533 N2536 P2537 P2538 T2539 G2542 R2543 M2546 R2549 R2552 H2553 L2557 Y2558 L2559 S2563 G2564 L2567 S2568 Q2569
I2570 I2573 Y2574 Y2575 I2578 Y2600 K2604 A2605 R2606 Q2612 Y2615 P2619 R2620 E2621 L2622 L2625 V2626 R2627 Y2630 P2637 R2638 Q2639 T2640 S2643 L2644 I2645 R2646 Y2650 R2654 I2655 D2658 R2659 L2660 V2661 K2664 S2668 Q2671 L2672 L2673 Y2674 K2679 Y2680
L2681 P2682 G2687 N2688 I2689 S2690 S2693 L2694 L2695 F2696 S2697 D2703 F2704 K2705 E2706 K2709 L2712 V2713 N2714 F2715 I2716 E2717 E2718 R2719 F2720 F2723 C2724 D2725 E2726 E2727 M2732 V2733 I2734 M2738 I2742 L2743 R2744 R2747 V2752 Q2753 G2754 M2757 L2758 I2759 S2762 R2763 T2764
G2765 K2766 T2767 I2768 R2771 F2772 V2773 A2774 W2775 L2776 K2780 Q2783 P2784 K2785 I2786 H2787 R2788 H2789 L2792 S2793 D2794 M2797 I2798 L2799 K2800 S2804 D2805 C2806 S2807 L2808 K2809 E2810 T2813 C2814 L2815 I2816 I2822 L2823 E2824 T2825 A2826 F2827 L2828 E2829 R2830 M2831 L2834 L2835 A2836 N2837 A2838
D2839 I2840 P2841 D2842 L2843 F2844 Q2845 Q2846 E2847 D2850 K2851 L2852 L2853 N2854 N2855 L2856 R2857 R2861 S2862 L2863 G2864 L2865 L2866 T2869 E2870 Q2871 E2872 L2873 Y2874 D2875 W2876 F2877 N2884 L2885 H2886 I2891 C2892 D2893 P2894 T2895 N2896 N2897 K2898 S2899 M2902 S2905 L2908 R2911 C2912 I2913 I2914
N2915 W2916 D2919 W2920 D2921 T2924 V2928 A2929 N2930 N2931 M2932 V2933 D2934 V2935 I2936 P2937 M2938 E2939 F2940 T2941 D2942 F2943 I2944 V2945 P2946 E2947 V2948 N2949 K2950 E2951 L2952 V2953 F2954 T2955 E2956 P2957 I2958 Q2959 T2960 I2961 R2962 D2963 V2966 N2967 I2968 H2971 F2972 D2973 R2974 N2975 Q2978 K2979 M2980 K2981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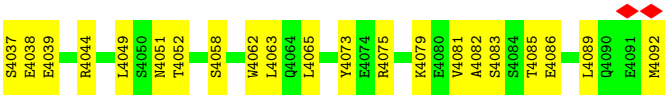
THR LEU ASP LYS MET LEU MET GLU GLN ASN GLU SER GLU ARG LYS GLN GLU ALA THR GLU GLU ILE LYS LYS ILE LEU LYS VAL GLN GLU GLU ASP ILE ARG LYS ARG LYS GLU VAL VAL MET LYS SER ILE GLN ASP ILE GLU PRO THR ILE LEU GLU GLU ALA GLN ARG GLY VAL LYS ASN
ILE LYS LYS GLN LEU THR GLU ILE ARG SER MET VAL ASN PRO PRO SER GLY VAL LYS ILE VAL MET GLU ALA VAL CYS ALA ILE SER LEU GLY TYR GLN PHE SER ASN TRP ASP ARG ASP ILE GLN GLN PHE ILE ARG LYS ASP ASP PHE ILE HIS ASN ILE VAL HIS TYR ASP THR THR LEU
HIS MET LYS PRO GLN ILE ARG LYS TYR MET GLU GLU GLU PHE LEU SER ASP PRO ASN PHE THR TYR GLU THR ILE ASN ARG ALA SER LYS ALA CYS GLY PRO LEU TYR GLN TRP ARG VAL ASN ALA GLN ILE ASN PHE SER LYS VAL LEU GLU GLN ARG GLN GLU MET LYS
ARG ILE GLU PHE GLU SER LEU LYS THR LYS ALA ASN LEU LEU ALA ALA GLU GLU MET THR GLN ASP LEU GLU ALA SER ILE GLU VAL SER LYS ARG LYS TYR SER LEU LEU ILE ARG ASP VAL GLU ALA ILE SER LYS THR GLU MET SER ASN VAL GLN ALA ASN LEU ASP ARG SER ILE SER
LEU VAL K3297 S3298 L3299 T3300 F3301 E3302 K3303 E3304 R3305 W3306 L3307 N3308 T3309 T3310 K3311 Q3312 F3313 S3314 K3315 T3316 S3317 Q3318 E3319 L3320 N3323 G3324 I3325 I3329 Y3330 Y3333 F3334 G3335 H3336 L3337 N3338 E3339 R3340 L3346 L3349 K3350 R3351 L3352 L3353 G3354 K3355 K3359 Y3360 D3361 Y3364 R3366 F3366
I3367 D3368 Y3369 L3370 L3373 D3374 E3375 K3376 M3377 L3380 E3381 L3384 D3385 K3386 N3387 D3388 Y3389 F3390 L3391 M3394 S3395 I3396 V3397 M3398 N3399 S3400 Q3401 D3402 F3406 L3407 L3408 D3409 M3414 N3424 K3425 T3426 V3427 L3428 L3429 S3430 F3431 L3432 E3433 E3434 R3439 G3447 S3448 V3449 V3450 I3451 I3452
Q3453 D3454 F3457 P3460 I3461 I3462 S3463 R3464 L3465 I3466 S3467 R3468 E3469 F3470 A3473 G3474 N3475 R3476 V3479 E3480 I3481 G3482 D3483 H3484 E3485 V3486 D3487 V3488 S3489 G3490 D3491 F3492 K3493 L3494 F3495 P3501 S3502 G3503 D3504 I3505 P3506 I3507 F3508 L3509 R3510 S3511 R3512 V3513 R3514 L3515 V3516 H3517 T3520 N3521
K3522 E3523 S3524 I3525 E3526 T3527 R3528 I3529 P3530 D3531 I3532 T3533 L3534 E3540 M3541 Q3542 R3543 K3544 R3545 E3546 D3547 L3548 I3549 K3550 L3551 N3552 T3553 E3554 Y3555 K3556 L3557 K3558 L3559 K3560 N3561 L3562 E3563 K3564 R3565 L3566 L3567 E3568 E3569 L3570 N3571 N3572 S3573 Q3574 G3575 N3576 M3577 L3578 E3579 N3580 D3581 E3582 L3583 M3584 V3585
T3586 L3587 N3588 N3589 L3590 K3591 K3592 E3593 A3594 M3595 N3596 I3597 E3598 K3599 K3600 L3601 S3602 E3603 S3604 E3605 E3606 F3607 F3608 P3609 Q3610 F3611 D3612 N3613 L3614 V3615 E3616 E3617 I3620 I3621 G3622 K3623 F3629 S3630 M3631 L3632 E3633 K3634 F3635 G3636 Q3637 F3638 H3639 W3640 F3641 I3644 S3645 I3646 S3651 C3652 F3653 K3654
R3655 V3656 K3659 K3660 S3661 R3662 E3663 T3664 R3665 A3666 A3667 R3668 T3669 R3670 V3671 D3672 E3673 I3674 L3675 W3676 L3677 L3678 Y3679 V3682 F3686 S3687 T3688 A3689 L3690 K3693 F3694 K3695 M3696 I3697 M3698 A3699 M3700 T3701 M3702 K3707 F3708 D3709 I3710 E3711 S3712 E3713 Q3714 Y3715 K3716 E3728 S3729 S3730 D3731 G3732
V3733 P3734 K3735 L3736 T3737 V3738 D3739 T3740 N3741 N3742 D3743 L3744 R3745 Y3746 L3747 L3760 N3761 W3762 F3767 F3768 V3769 D3770 N3780 Y3785 F3786 T3787 M3788 A3789 S3790 E3791 K3799 L3800 I3801 E3802 L3803 A3804 K3805 E3809 S3810 L3811 K3812 I3813 I3814 P3815 I3819 E3820 N3821 L3822 N3823 Q3826 W3838
I3839 L3840 L3841 Q3842 N3843 I3844 Q3845 M3846 W3850 V3851 L3855 V3859 E3860 E3861 T3862 K3863 A3864 A3865 E3866 E3867 F3871 K3872 M3873 F3874 M3875 T3876 C3877 H3878 G3881 L3884 R3891 T3892 F3895 V3896 Y3897 E3898 D3899 I3900 I3903 F3915 F3916 K3919 W3924 W3934 F3935 H3936 A3937
L3938 I3939 T3940 A3941 R3944 H3948 N3957 D3958 C3959 D3960 F3961 Q3962 F3963 A3964 L3968 N3975 S3976 T3977 N3978 N3979 I3980 R3986 D3987 H3988 I3989 A3990 T3991 I3992 V3993 K3997 I3998 D3999 K4009 L4010 C4011 A4012 D4019 Q4022 I4023 V4024 V4027 R4028 I4029 P4030 L4033 L4034 Q4035 Q4036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L4049
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R4075
K4079
E4080
V4081
A4082
S4083
S4084
T4085
E4086
L4089
Q4090
E4091
M4092

