wwPDB EM Validation Summary Report (i)

Apr 1, 2026 – 06:32 PM JST

PDB ID	:	9X2A / pdb_00009x2a
EMDB ID	:	EMD-66475
Title	:	Cryo-EM structure of PsoA in cofactor bound state (PsoA-PKS-II)
Authors	:	Sun, L.; Bai, L.
Deposited on	:	2025-10-04
Resolution	:	3.36 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 (i) 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 (i)) were used in the production of this report:

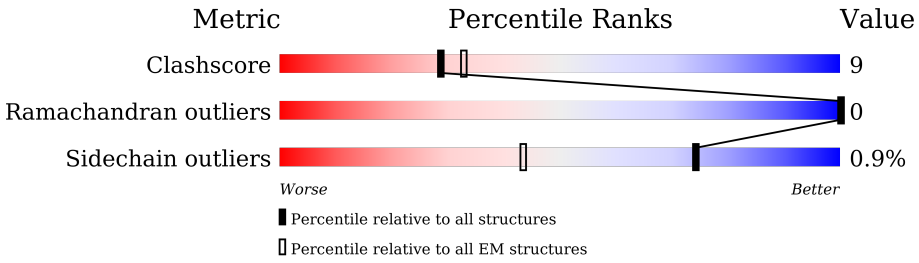
EMDB validation analysis	:	0.0.1.dev132
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4-5-2 with Phenix2.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive 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)	:	2.48.1

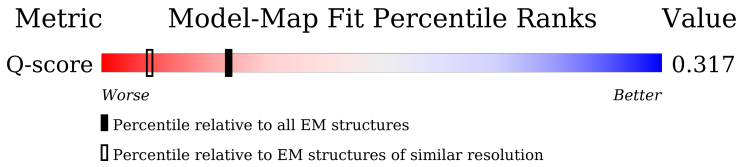
1 Overall quality at a glance (i)

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

The reported resolution of this entry is 3.36 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	14332 (2.86 - 3.86)

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	4007	16% 48% 12% 41%
1	B	4007	22% 48% 11% 41%

2 Entry composition

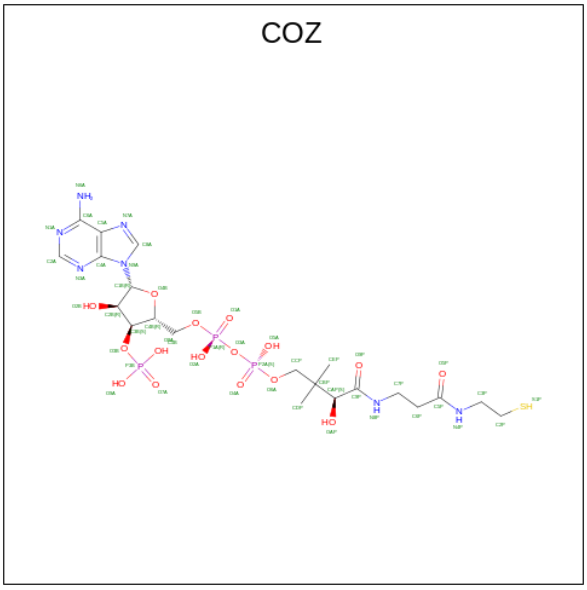
There are 3 unique types of molecules in this entry. The entry contains 72870 atoms, of which 36214 are hydrogens and 0 are deuteriums.

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 PKS-NRPS hybrid synthetase psoA.

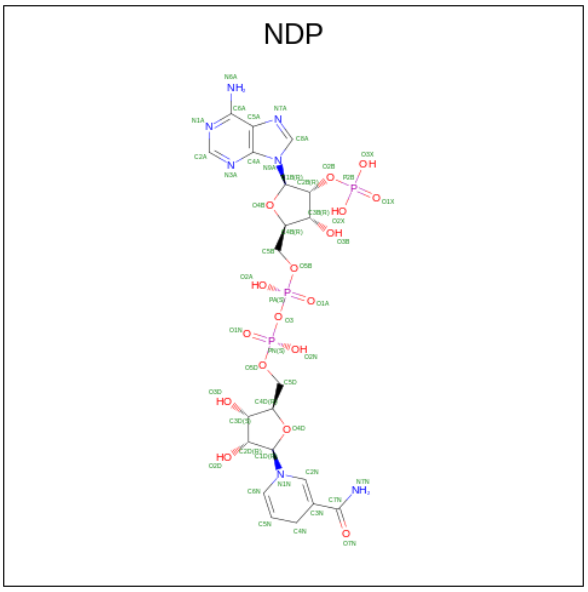
Mol	Chain	Residues	Atoms						AltConf	Trace
1	A	2382	Total	C	H	N	O	S	0	0
			36281	11461	18049	3198	3492	81		
1	B	2382	Total	C	H	N	O	S	0	0
			36281	11461	18049	3198	3492	81		

- Molecule 2 is COENZYME A (CCD ID: COZ) (formula: $C_{21}H_{36}N_7O_{16}P_3S$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms							AltConf
2	A	1	Total	C	H	N	O	P	S	0
			80	21	32	7	16	3	1	
2	B	1	Total	C	H	N	O	P	S	0
			80	21	32	7	16	3	1	

- Molecule 3 is NADPH DIHYDRO-NICOTINAMIDE-ADENINE-DINUCLEOTIDE PHOSPHATE (CCD ID: NDP) (formula: $C_{21}H_{30}N_7O_{17}P_3$) (labeled as "Ligand of Interest" by depositor).



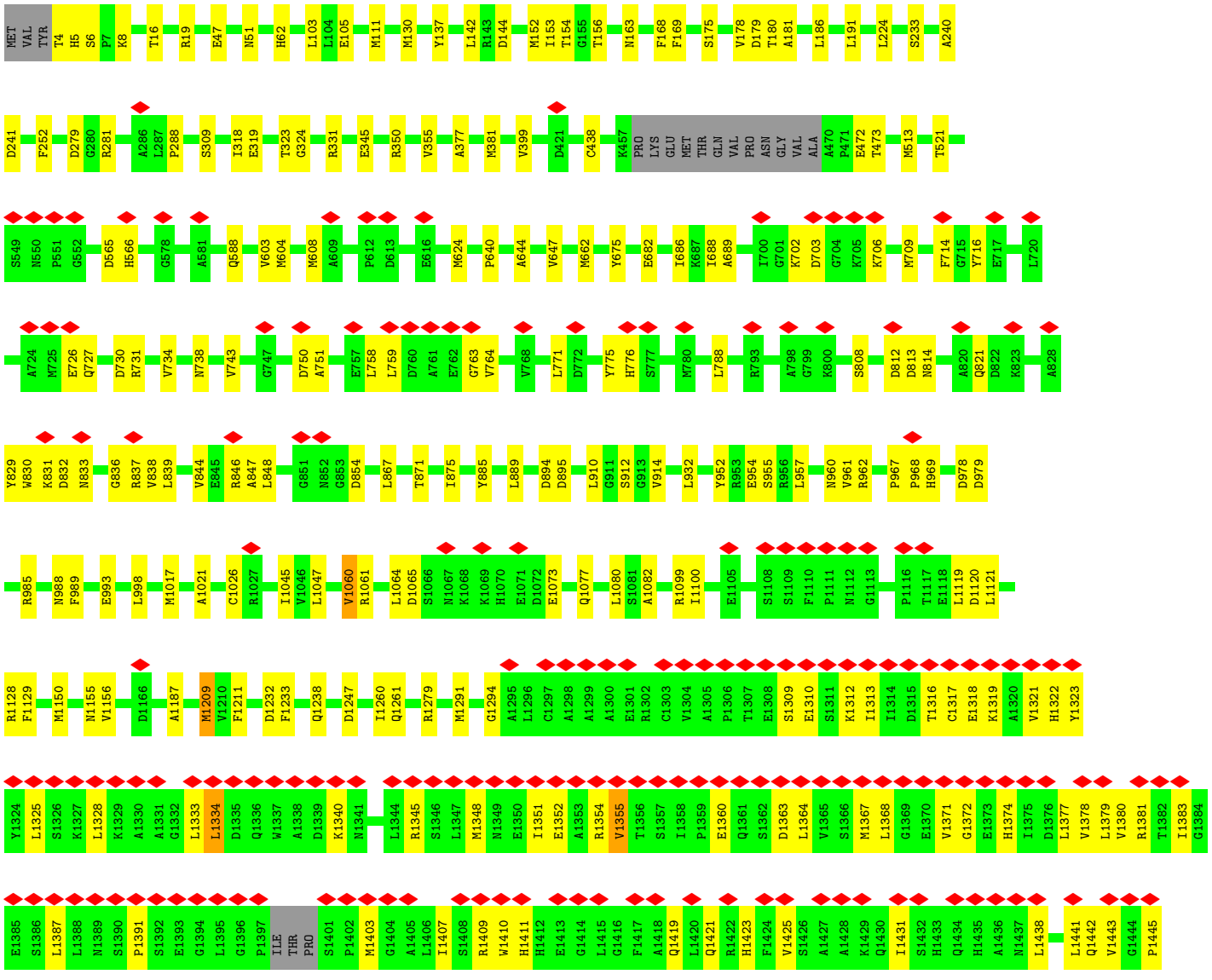
Mol	Chain	Residues	Atoms						AltConf
3	A	1	Total	C	H	N	O	P	0
			74	21	26	7	17	3	
3	B	1	Total	C	H	N	O	P	0
			74	21	26	7	17	3	

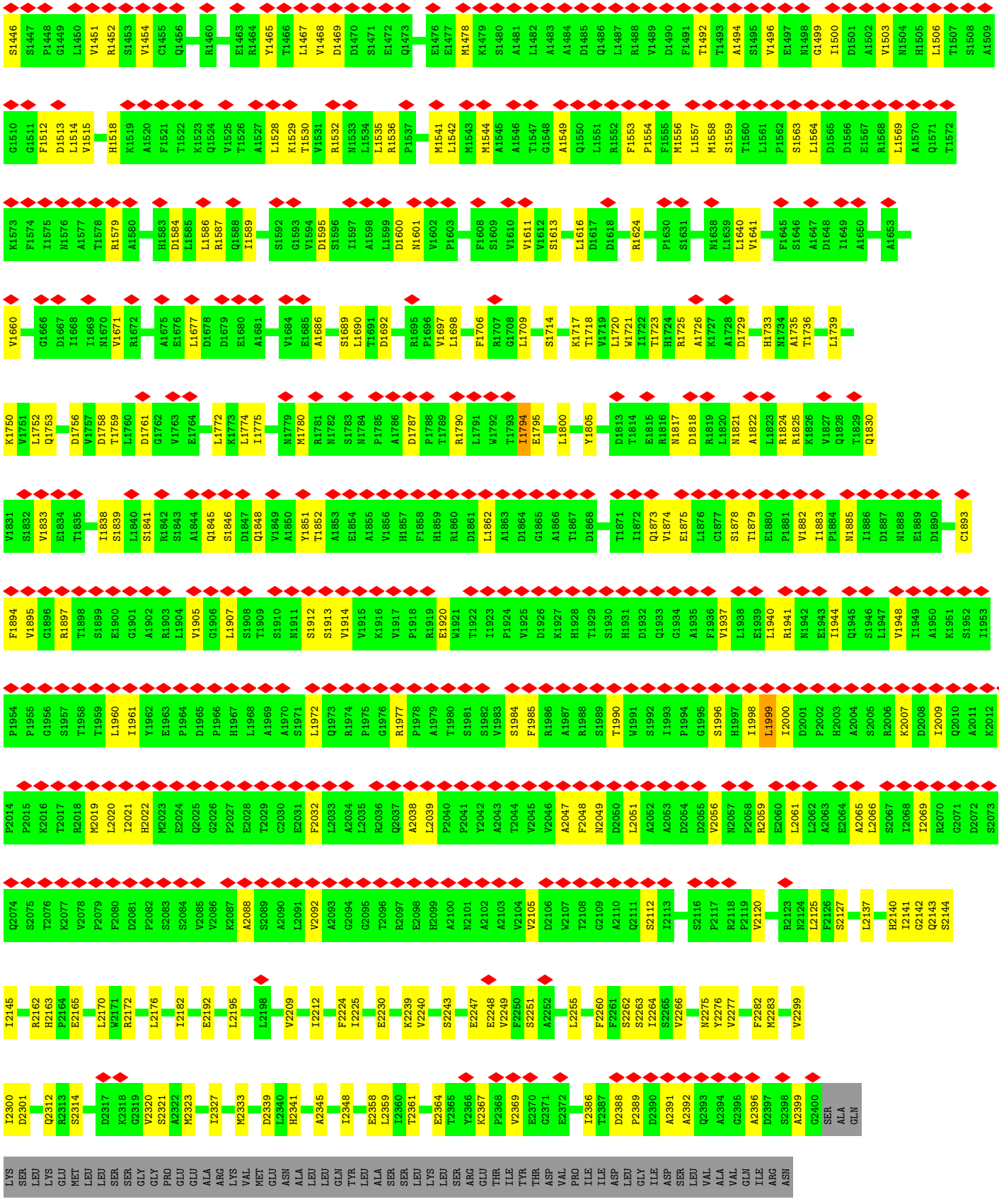
3 Residue-property plots (i)