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	53499	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS GLACIOS	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/Å^2$)	40	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	45000	Depositor
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	0.881	Depositor
Minimum map value	-0.306	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.029	Depositor
Recommended contour level	0.2	Depositor
Map size (Å)	333.312, 333.312, 333.312	wwPDB
Map dimensions	256, 256, 256	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.302, 1.302, 1.302	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: ATP, ADP

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	#$\|Z\|$ >5	RMSZ	#$\|Z\|$ >5
1	A	0.18	0/21346	0.37	0/28844

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	1373	ARG	Sidechain

5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	20925	0	21047	810	0
2	A	81	0	36	9	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	31	0	12	5	0
All	All	21037	0	21095	810	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 19.

The worst 5 of 810 close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1364:GLU:CG	1:A:1420:TYR:CD2	1.83	1.62
1:A:1364:GLU:CD	1:A:1420:TYR:C	1.84	1.46
1:A:1364:GLU:HG3	1:A:1420:TYR:CD2	1.41	1.42
1:A:1364:GLU:CD	1:A:1420:TYR:O	1.66	1.39
1:A:1364:GLU:CG	1:A:1420:TYR:O	1.69	1.38

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	A	2579/4092 (63%)	2453 (95%)	124 (5%)	2 (0%)	48 82

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	2499	SER
1	A	3525	ILE

5.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all PDB entries followed by that with respect to all EM entries.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	2358/3759 (63%)	2352 (100%)	6 (0%)	91 92

5 of 6 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1376	LYS
1	A	1379	LYS
1	A	1380	GLU
1	A	1374	ILE
1	A	1372	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 27 such sidechains are listed below:

Mol	Chain	Res	Type
1	A	2513	GLN
1	A	2741	HIS
1	A	3984	GLN
1	A	2671	GLN
1	A	2832	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

4 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
2	ADP	A	4103	-	24,29,29	0.86	0	29,45,45	1.18	2 (6%)
2	ADP	A	4104	-	24,29,29	0.90	0	29,45,45	1.27	3 (10%)
2	ADP	A	4101	-	24,29,29	0.84	0	29,45,45	1.19	2 (6%)
3	ATP	A	4102	-	28,33,33	0.75	0	34,52,52	0.60	1 (2%)

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	ADP	A	4103	-	-	7/12/32/32	0/3/3/3
2	ADP	A	4104	-	-	1/12/32/32	0/3/3/3
2	ADP	A	4101	-	-	7/12/32/32	0/3/3/3
3	ATP	A	4102	-	-	9/18/38/38	0/3/3/3

There are no bond length outliers.

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	4101	ADP	N3-C2-N1	-3.64	123.73	128.67
2	A	4104	ADP	N3-C2-N1	-3.62	123.75	128.67
2	A	4103	ADP	N3-C2-N1	-3.57	123.83	128.67
2	A	4104	ADP	C4-C5-N7	-2.74	106.44	109.34
2	A	4103	ADP	C4-C5-N7	-2.55	106.64	109.34

There are no chirality outliers.

5 of 24 torsion outliers are listed below:

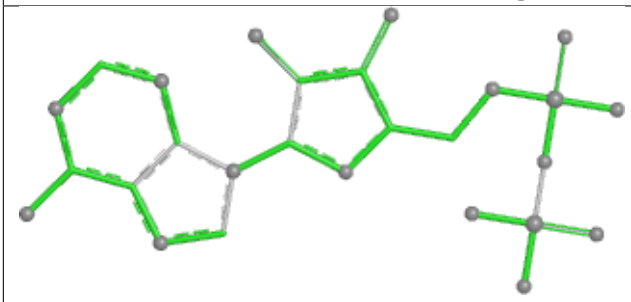
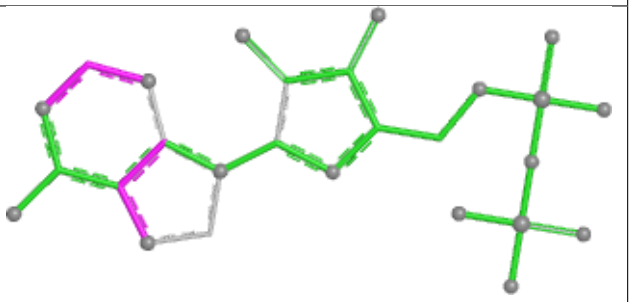
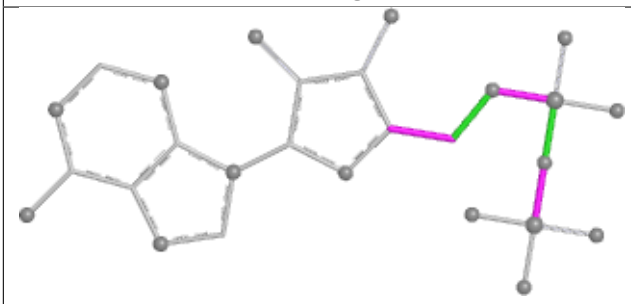
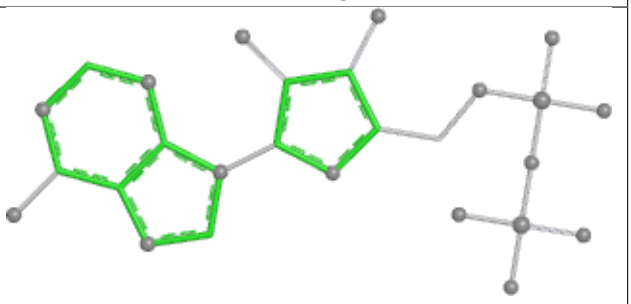
Mol	Chain	Res	Type	Atoms
2	A	4101	ADP	PA-O3A-PB-O2B
2	A	4101	ADP	PA-O3A-PB-O3B
2	A	4101	ADP	C5'-O5'-PA-O1A
2	A	4101	ADP	C5'-O5'-PA-O3A
2	A	4103	ADP	PA-O3A-PB-O2B

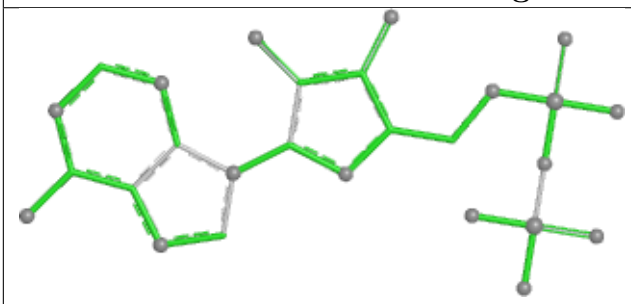
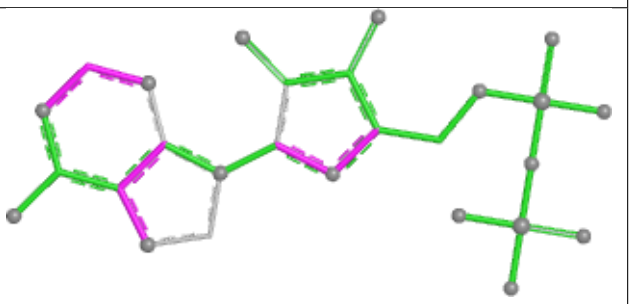
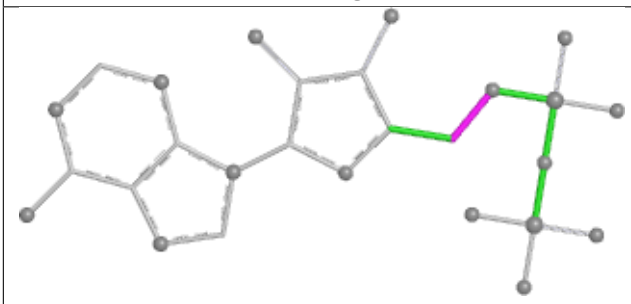
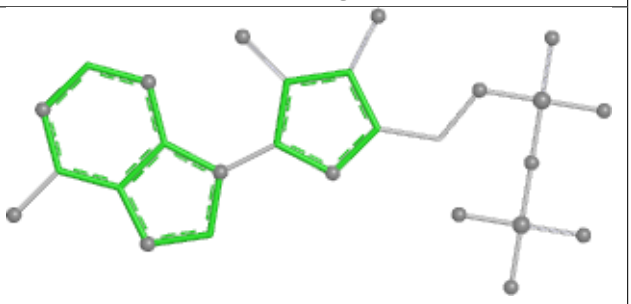
There are no ring outliers.

4 monomers are involved in 14 short contacts:

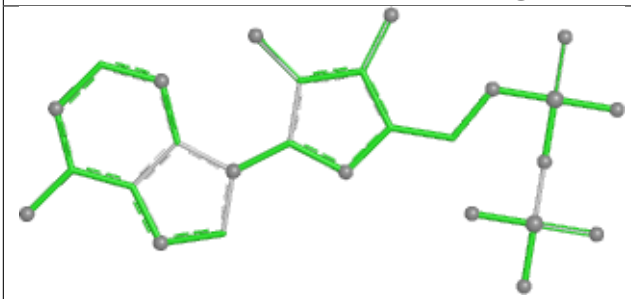
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	4103	ADP	1	0
2	A	4104	ADP	4	0
2	A	4101	ADP	4	0
3	A	4102	ATP	5	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

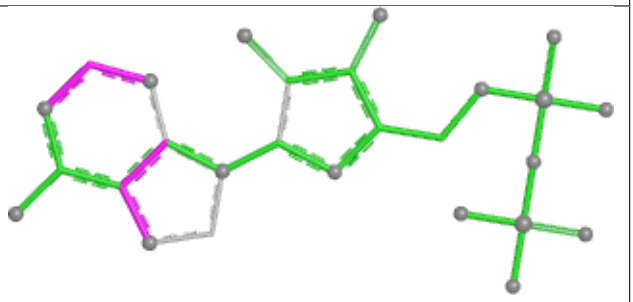
Ligand ADP A 4103	
 Bond lengths	 Bond angles
 Torsions	 Rings

Ligand ADP A 4104	
 Bond lengths	 Bond angles
 Torsions	 Rings

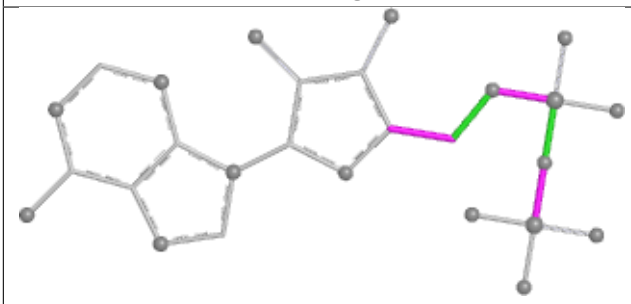
Ligand ADP A 4101



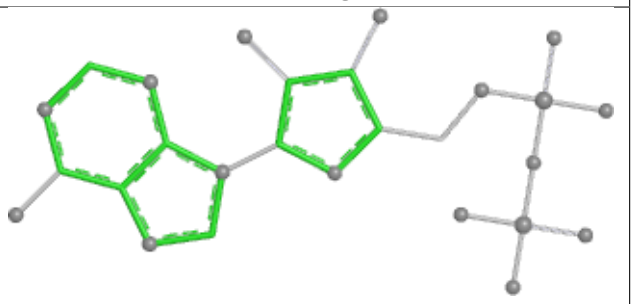
Bond lengths



Bond angles

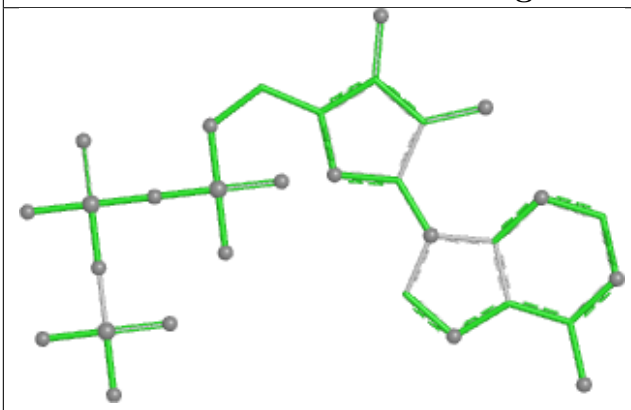


Torsions

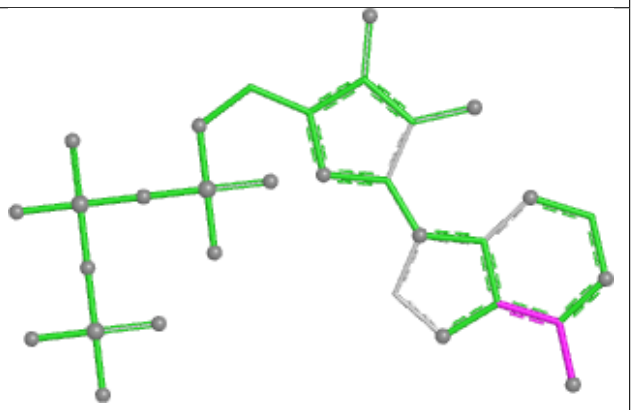


Rings

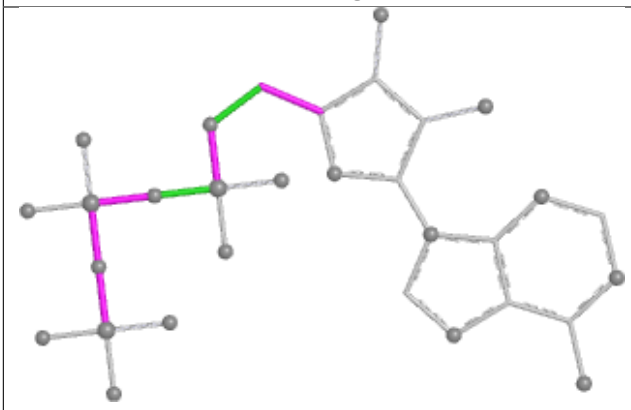
Ligand ATP A 4102



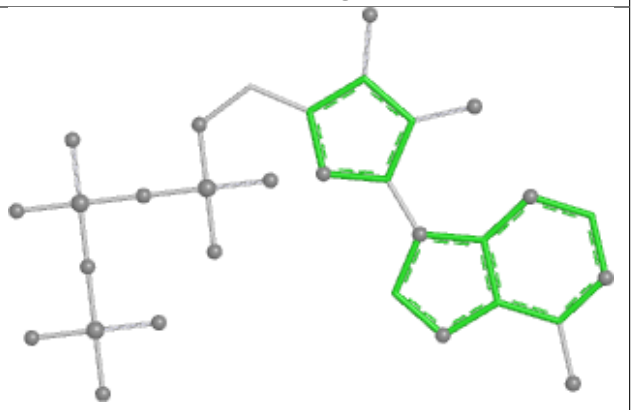
Bond lengths



Bond angles



Torsions



Rings

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

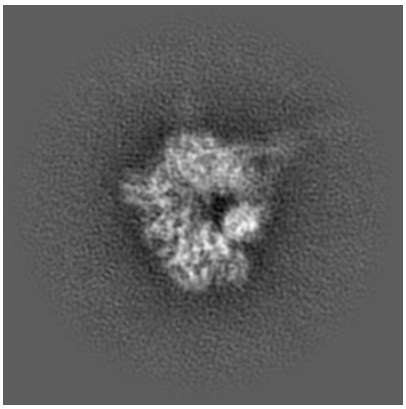
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-48240. These allow visual inspection of the internal detail of the map and identification of artifacts.