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: PKS-NRPS hybrid synthetase psoA

Chain A:

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G1510 G1511 F1512 D1513 L1514 V1515 H1518 K1519 A1520 F1521 T1522 K1523 Q1524 V1525 T1526 A1527 L1528 K1529 T1530 V1531 R1532 N1533 L1534 L1535 R1536 P1537 M1541 L1542 M1543 M1544 A1545 A1546 T1547 G1548 A1549 Q1550 L1551 R1552 F1553 P1554 F1555 M1556 L1557 M1558 S1559 T1560 L1561 P1562 S1563 L1564 D1565 D1566 E1567 R1568 L1569 A1570 Q1571 T1572
K1573 F1574 I1575 N1576 A1577 T1578 R1579 A1580 H1583 D1584 L1585 L1586 R1587 Q1588 I1589 S1592 G1593 V1594 D1595 S1596 I1597 A1598 L1599 D1600 N1601 V1602 P1603 F1608 S1609 V1610 V1611 V1612 S1613 L1616 D1617 D1618 R1624 P1630 S1631 N1638 L1639 L1640 V1641 F1645 S1646 A1647 D1648 I1649 A1650 A1653
V1660 G1666 D1667 I1668 I1669 N1670 V1671 R1672 A1675 E1676 L1677 D1678 D1679 E1680 A1681 V1684 E1685 A1686 S1689 L1690 T1691 D1692 R1695 P1696 V1697 L1698 F1706 R1707 G1708 L1709 S1714 K1717 T1718 V1719 L1720 W1721 I1722 T1723 H1724 R1725 A1726 K1727 A1728 D1729 H1733 N1734 A1735 T1736 L1739
K1750 V1751 L1752 Q1753 D1756 V1757 D1758 T1759 L1760 D1761 G1762 V1763 E1764 L1772 K1773 L1774 I1775 N1779 M1780 R1781 N1782 S1783 N1784 P1785 A1786 D1787 P1788 T1789 R1790 L1791 W1792 T1793 I1794 E1795 L1800 Y1805 D1813 T1814 E1815 R1816 N1817 D1818 R1819 L1820 N1821 A1822 L1823 R1824 R1825 K1826 V1827 Q1828 T1829 Q1830
V1831 S1832 V1833 E1834 T1835 I1838 S1839 L1840 S1841 R1842 S1843 A1844 Q1845 S1846 D1847 Q1848 V1849 A1850 Y1851 T1852 A1853 E1854 A1855 V1856 H1857 F1858 H1859 R1860 D1861 L1862 A1863 D1864 G1865 A1866 T1867 D1868 T1871 I1872 Q1873 V1874 E1875 L1876 C1877 S1878 T1879 E1880 P1881 V1882 I1883 P1884 N1885 I1886 D1887 N1888 E1889 D1890 C1893
F1894 V1895 G1896 R1897 T1898 S1899 E1900 G1901 A1902 R1903 L1904 V1905 G1906 L1907 S1908 T1909 S1910 N1911 S1912 S1913 V1914 V1915 K1916 V1917 P1918 R1919 E1920 W1921 T1922 I1923 P1924 V1925 D1926 K1927 H1928 T1929 S1930 H1931 D1932 Q1933 G1934 A1935 F1936 V1937 L1938 E1939 L1940 R1941 N1942 E1943 I1944 Q1945 S1946 L1947 V1948 I1949 A1950 K1951 S1952 I1953
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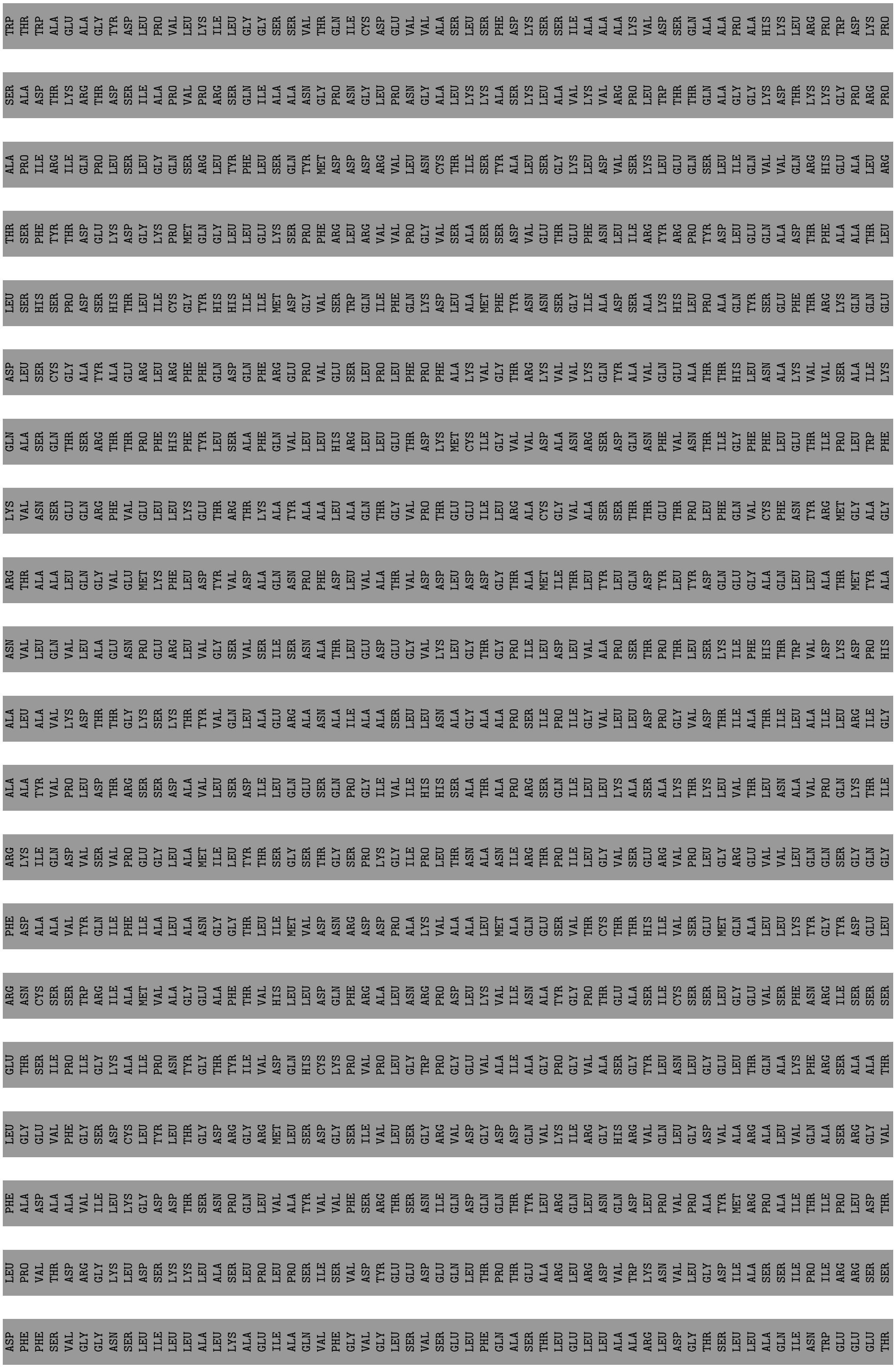
Q2074 S2075 T2076 K2077 V2078 P2079 F2080 D2081 P2082 S2083 S2084 V2085 V2086 K2087 A2088 S2089 A2090 L2091 V2092 A2093 G2094 G2095 T2096 R2097 E2098 H2099 A2100 N2101 A2102 A2103 V2104 V2105 D2106 W2107 T2108 G2109 A2110 Q2111 S2112 I2113 S2116 P2117 R2118 P2119 V2120 R2123 N2124 L2125 F2126 S2127 L2137 H2140 I2141 G2142 Q2143 S2144
I2145 R2162 H2163 P2164 E2165 L2170 W2171 R2172 L2176 I2182 E2192 L2195 L2198 V2209 I2212 F2224 I2225 E2230 K2239 V2240 S2243 E2247 E2248 V2249 F2250 S2251 A2252 L2255 F2260 F2261 S2262 S2263 I2264 S2265 V2266 N2275 Y2276 V2277 F2282 M2283 V2299
I2300 D2301 Q2312 R2313 S2314 D2317 K2318 G2319 V2320 S2321 A2322 M2323 I2327 M2333 D2339 L2340 H2341 A2345 I2348 E2358 L2359 I2360 T2361 E2364 T2365 Y2366 K2367 P2368 V2369 E2370 G2371 E2372 I2386 T2387 D2388 P2389 D2390 A2391 A2392 Q2393 A2394 G2395 A2396 D2397 S2398 A2399 G2400 SER ALA GLN
LYS SER LEU LYS GLU MET LEU LEU SER SER GLY GLY PRO GLU GLU ALA ARG LYS VAL MET GLU ASN ALA LEU LEU GLN TYR LEU ALA SER SER LEU LYS LEU SER ARG GLU THR ILE TYR THR ASP VAL PRO ILE ILE ASP LEU GLY ILE ASP SER LEU VAL ALA VAL GLN ILE ARG ASN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SER ALA ASP THR LYS ARG THR ASP SER ILE ALA PRO VAL PRO ARG SER GLN ILE ALA ALA ASN GLY PRO ASN GLY LEU PRO ASN GLY ALA LEU LYS LYS ALA SER LYS LEU ALA VAL LYS VAL ARG PRO LEU TRP THR THR GLN ALA GLY GLY LYS ASP THR LYS LYS GLY PRO ARG PRO
ALA PRO ILE ARG ILE GLN PRO LEU SER LEU GLY GLN SER ARG LEU TYR PHE LEU SER GLN TYR MET ASP ASP ASP ARG VAL LEU ASN CYS THR ILE SER TYR ALA LEU SER GLY LYS LEU ASP VAL SER LYS LEU GLU GLN SER LEU ILE GLN VAL VAL GLN ARG HIS GLU ALA LEU ARG
THR SER PHE TYR THR ASP GLU LYS ASP GLY LYS PRO MET GLN GLY LEU LEU GLU LYS SER PRO PHE ARG LEU ARG VAL VAL PRO GLY VAL SER ALA SER SER ASP VAL GLU THR GLU PHE ASN LEU ILE ARG TYR ARG PRO TYR ASP LEU GLU GLN ALA ASP THR PHE ALA ALA THR LEU
LEU SER HIS SER PRO ASP SER HIS THR LEU ILE CYS GLY TYR HIS HIS ILE ILE MET ASP GLY VAL SER TRP GLN ILE PHE GLN LYS ASP LEU ALA MET PHE TYR ASN ASN SER GLY ILE ALA ASP SER ALA LYS HIS LEU PRO ALA GLN TYR SER GLU PHE THR ARG LYS GLN GLU
ASP LEU SER CYS GLY ALA TYR ALA GLU ARG LEU ARG PHE PHE GLN ASP GLN PHE ARG GLU PRO VAL GLU SER LEU PRO LEU PHE PRO PHE ALA LYS VAL GLY THR ARG LYS VAL VAL LYS GLN TYR ALA VAL GLN GLU ALA THR THR HIS LEU ASN ALA LYS VAL VAL SER ALA ILE LYS
GLN ALA SER GLN THR SER ARG THR THR PRO PHE HIS PHE TYR LEU SER ALA PHE GLN VAL LEU LEU HIS ARG LEU LEU GLU THR ASP LYS MET CYS ILE GLY VAL VAL ASP ALA ASN ARG SER ASP GLN ASN PHE VAL ASN THR ILE GLY PHE PHE LEU GLU THR ILE PRO LEU TRP PHE
LYS VAL ASN SER GLU GLN ARG PHE VAL GLU LEU LEU LYS GLU THR ARG THR LYS ALA TYR ALA ALA LEU ALA GLN THR GLY VAL PRO THR GLU GLU ILE LEU ARG ALA CYS GLY VAL ALA SER SER THR THR GLU THR PRO LEU PHE GLN VAL CYS PHE ASN TYR ARG MET GLY ALA GLY
ARG THR ALA ALA LEU GLN GLY VAL GLU MET LYS PHE LEU ASP TYR VAL ASP ALA GLN ASN PRO PHE ASP LEU VAL ALA THR VAL ASP ASP LEU ASP ASP GLY THR ALA MET ILE THR LEU TYR LEU GLN ASP TYR LEU TYR ASP GLN GLU GLY ALA GLN LEU LEU ALA THR MET TYR ALA
ASN VAL LEU GLN VAL LEU ALA GLU ASN PRO GLU ARG LEU VAL GLY SER VAL SER ILE SER ASN ALA THR LEU GLU ASP GLU GLY VAL LYS LEU GLY THR GLY PRO ILE LEU ASP LEU VAL ALA PRO SER THR PRO THR LEU SER LYS ILE PHE HIS THR TRP VAL ASP LYS ASP PRO HIS
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ARG ASN CYS SER SER TRP ARG ILE ALA MET VAL ALA GLY GLU ALA PHE THR VAL HIS LEU LEU ASP GLN PHE ARG ALA LEU ASN ARG PRO ASP LEU LYS VAL ILE ASN ALA TYR GLY PRO THR GLU ALA SER ILE CYS SER SER LEU GLY GLU VAL SER PHE ASN ARG ILE SER SER
GLU THR SER ILE PRO ILE GLY LYS ALA ILE PRO ASN TYR GLY THR TYR ILE VAL ASP GLN HIS CYS LYS PRO VAL PRO LEU GLY TRP PRO GLY GLU VAL ALA ILE ALA GLY PRO GLY VAL ALA SER GLY TYR LEU ASN LEU GLY GLU LEU THR GLN ALA LYS PHE ARG SER ALA ALA THR
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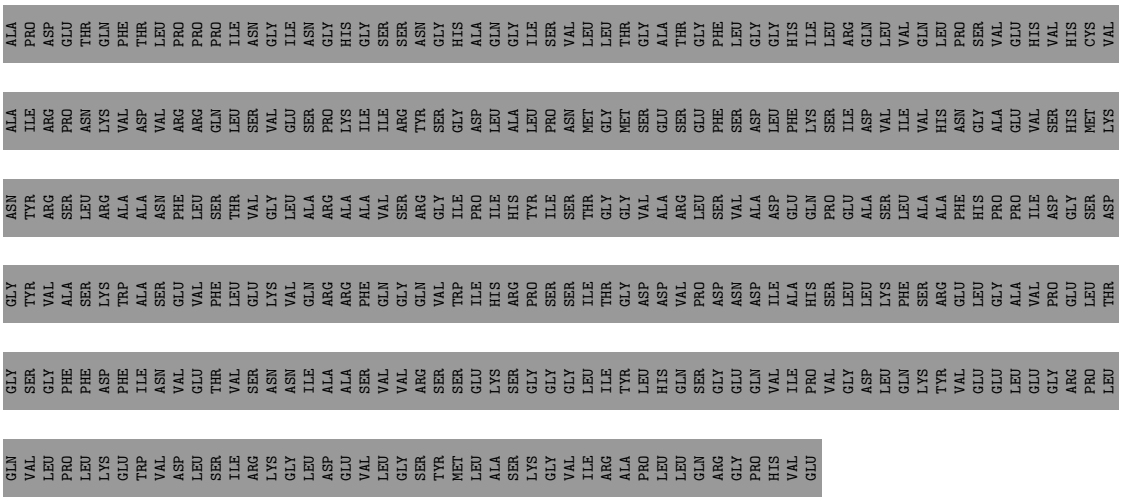
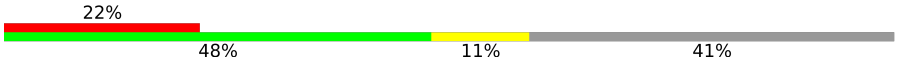
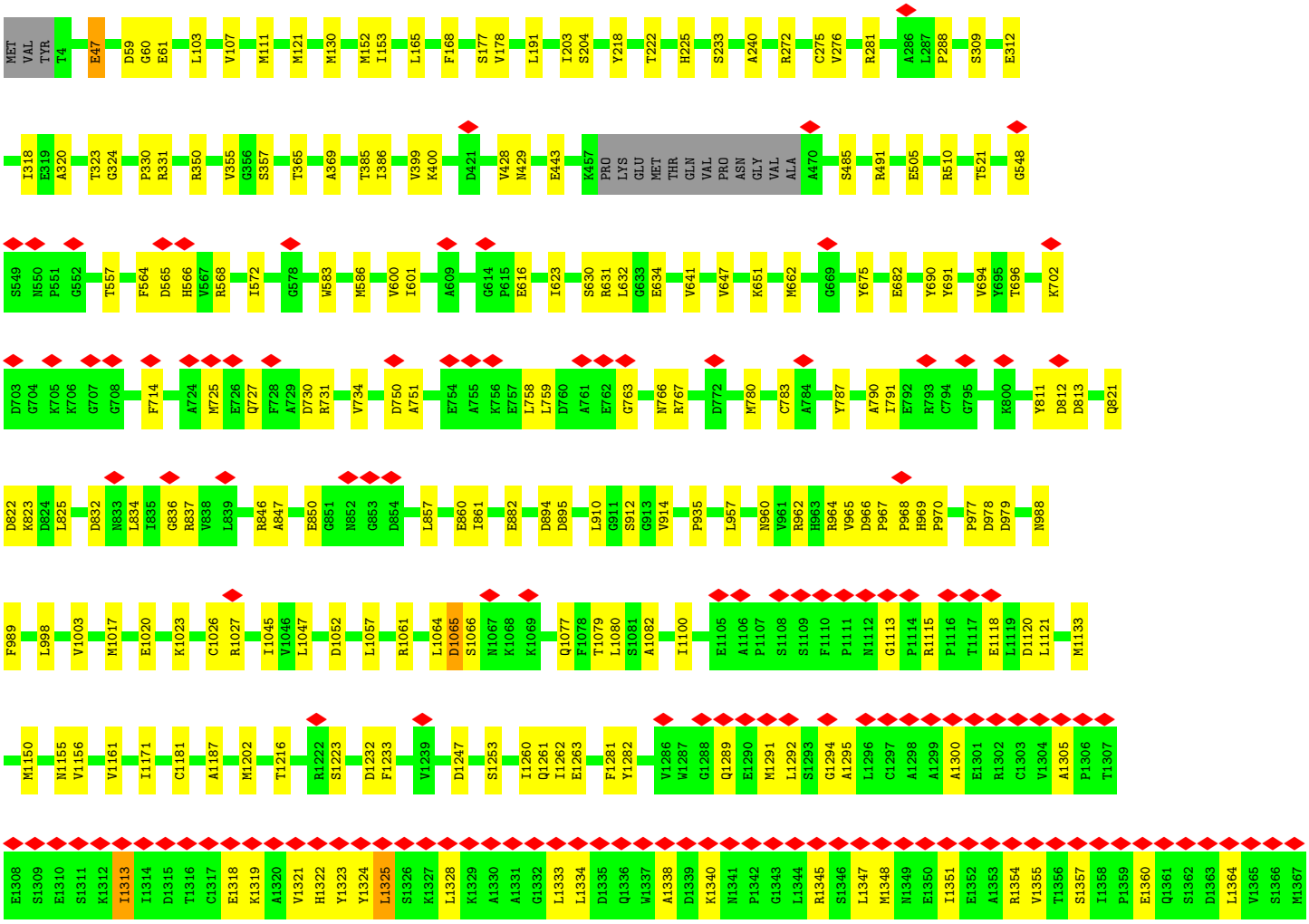
LEU PRO VAL THR ASP ARG GLY LYS LEU ASP SER LYS LYS LEU ALA SER LEU PRO LEU PRO SER ILE SER VAL ASP TYR GLU GLU ASP GLU GLN LEU THR PRO THR GLU ALA ARG LEU ARG ASP VAL TRP LYS ASN VAL LEU GLY ASP ILE ALA SER SER ILE PRO ILE ARG SER SER
ASP PHE PHE SER VAL GLY GLY ASN SER LEU ILE LEU LEU ALA LEU LYS ALA GLU ILE ALA GLN VAL PHE GLY VAL GLY LEU SER VAL SER GLU LEU PHE GLN ALA SER THR LEU GLU LEU LEU ALA ALA ARG LEU ASP GLY THR SER LEU LEU ALA GLN ILE ASN TRP GLU GLU THR