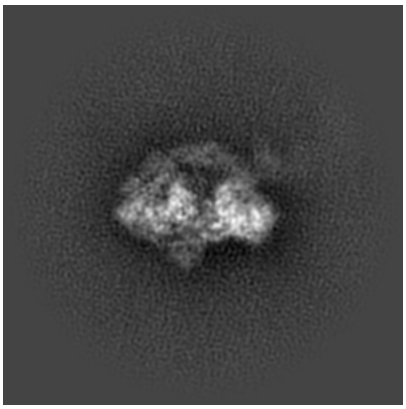
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

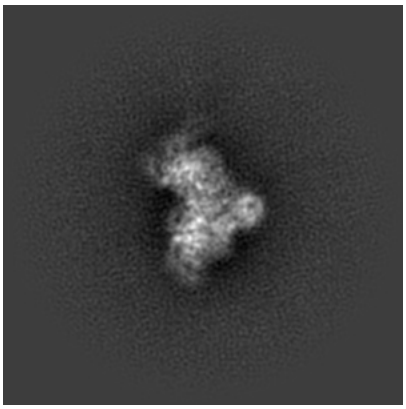
6.1.1 Primary map



X

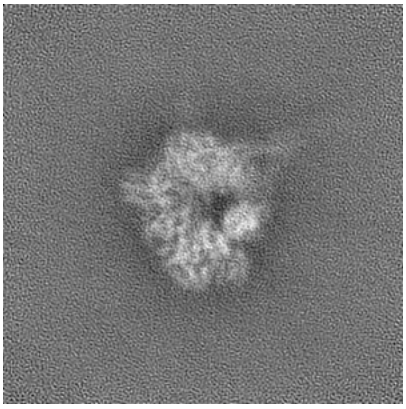


Y

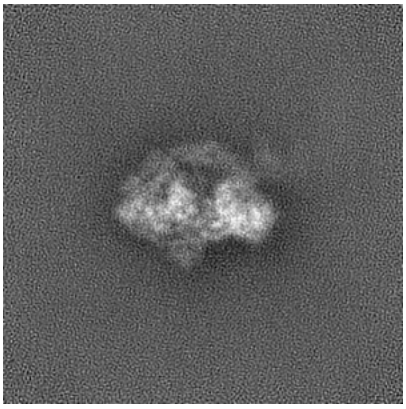


Z

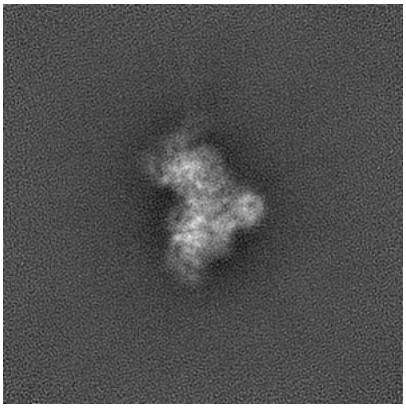
6.1.2 Raw map



X



Y

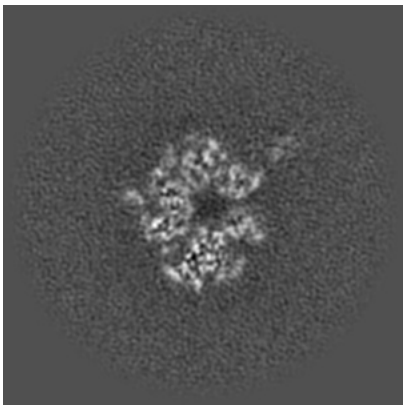


Z

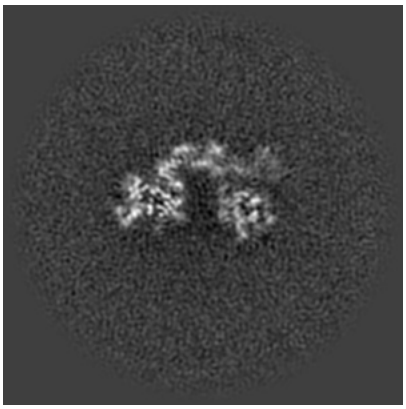
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

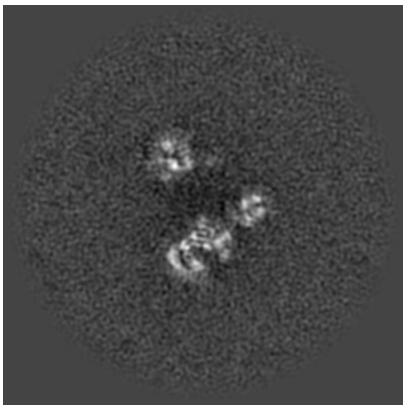
6.2.1 Primary map



X Index: 128

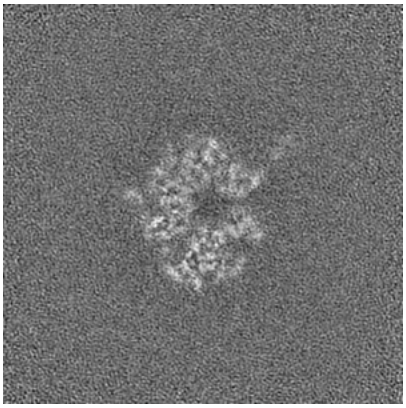


Y Index: 128

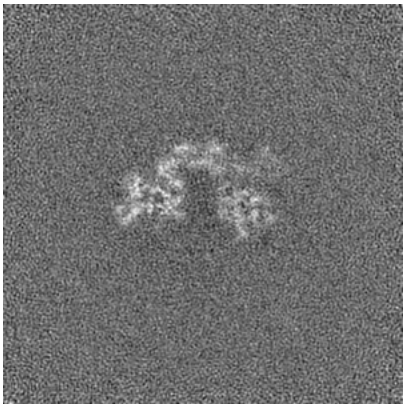


Z Index: 128

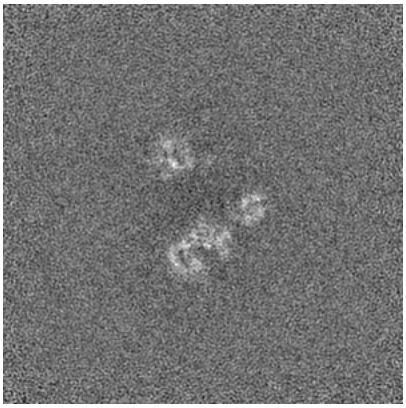
6.2.2 Raw map



X Index: 128



Y Index: 128

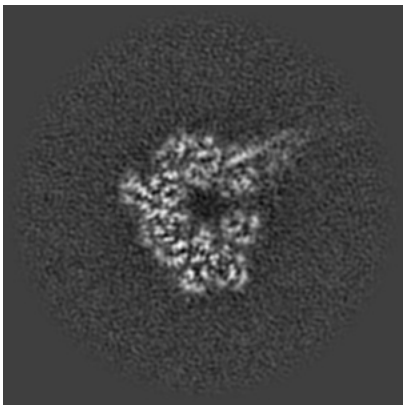


Z Index: 128

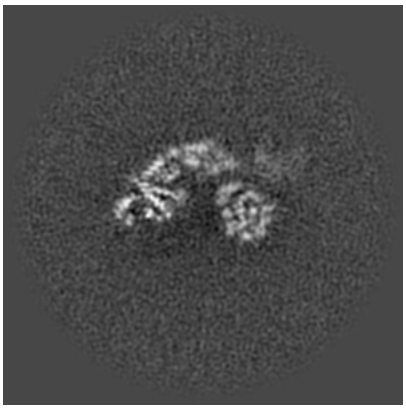
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

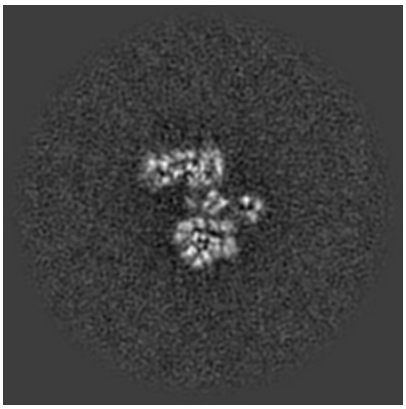
6.3.1 Primary map



X Index: 122

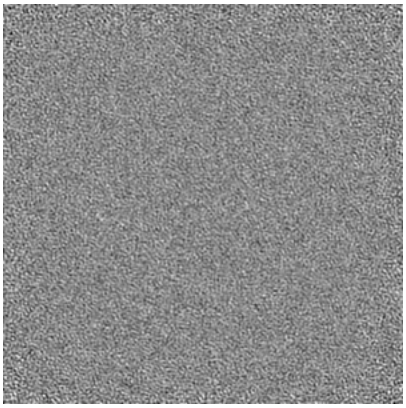


Y Index: 124

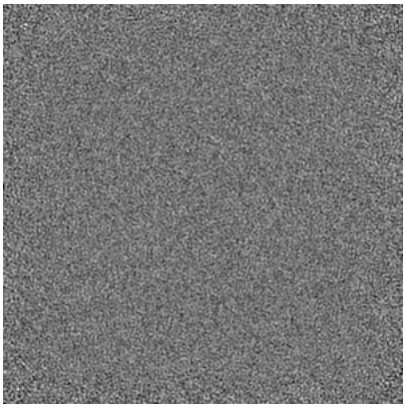


Z Index: 113

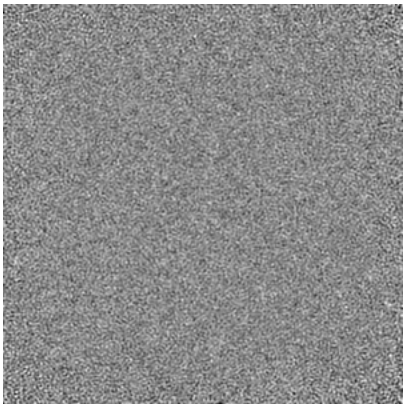
6.3.2 Raw map



X Index: 0



Y Index: 0

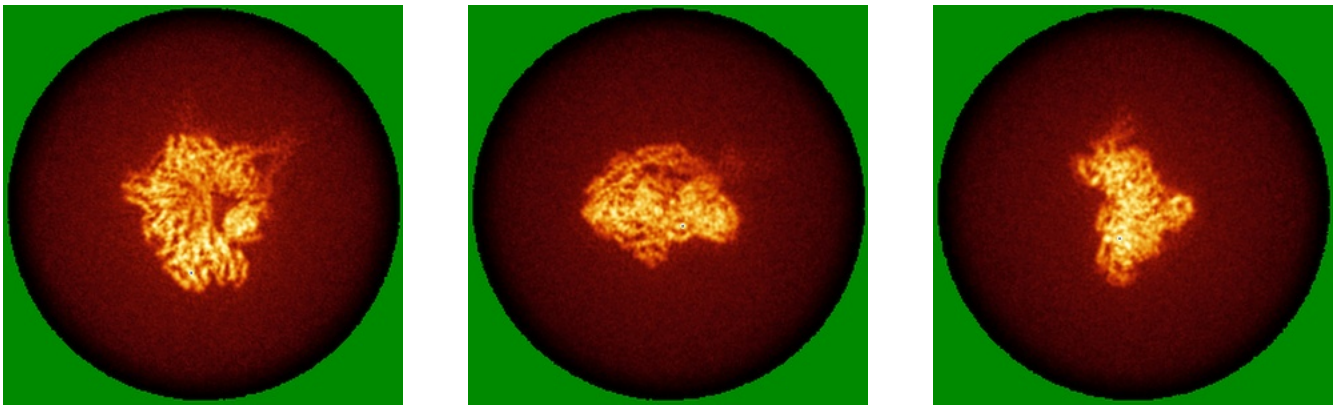


Z Index: 0

The images above show the largest variance slices of the map in three orthogonal directions.

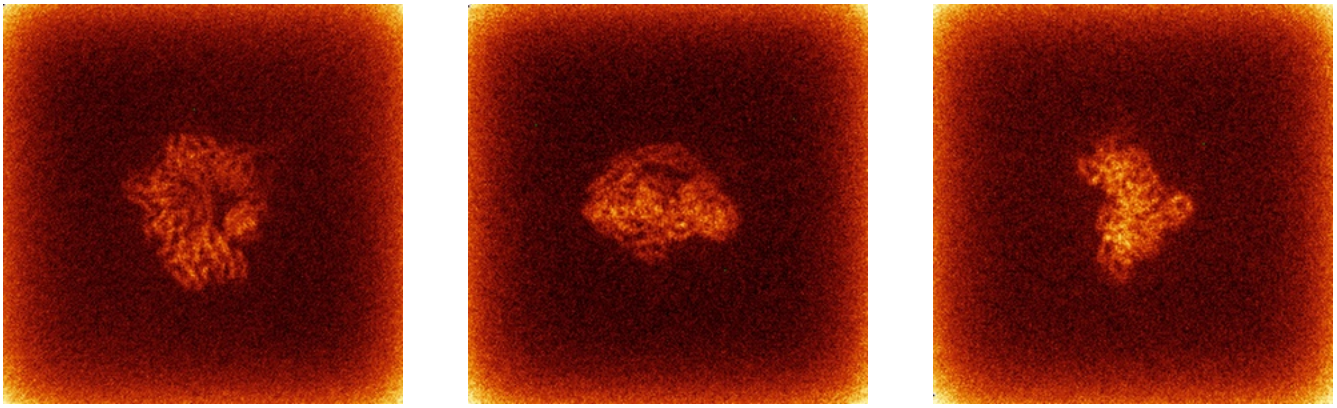
6.4 Orthogonal standard-deviation projections (False-color) (i)

6.4.1 Primary map



X Y Z

6.4.2 Raw map



X Y Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

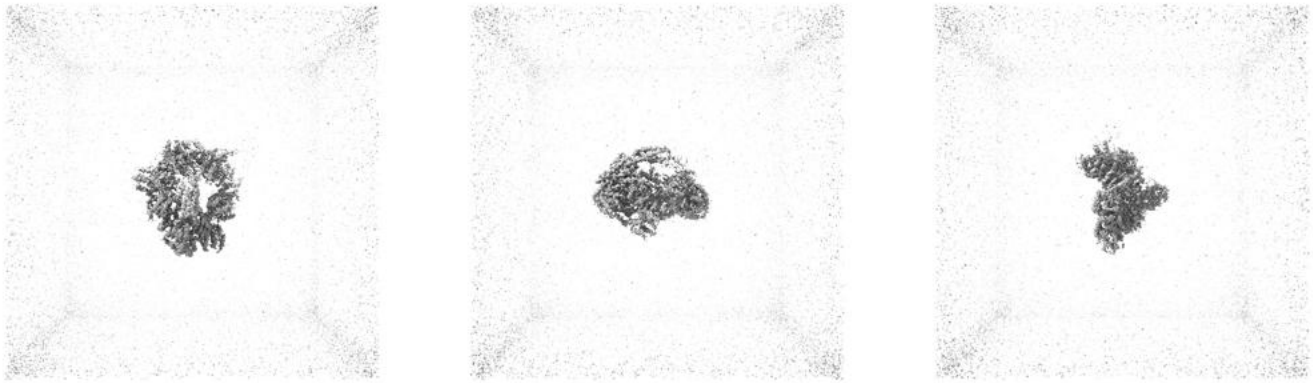
6.5 Orthogonal surface views (i)

6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.2. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



X Y Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

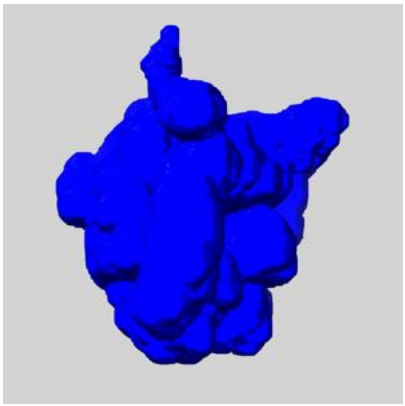
6.6 Mask visualisation (i)

This section shows the 3D surface view of the primary map at 50% transparency overlaid with the specified mask at 0% transparency

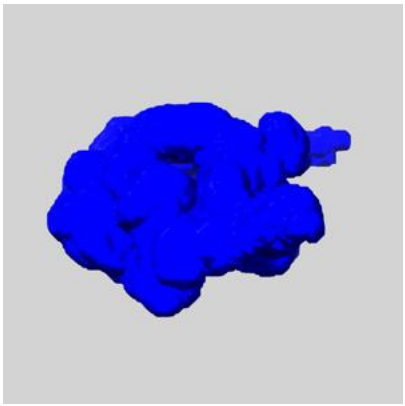
A mask typically either:

- Encompasses the whole structure
- Separates out a domain, a functional unit, a monomer or an area of interest from a larger structure