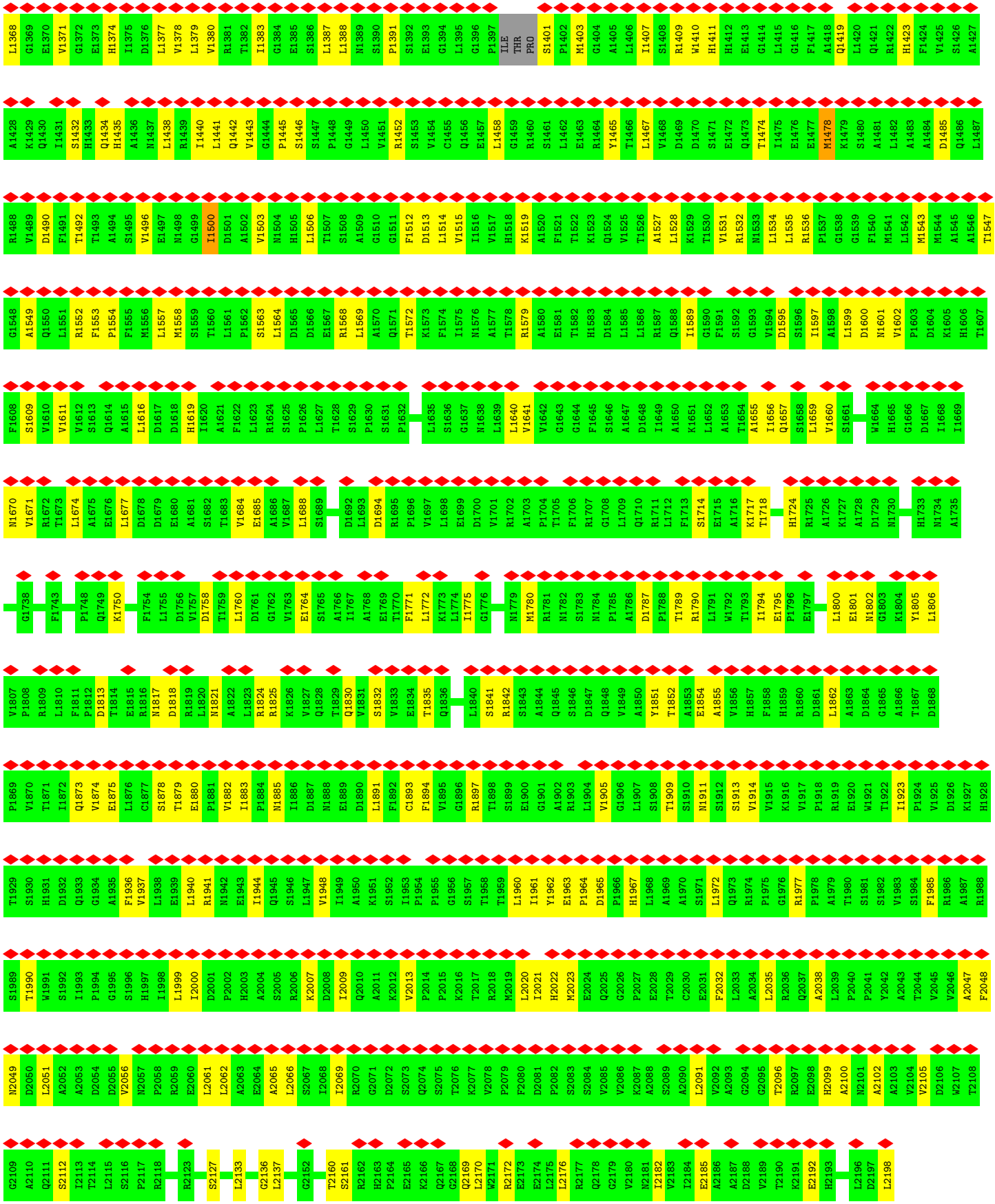


• Molecule 1: PKS-NRPS hybrid synthetase psoA

Chain B:



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A1428 K1429 Q1430 I1431 S1432 H1433 Q1434 H1435 A1436 N1437 L1438 R1439 I1440 L1441 Q1442 V1443 G1444 P1445 S1446 S1447 P1448 G1449 L1450 V1451 R1452 S1453 V1454 C1455 Q1456 E1457 L1458 G1459 R1460 S1461 L1462 E1463 R1464 Y1465 T1466 L1467 V1468 D1469 D1470 S1471 E1472 Q1473 T1474 I1475 E1476 E1477 M1478 K1479 S1480 A1481 L1482 A1483 A1484 D1485 Q1486 L1487
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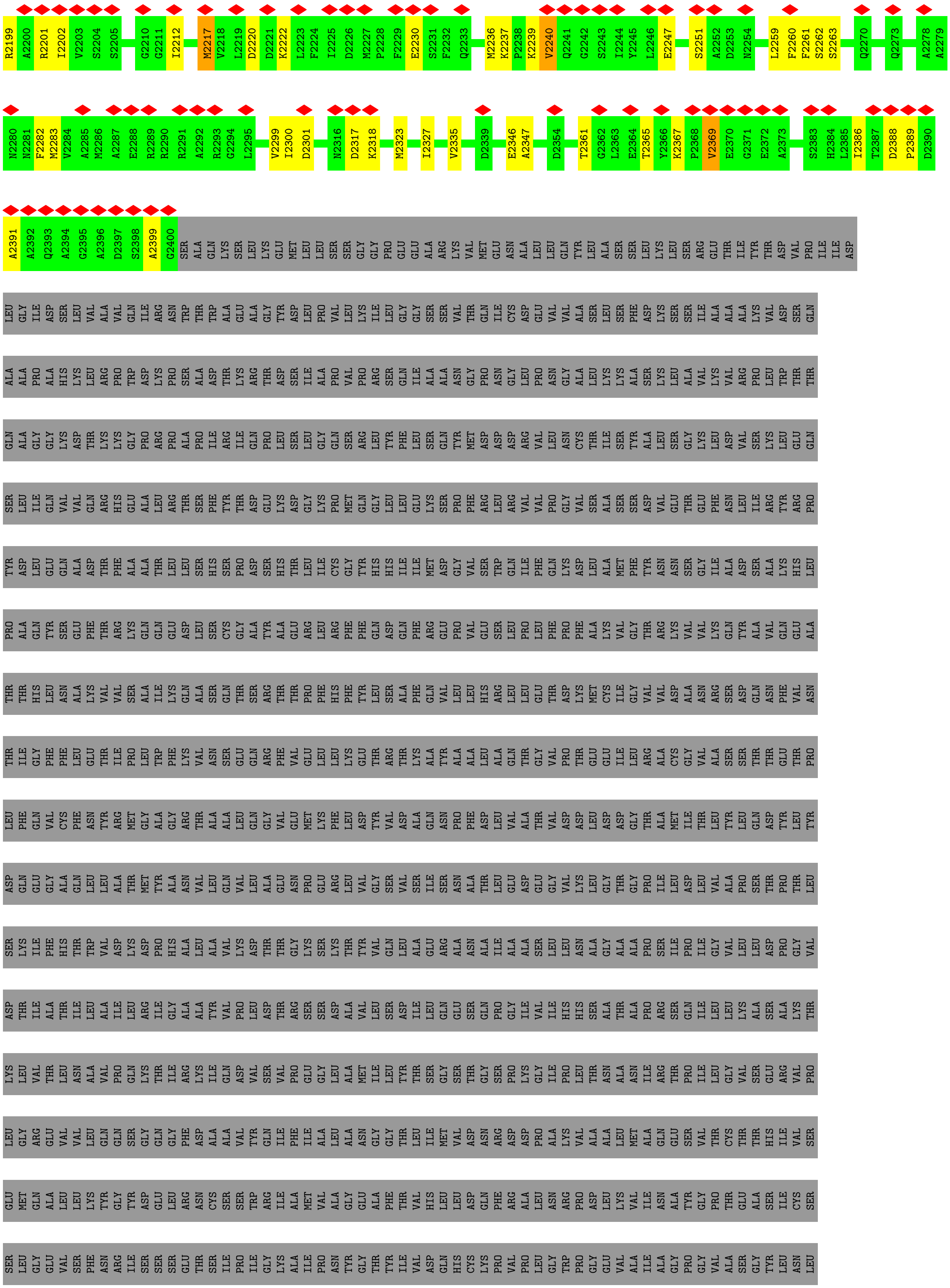
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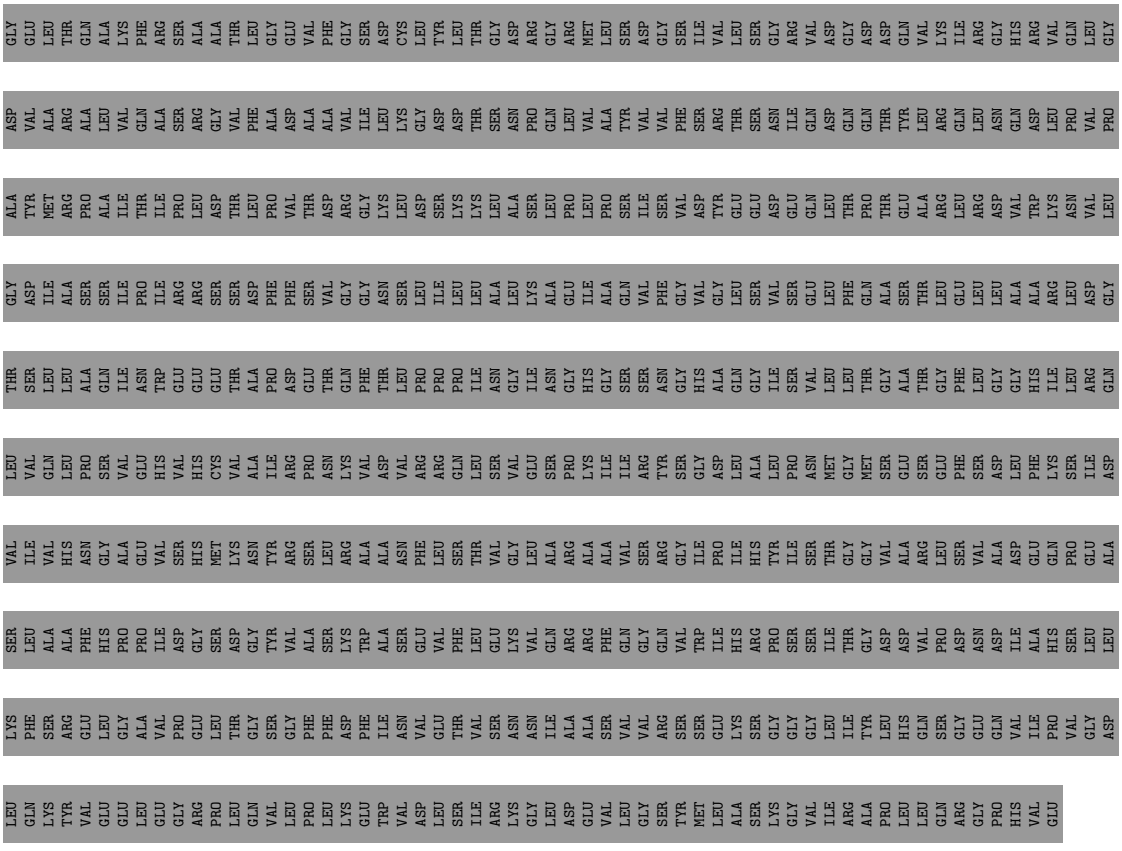
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ASP VAL ALA ARG ALA LEU VAL GLN ALA SER ARG GLY VAL PHE ALA ASP ALA ALA VAL ILE LEU LYS GLY ASP SER ASP THR SER ASN PRO GLN LEU VAL ALA TYR VAL VAL PHE SER ARG THR SER ASN ILE GLN ASP GLN GLN THR TYR LEU ARG GLN LEU ASN GLN ASP LEU PRO VAL PRO
ALA TYR MET ARG PRO ALA ILE THR ILE PRO LEU ASP THR LEU PRO VAL THR ASP ARG GLY LYS LEU ASP SER LYS LYS LEU ALA ALA SER LEU PRO LEU PRO LEU PRO SER ILE SER VAL ASP TYR GLU GLU ASP GLU GLN LEU THR PRO THR GLU ALA ARG LEU GLU ARG ASP VAL TRP LYS ASN VAL LEU
GLY ASP ILE ALA SER SER ILE PRO ILE ARG ARG SER SER ASP PHE PHE SER VAL GLY GLY ASN SER LEU ILE LEU LEU LEU ALA LEU LYS ALA GLU ILE ALA GLN ILE GLY VAL LEU SER VAL SER GLU GLN LEU PHE GLN ALA SER THR LEU GLU LEU LEU ALA ALA ARG LEU ASP GLY
THR SER LEU LEU ALA GLN ILE ASN TRP GLU GLU GLU THR ALA PRO ASP GLU THR GLN PHE THR LEU PRO PRO PRO ILE ASN GLY ILE ASN GLY HIS GLY SER SER ASN GLY HIS ALA GLN GLY ILE SER VAL LEU LEU THR GLY ALA THR GLY GLY PHE LEU GLY GLY HIS ILE LEU ARG GLN
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LYS PHE SER ARG GLU LEU GLY ALA VAL PRO GLU LEU THR GLY SER GLY PHE PHE ASP PHE ILE ASN VAL GLU THR VAL SER ASN ASN ILE ALA ALA SER VAL VAL ARG SER SER GLU LYS SER GLY GLY GLY LEU ILE TYR LEU HIS GLN SER GLY GLU GLN VAL ILE PRO VAL GLY ASP
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4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	107200	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TECNAI F30	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/Å^2$)	40	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1800	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	0.616	Depositor
Minimum map value	-0.426	Depositor
Average map value	-0.000	Depositor
Map value standard deviation	0.015	Depositor
Recommended contour level	0.08	Depositor
Map size (Å)	426.24, 426.24, 426.24	wwPDB
Map dimensions	576, 576, 576	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.74, 0.74, 0.74	Depositor

5 Model quality

5.1 Standard geometry

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

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	0.12	0/18627	0.30	0/25329
1	B	0.12	0/18627	0.30	0/25329
All	All	0.12	0/37254	0.30	0/50658

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	18232	18049	18046	345	0
1	B	18232	18049	18046	334	0
2	A	48	32	32	2	0
2	B	48	32	32	2	0
3	A	48	26	26	2	0
3	B	48	26	26	2	0
All	All	36656	36214	36208	672	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 9.

The worst 5 of 672 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:808:SER:HG	1:A:829:TYR:HH	1.16	0.93
1:B:1061:ARG:NH1	1:B:1077:GLN:OE1	2.02	0.91
1:B:1442:GLN:OE1	1:B:1465:TYR:OH	1.91	0.87
1:A:2007:LYS:NZ	1:B:1247:ASP:OD2	2.08	0.87
1:A:1496:VAL:HG22	1:A:1500:ILE:HD11	1.59	0.85

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	2376/4007 (59%)	2273 (96%)	103 (4%)	0	100	100
1	B	2376/4007 (59%)	2273 (96%)	103 (4%)	0	100	100
All	All	4752/8014 (59%)	4546 (96%)	206 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

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	1977/3338 (59%)	1963 (99%)	14 (1%)	81	89
1	B	1977/3338 (59%)	1955 (99%)	22 (1%)	70	82

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	3954/6676 (59%)	3918 (99%)	36 (1%)	74 87

5 of 36 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	1401	SER
1	B	2369	VAL
1	B	1410	TRP
1	B	2169	GLN
1	A	2019	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 38 such sidechains are listed below:

Mol	Chain	Res	Type
1	B	1657	GLN
1	B	2281	ASN
1	B	1665	HIS
1	B	1945	GLN
1	B	2379	ASN

5.3.3 RNA (i)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains (i)

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

5.5 Carbohydrates (i)

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	$\#\|Z\| > 2$
3	NDP	A	4102	-	45,52,52	2.29	5 (11%)	53,80,80	1.75	11 (20%)
3	NDP	B	4102	-	45,52,52	2.28	6 (13%)	53,80,80	1.70	9 (16%)
2	COZ	B	4101	-	41,50,50	1.00	1 (2%)	52,75,75	1.23	5 (9%)
2	COZ	A	4101	-	41,50,50	1.00	1 (2%)	52,75,75	1.19	5 (9%)

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
3	NDP	A	4102	-	-	14/30/77/77	0/5/5/5
3	NDP	B	4102	-	-	7/30/77/77	0/5/5/5
2	COZ	B	4101	-	-	5/44/64/64	0/3/3/3
2	COZ	A	4101	-	-	15/44/64/64	0/3/3/3

The worst 5 of 13 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	4102	NDP	P2B-O2B	12.53	1.83	1.59
3	B	4102	NDP	P2B-O2B	12.44	1.82	1.59
2	B	4101	COZ	P3B-O3B	5.01	1.68	1.59
2	A	4101	COZ	P3B-O3B	4.99	1.68	1.59
3	A	4102	NDP	PN-O5D	4.58	1.77	1.59

The worst 5 of 30 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	4102	NDP	PN-O3-PA	-7.13	108.36	132.83
3	B	4102	NDP	PN-O3-PA	-7.12	108.39	132.83
2	A	4101	COZ	C7P-N8P-C9P	3.44	128.72	122.59
3	B	4102	NDP	O2B-P2B-O1X	-3.39	96.32	109.39
2	B	4101	COZ	O6A-CCP-CBP	3.35	115.94	110.55

There are no chirality outliers.

5 of 41 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	4101	COZ	CCP-O6A-P2A-O3A
2	A	4101	COZ	CCP-O6A-P2A-O4A
2	A	4101	COZ	C9P-CAP-CBP-CCP
2	A	4101	COZ	C9P-CAP-CBP-CDP
2	A	4101	COZ	C9P-CAP-CBP-CEP

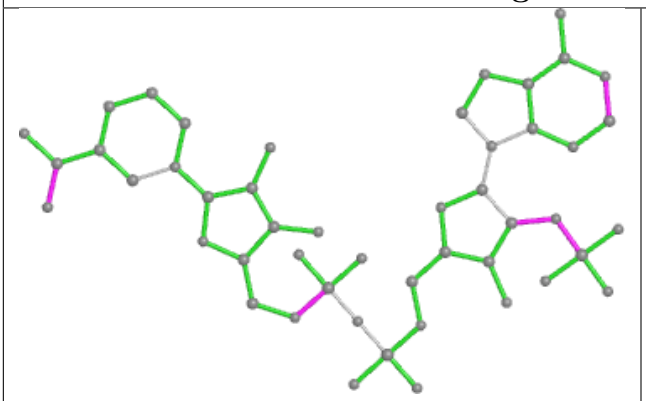
There are no ring outliers.

4 monomers are involved in 8 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	4102	NDP	2	0
3	B	4102	NDP	2	0
2	B	4101	COZ	2	0
2	A	4101	COZ	2	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 NDP A 4102



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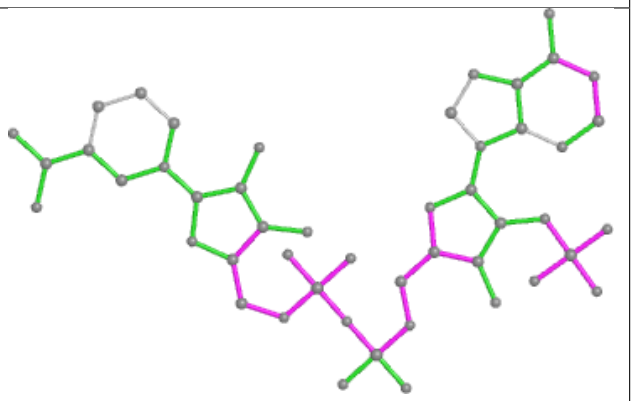

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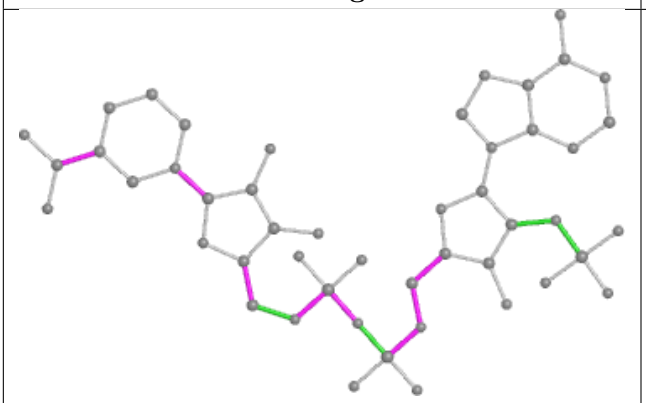
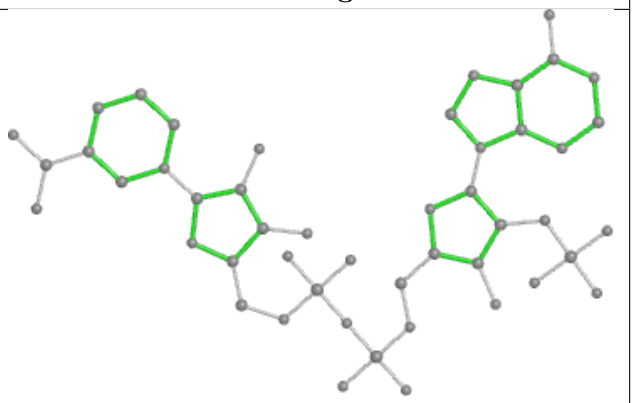


Torsions



Rings

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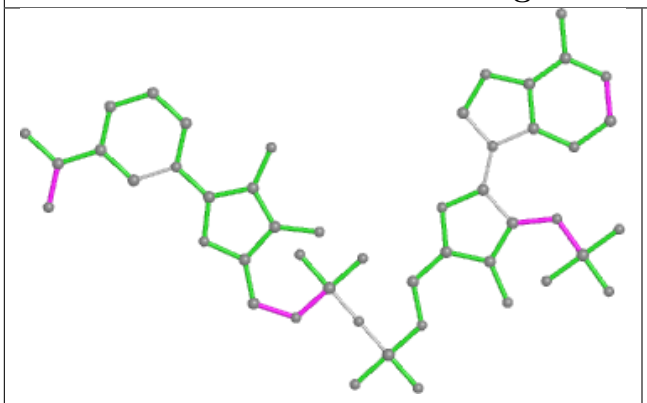

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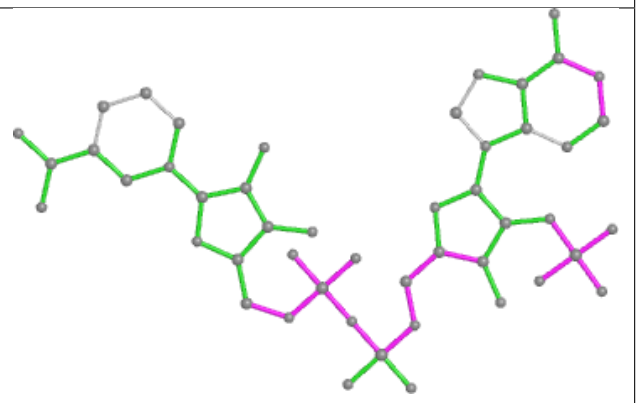

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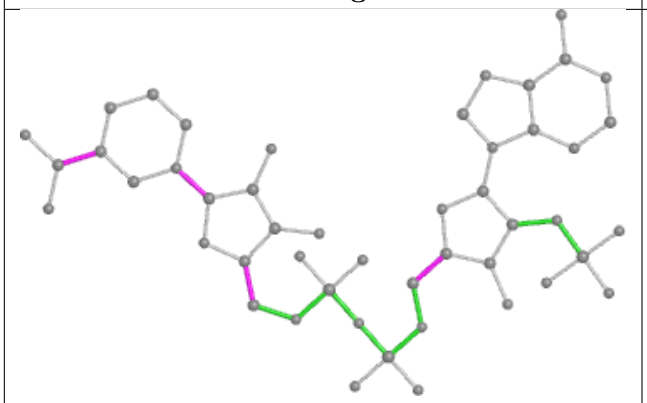

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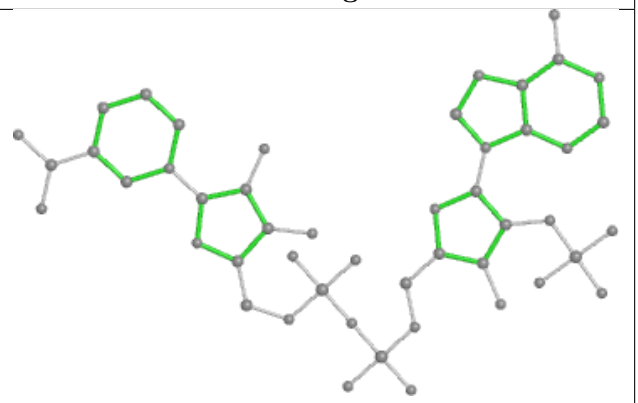
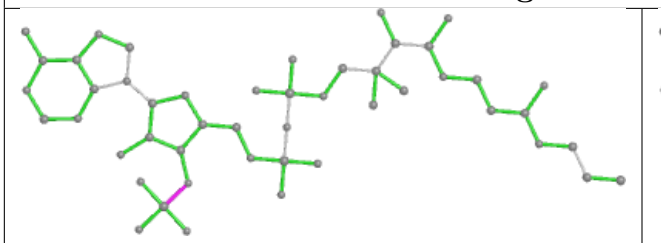


Rings

Ligand COZ B 4101



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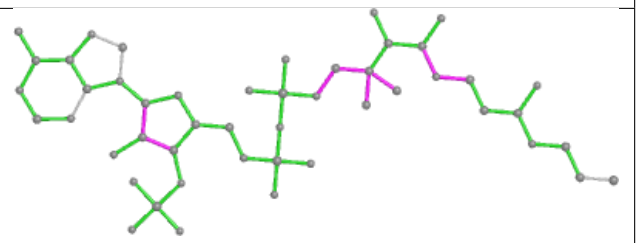

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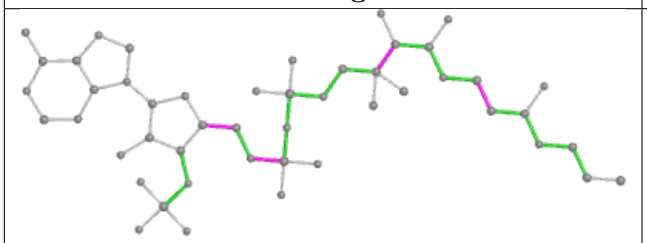
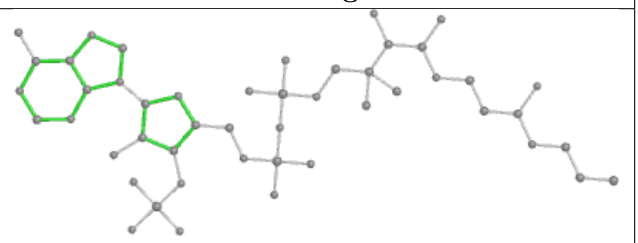
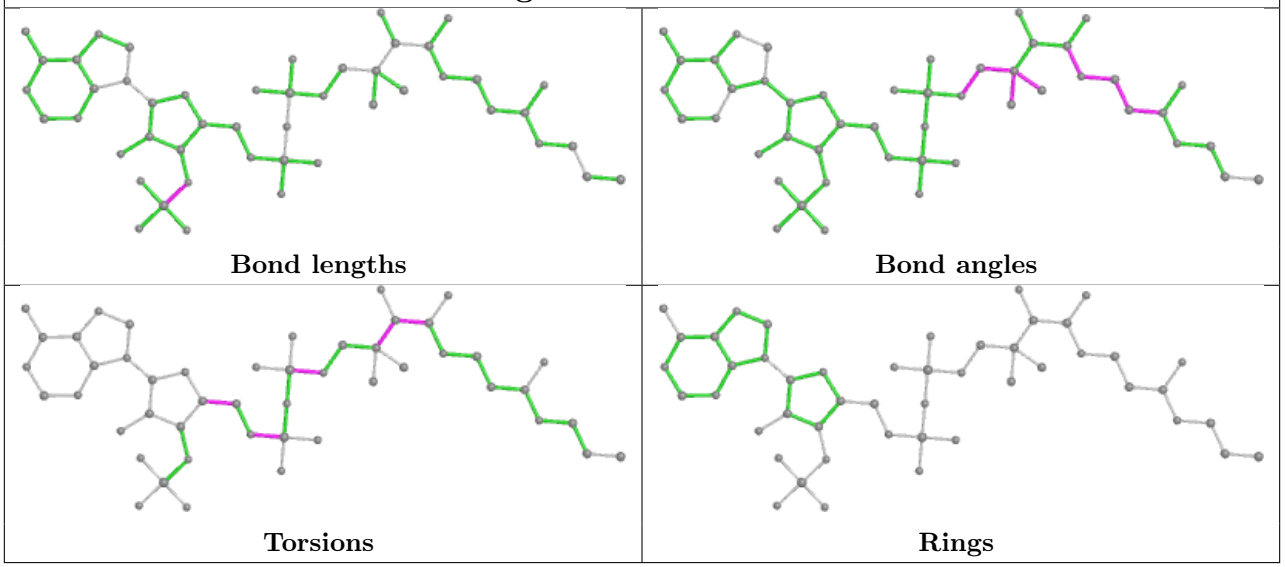


Torsions



Rings

Ligand COZ A 4101



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.