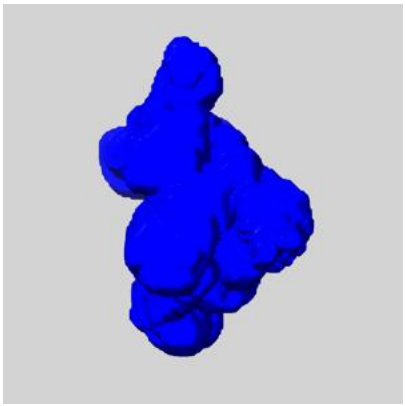
6.6.1 emd_48240_msk_1.map (i)



X



Y

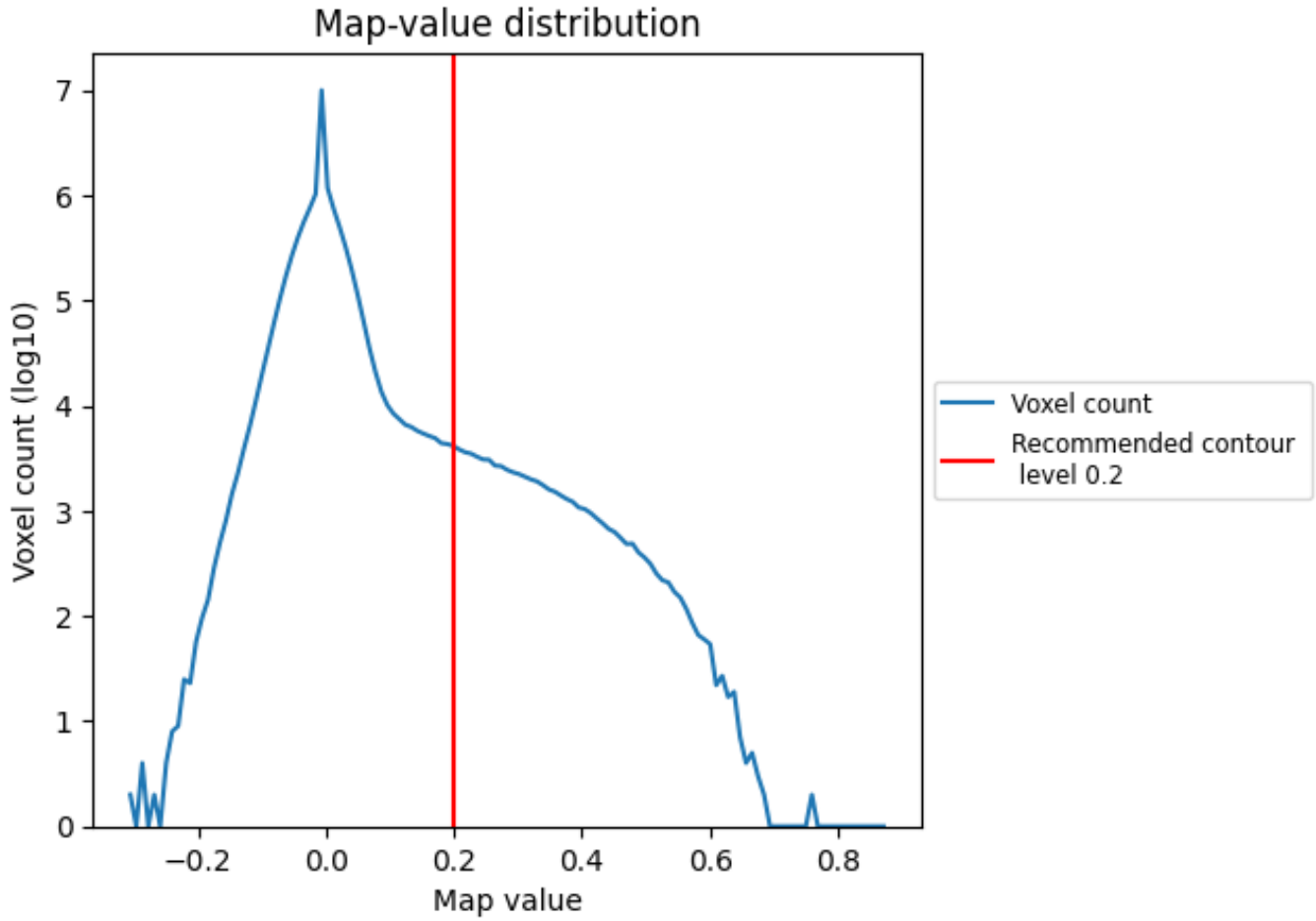


Z

7 Map analysis

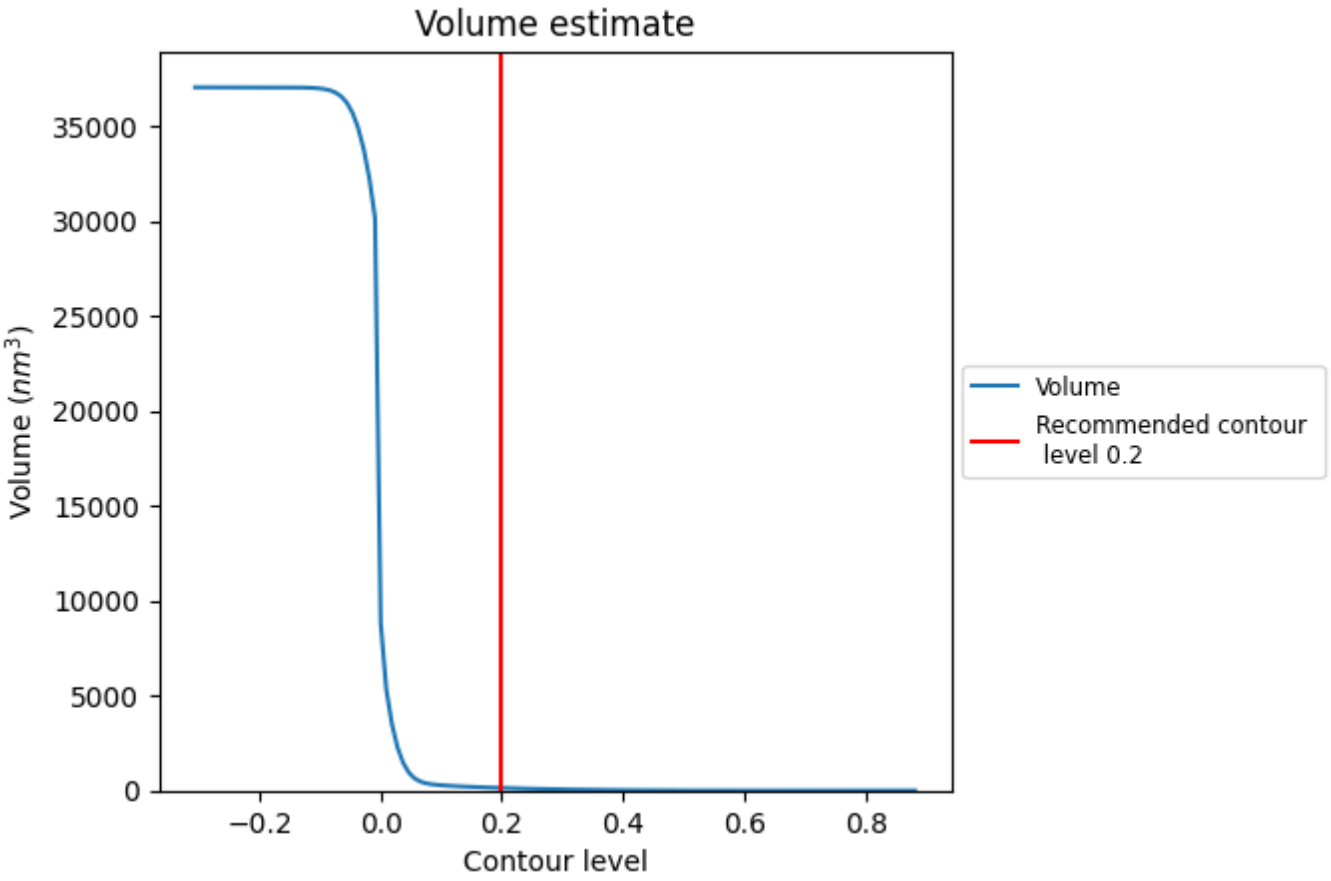
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

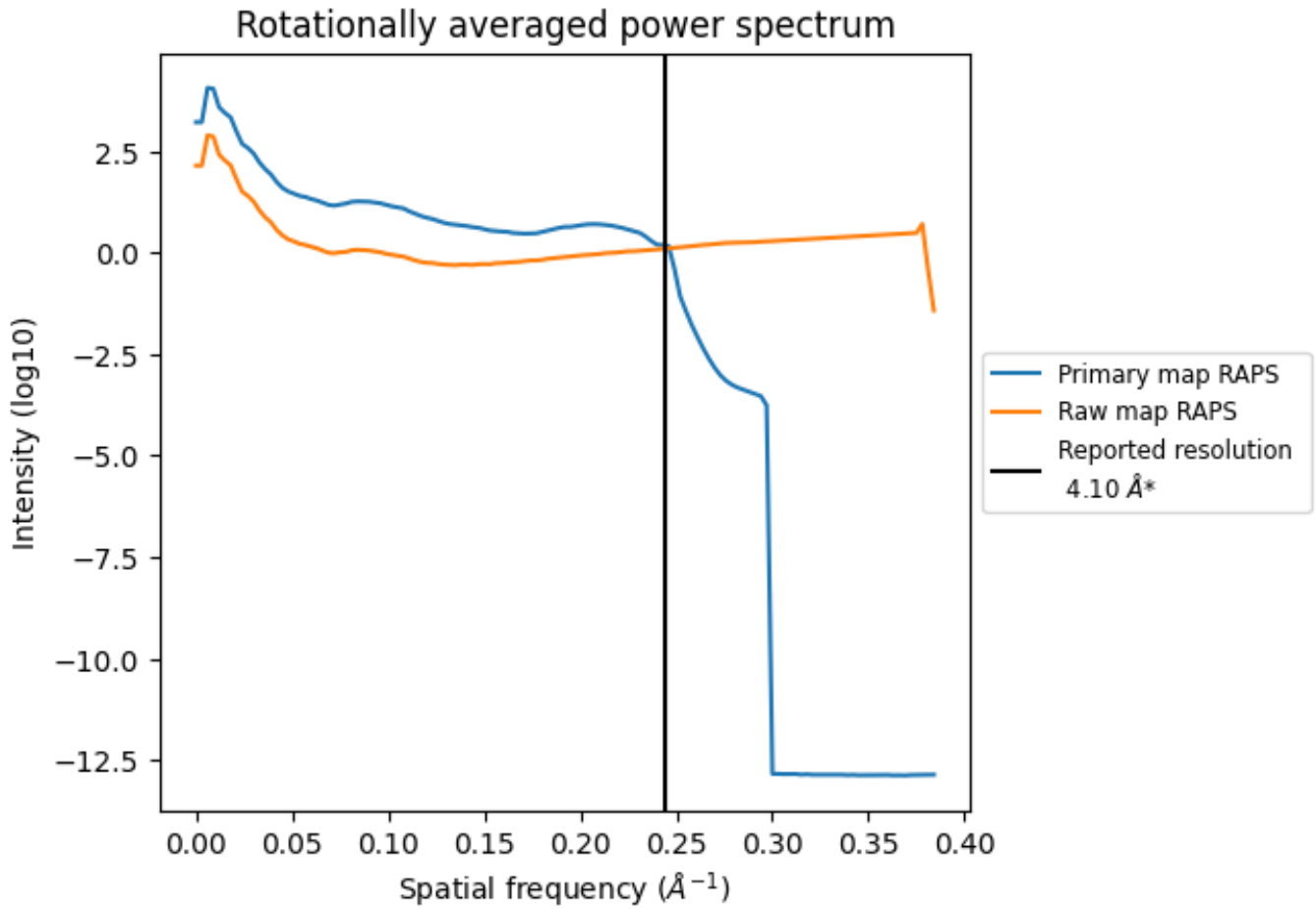
7.2 Volume estimate (i)



The volume at the recommended contour level is 135 nm^3; this corresponds to an approximate mass of 122 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum (i)

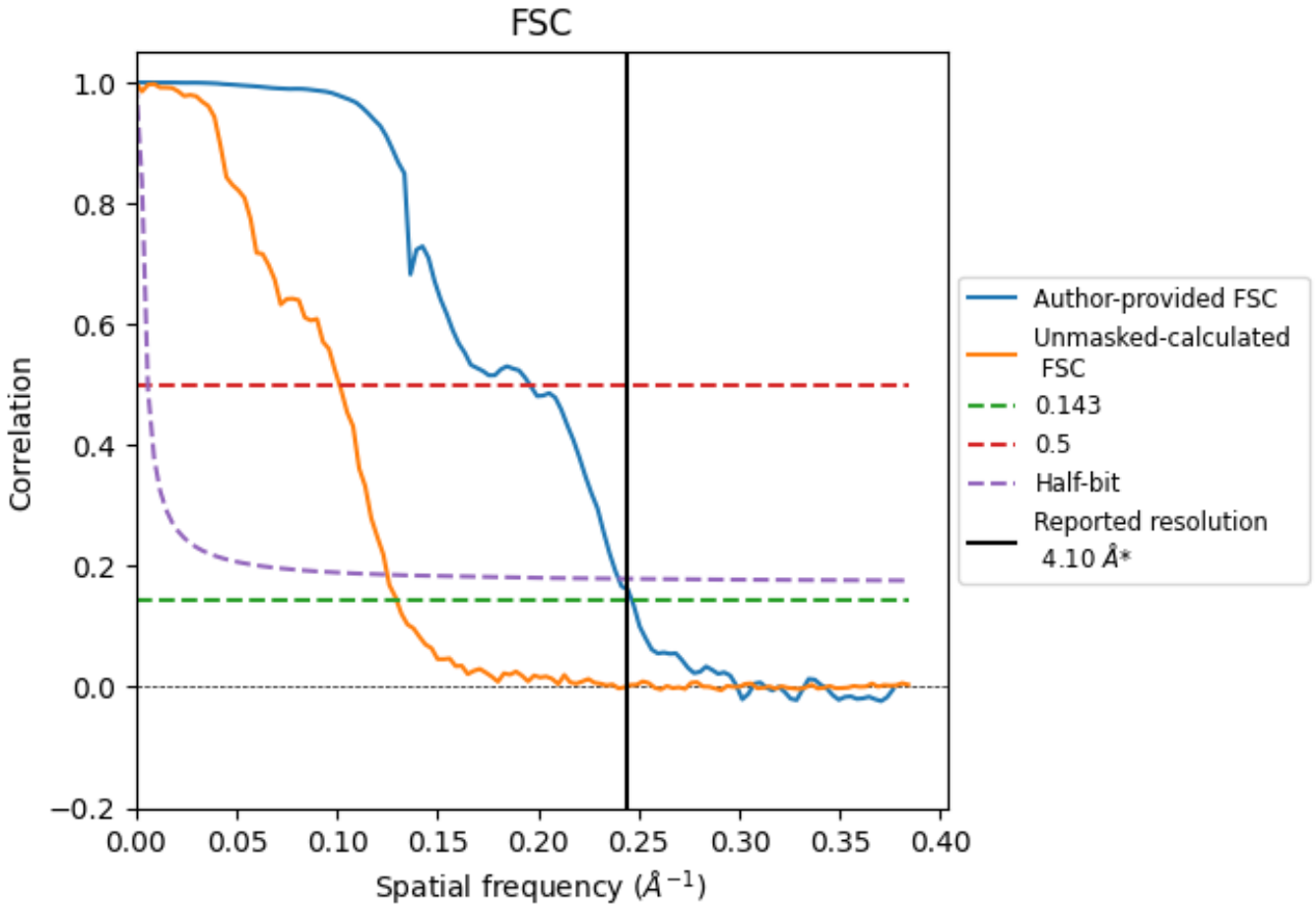


*Reported resolution corresponds to spatial frequency of 0.244 $Å^{-1}$

8 Fourier-Shell correlation

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC



*Reported resolution corresponds to spatial frequency of 0.244 Å^{-1}

8.2 Resolution estimates (i)

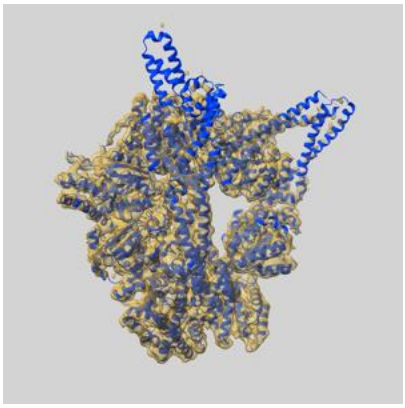
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	4.10	-	-
Author-provided FSC curve	4.06	5.11	4.17
Unmasked-calculated*	7.71	9.88	8.00

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 7.71 differs from the reported value 4.1 by more than 10 %

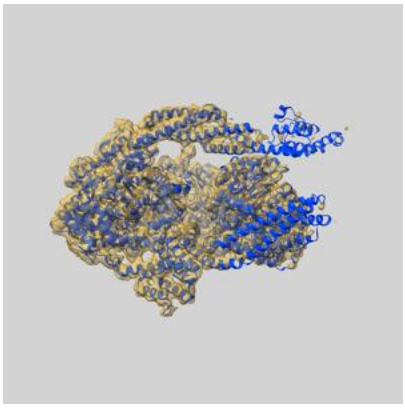
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-48240 and PDB model 9MFW. Per-residue inclusion information can be found in section 3 on page 5.