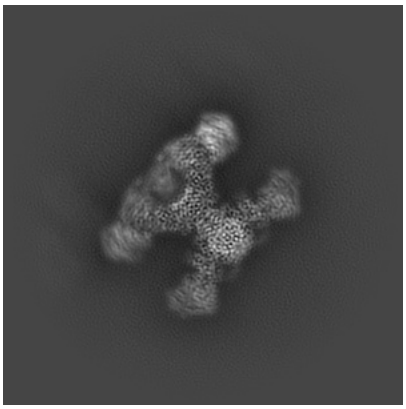
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-66475. These allow visual inspection of the internal detail of the map and identification of artifacts.

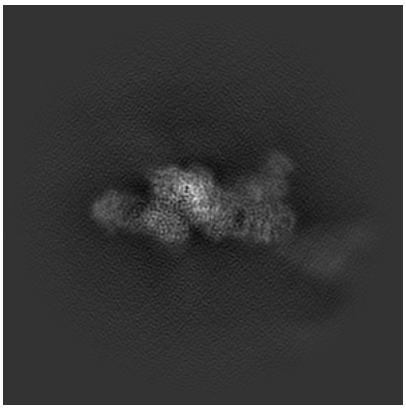
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

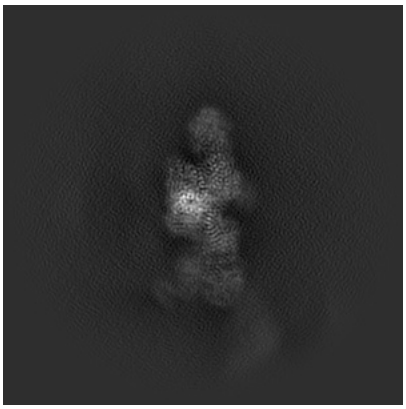
6.1.1 Primary map



X

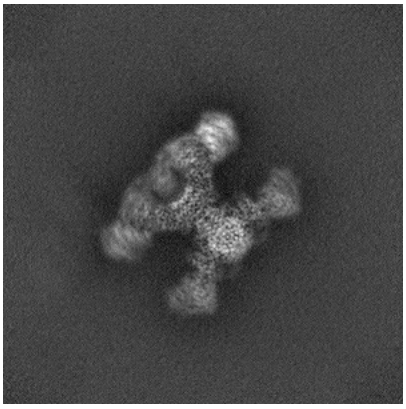


Y

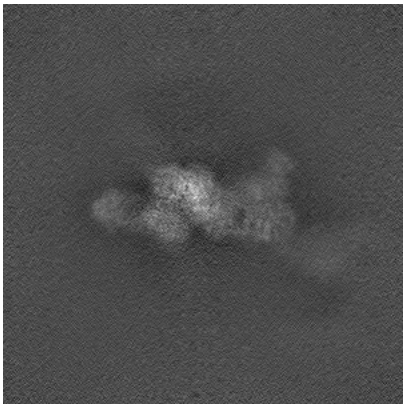


Z

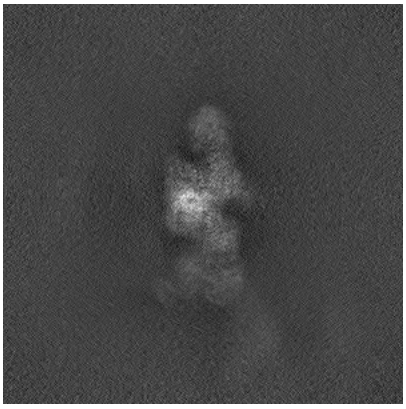
6.1.2 Raw map



X



Y

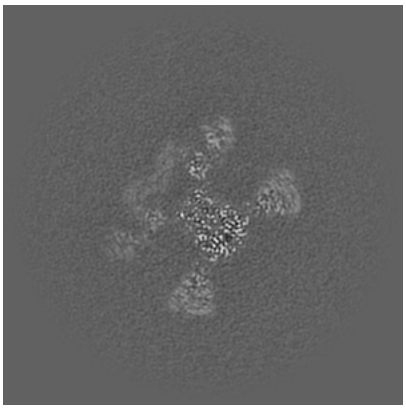


Z

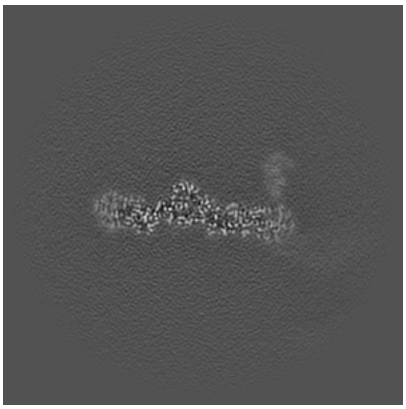
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

6.2.1 Primary map



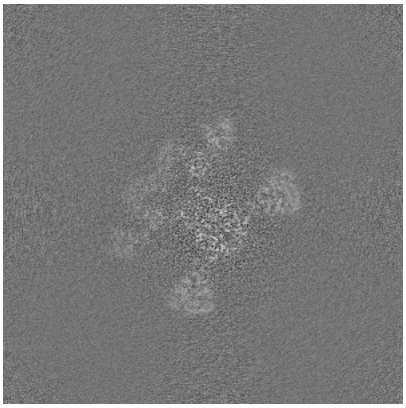
X Index: 288



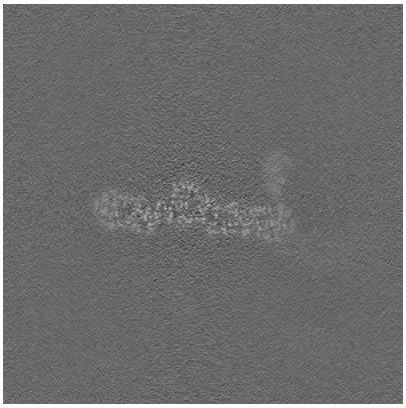
Y Index: 288

Z Index: 288

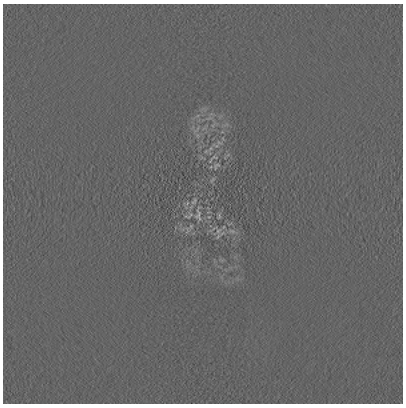
6.2.2 Raw map



X Index: 288



Y Index: 288

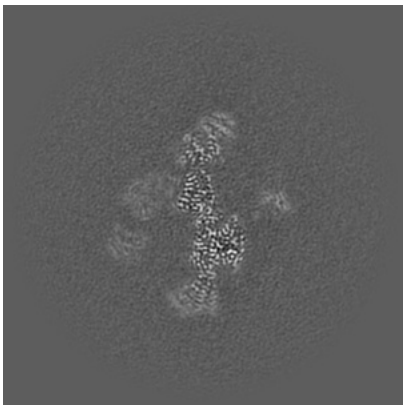


Z Index: 288

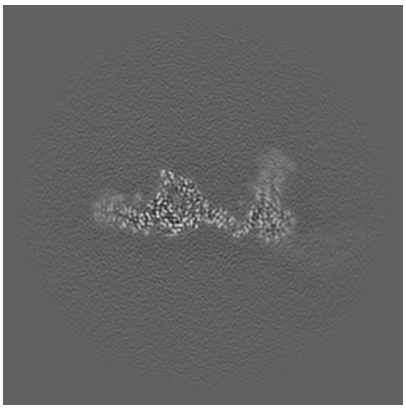
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

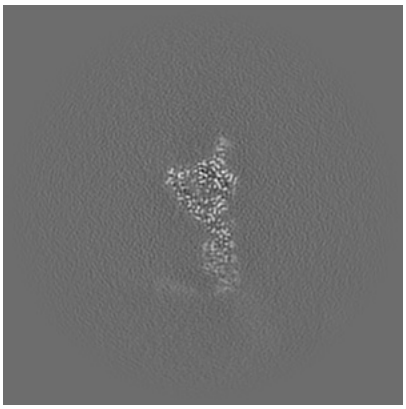
6.3.1 Primary map



X Index: 272

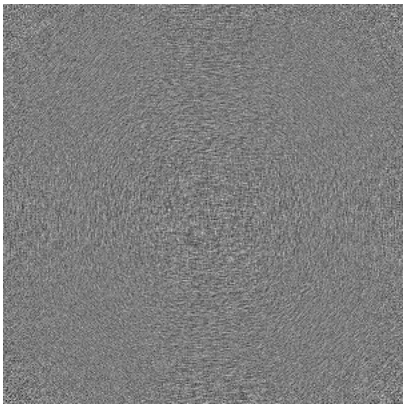


Y Index: 299

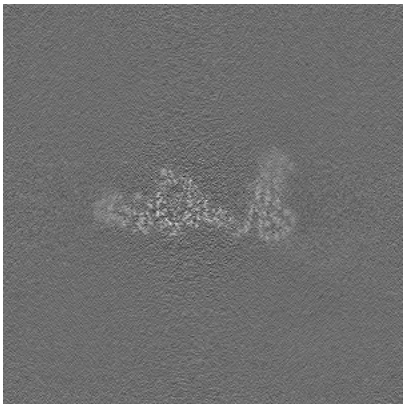


Z Index: 260

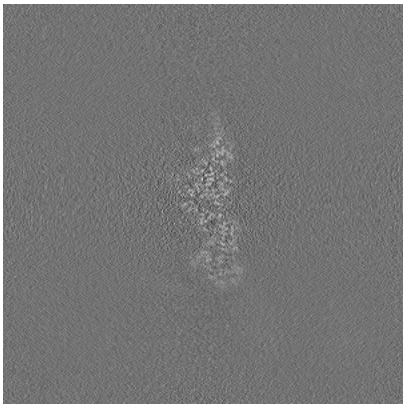
6.3.2 Raw map



X Index: 0



Y Index: 300

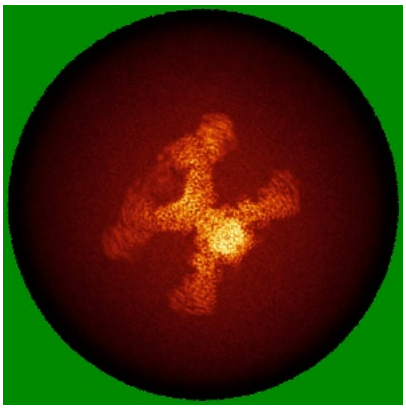


Z Index: 268

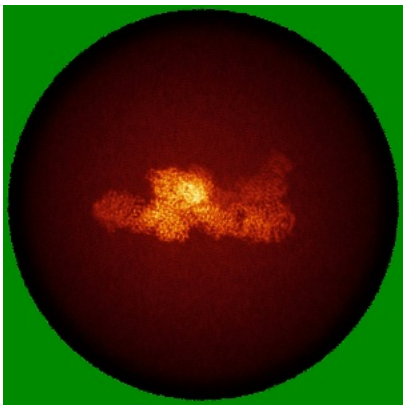
The images above show the largest variance slices of the map in three orthogonal directions.

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

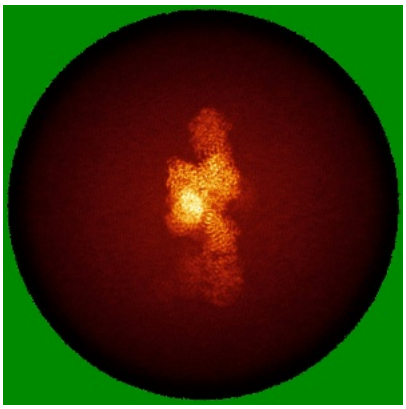
6.4.1 Primary map



X

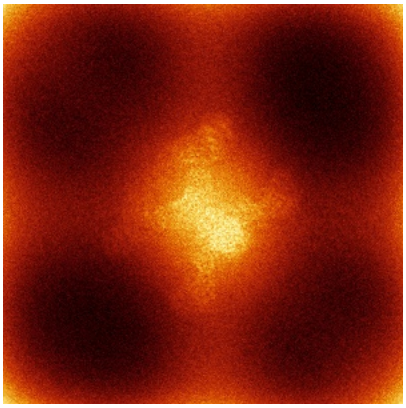


Y

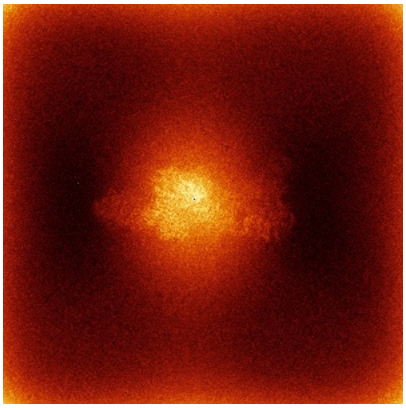


Z

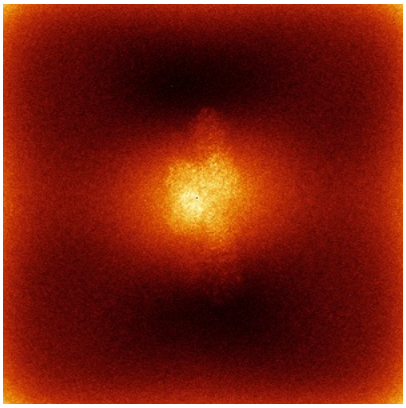
6.4.2 Raw map



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.

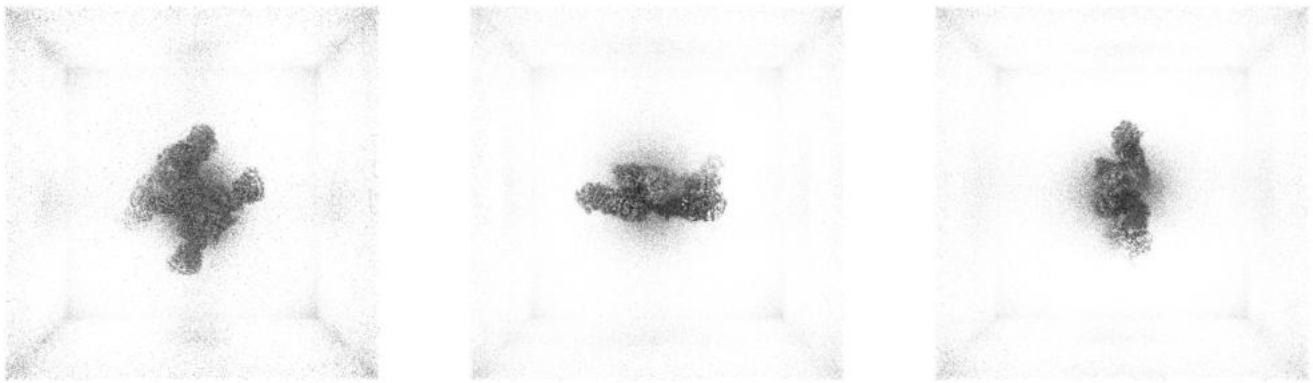
6.5 Orthogonal surface views (i)

6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.08. 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.

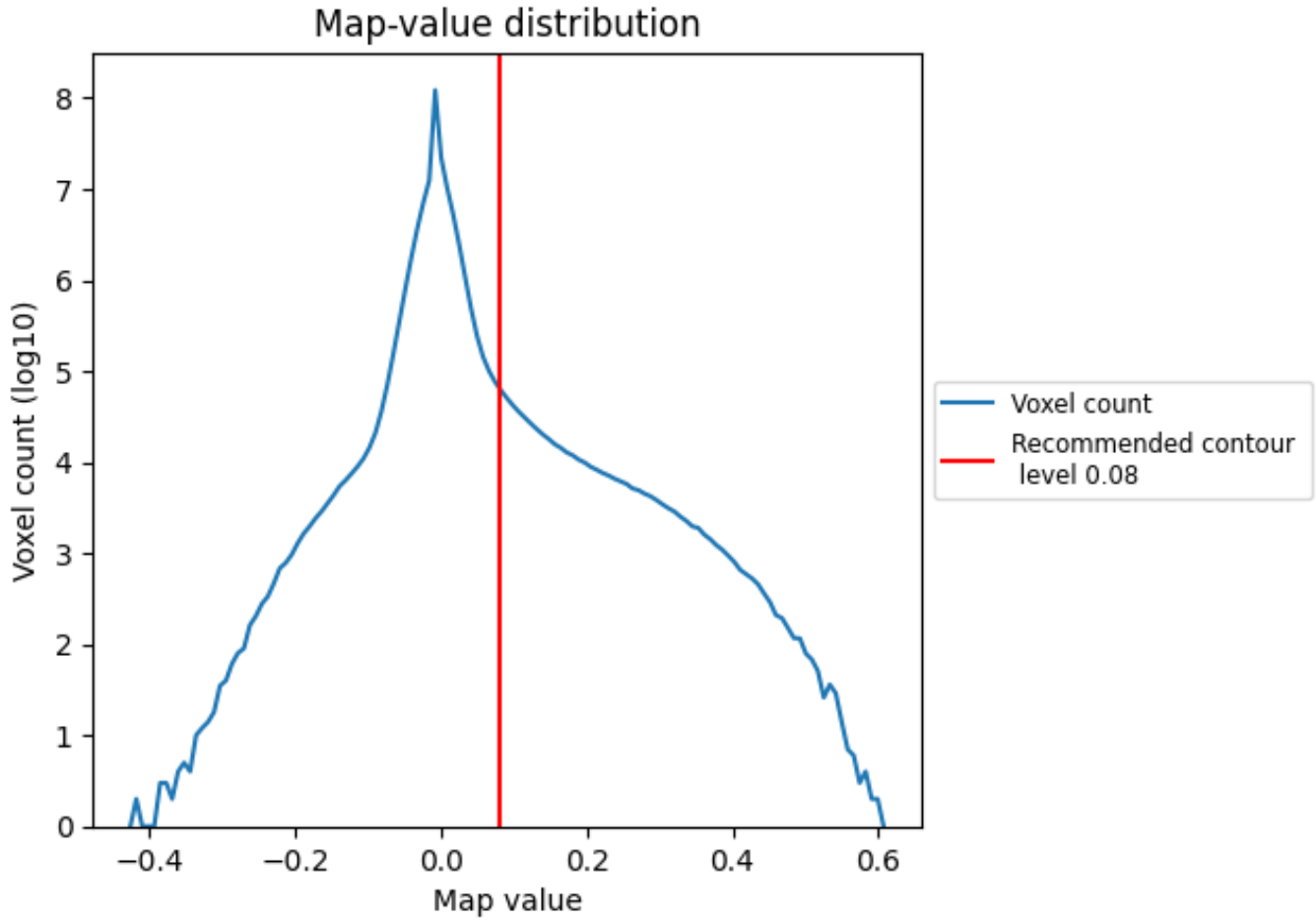
6.6 Mask visualisation (i)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis

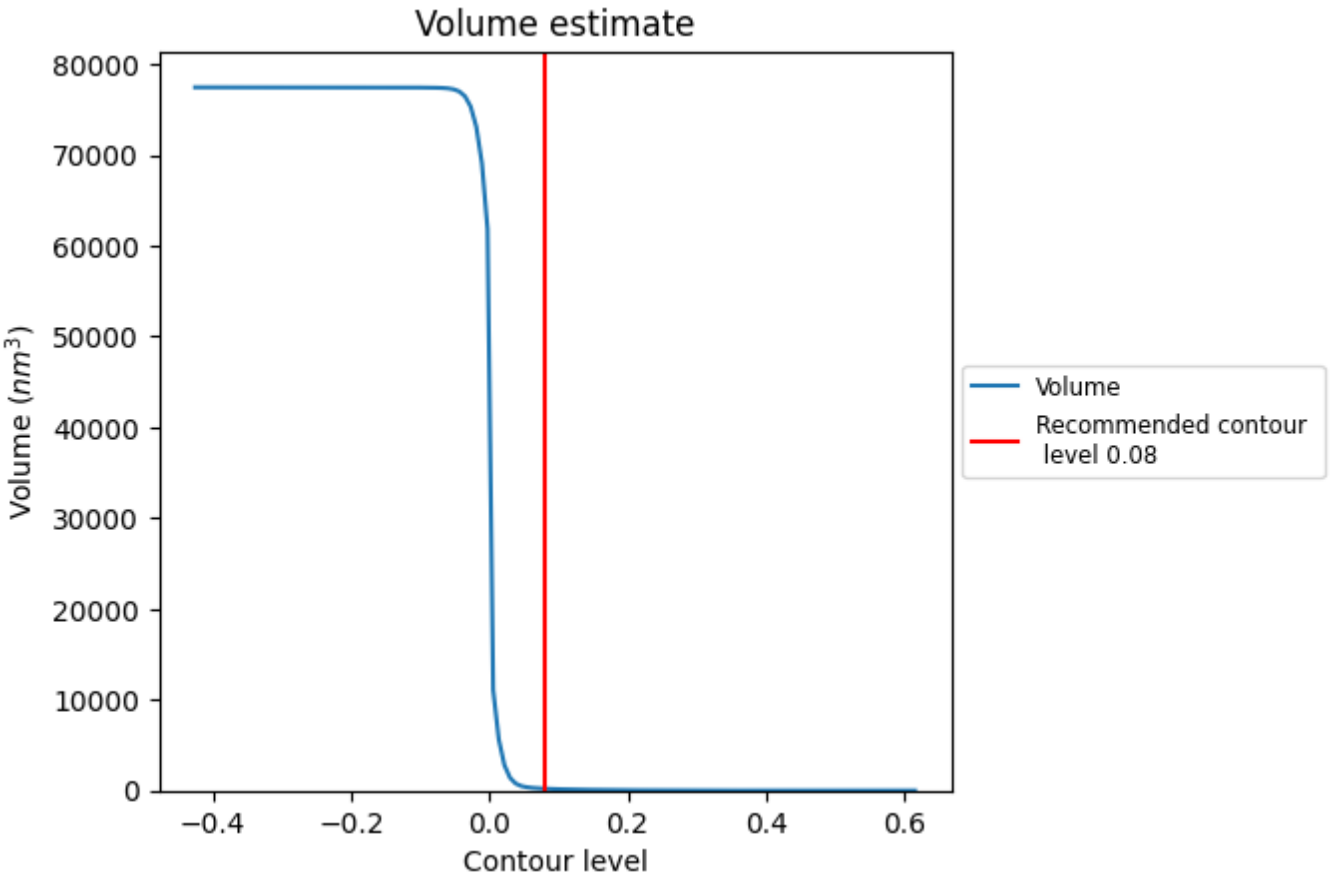
This section contains the results of statistical analysis of the map.

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.