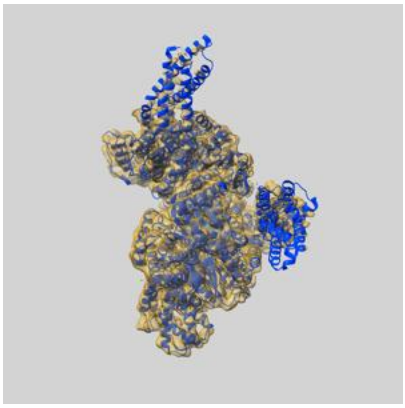
9.1 Map-model overlay



X



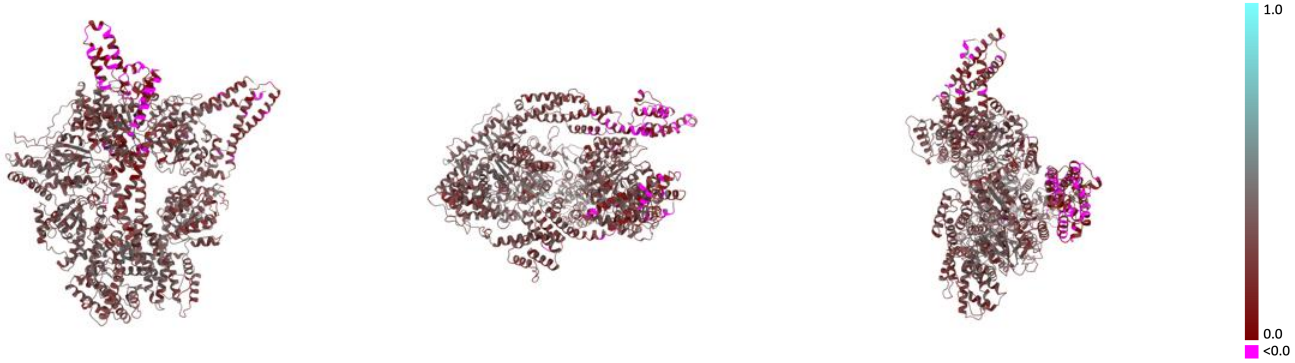
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.2 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

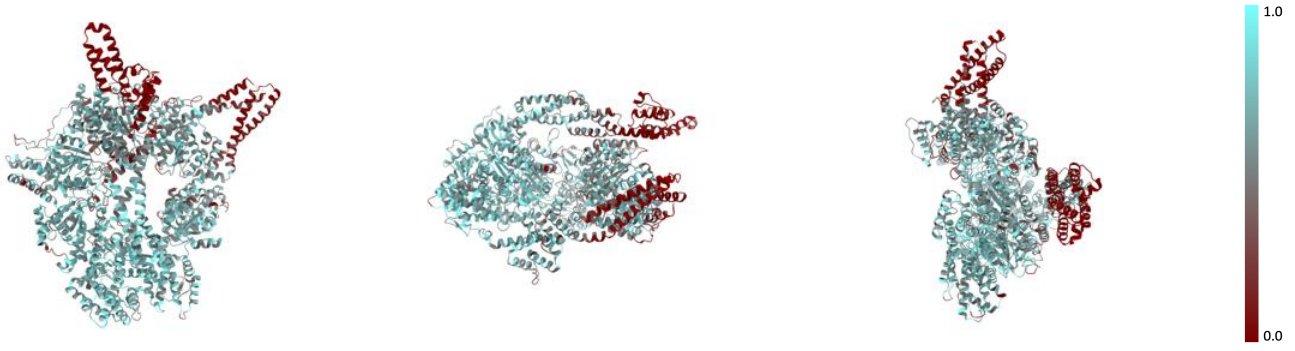
9.2 Q-score mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

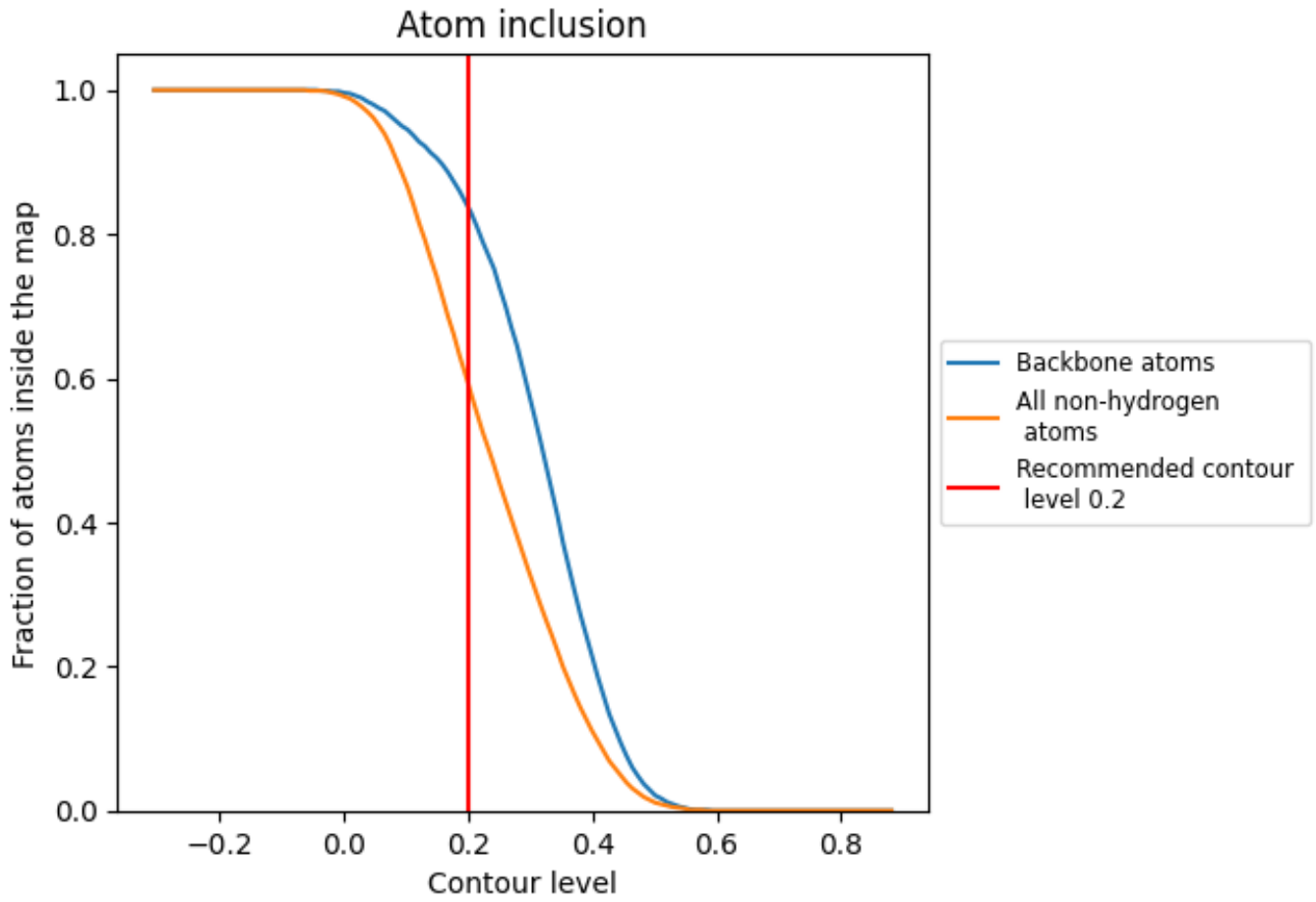
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.2).

9.4 Atom inclusion (i)



At the recommended contour level, 84% of all backbone atoms, 59% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.2) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5920	0.2940
A	0.5920	0.2940