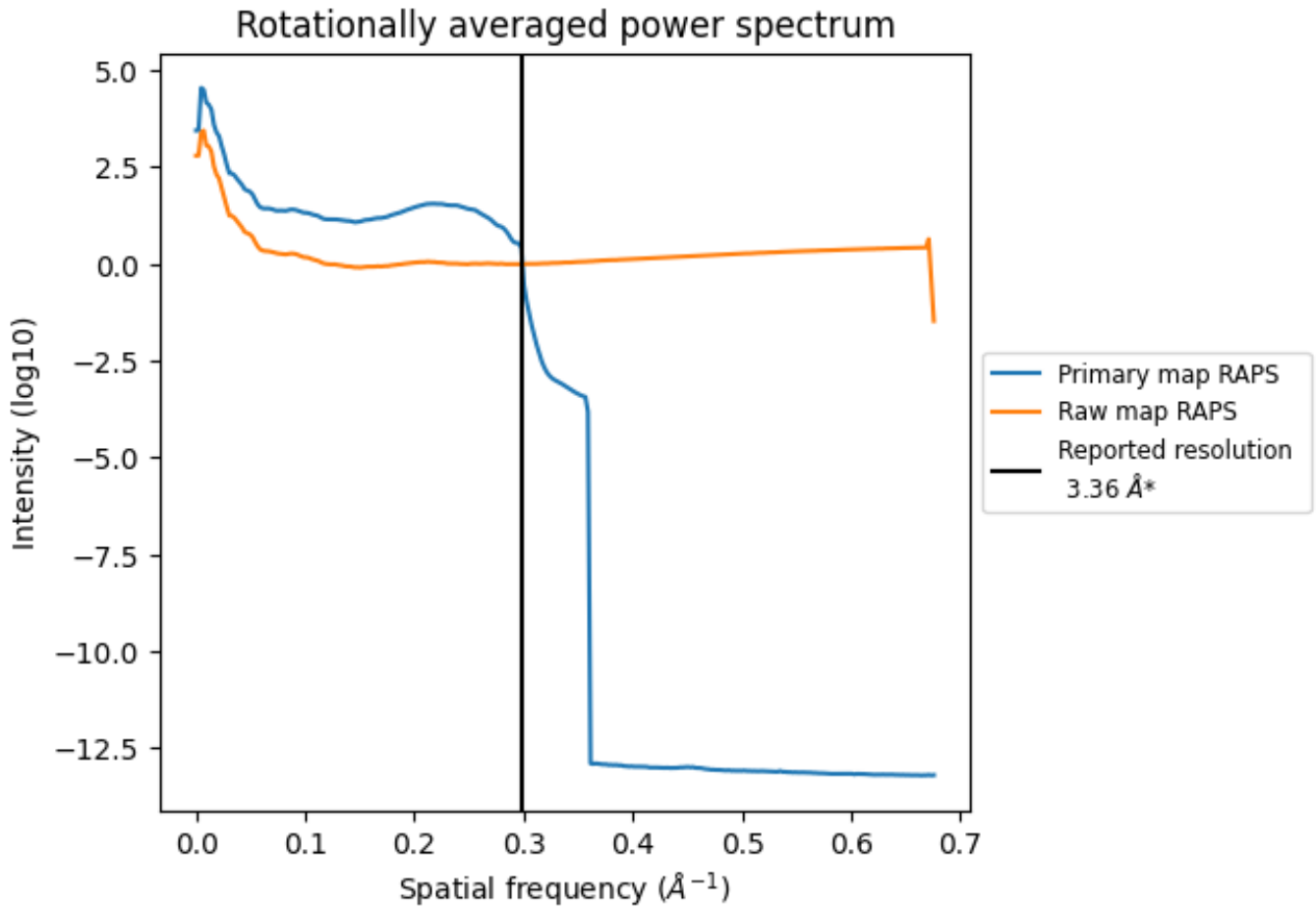
7.2 Volume estimate (i)



The volume at the recommended contour level is 206 nm^3; this corresponds to an approximate mass of 186 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)

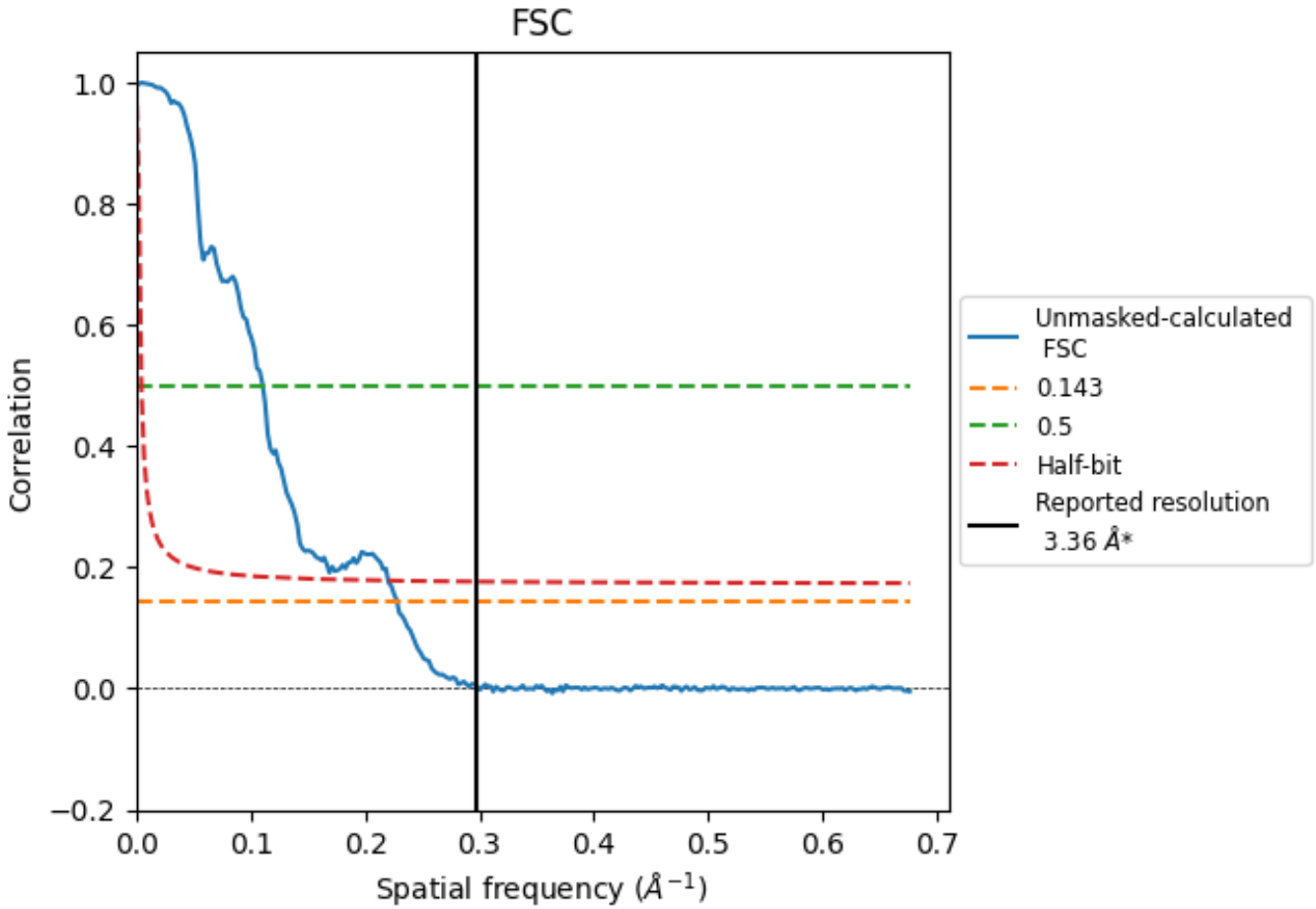


*Reported resolution corresponds to spatial frequency of 0.298 $Å^{-1}$

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 0.298 Å^{-1}

8.2 Resolution estimates (i)

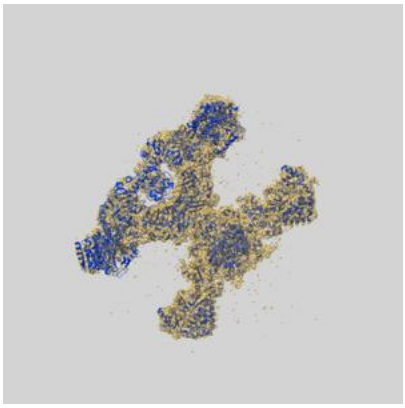
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.36	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.39	9.05	4.54

*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 4.39 differs from the reported value 3.36 by more than 10 %

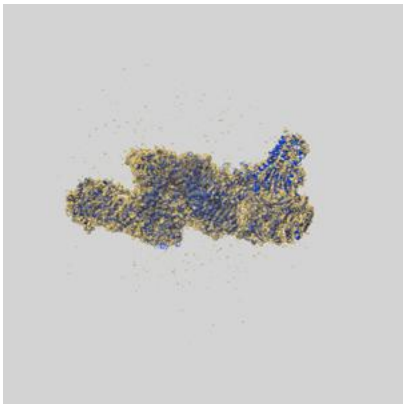
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-66475 and PDB model 9X2A. Per-residue inclusion information can be found in section 3 on page 5.

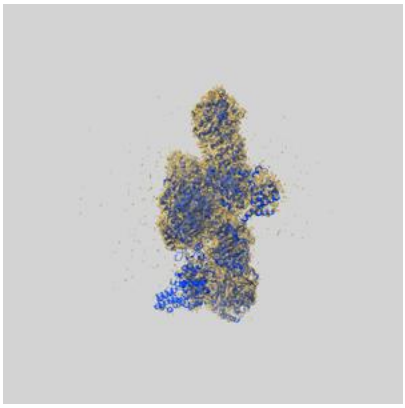
9.1 Map-model overlay



X



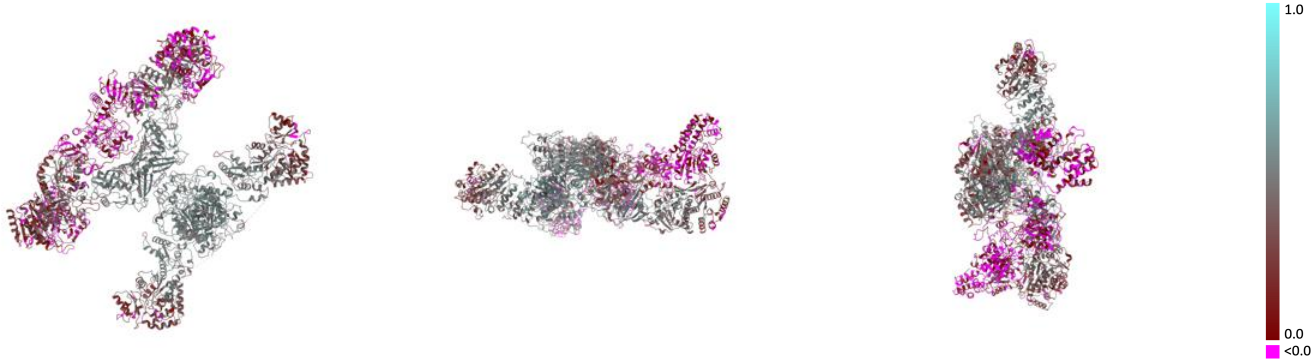
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.08 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.

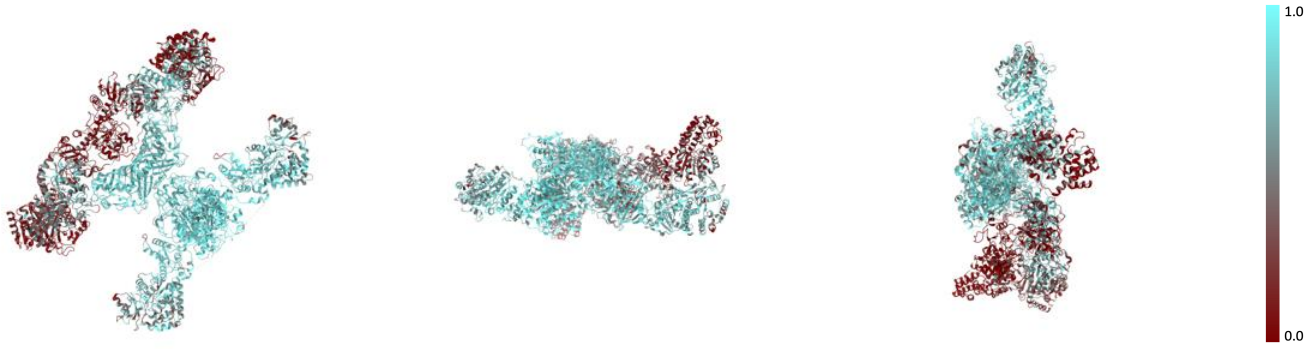
9.2 Q-score mapped to coordinate model



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.

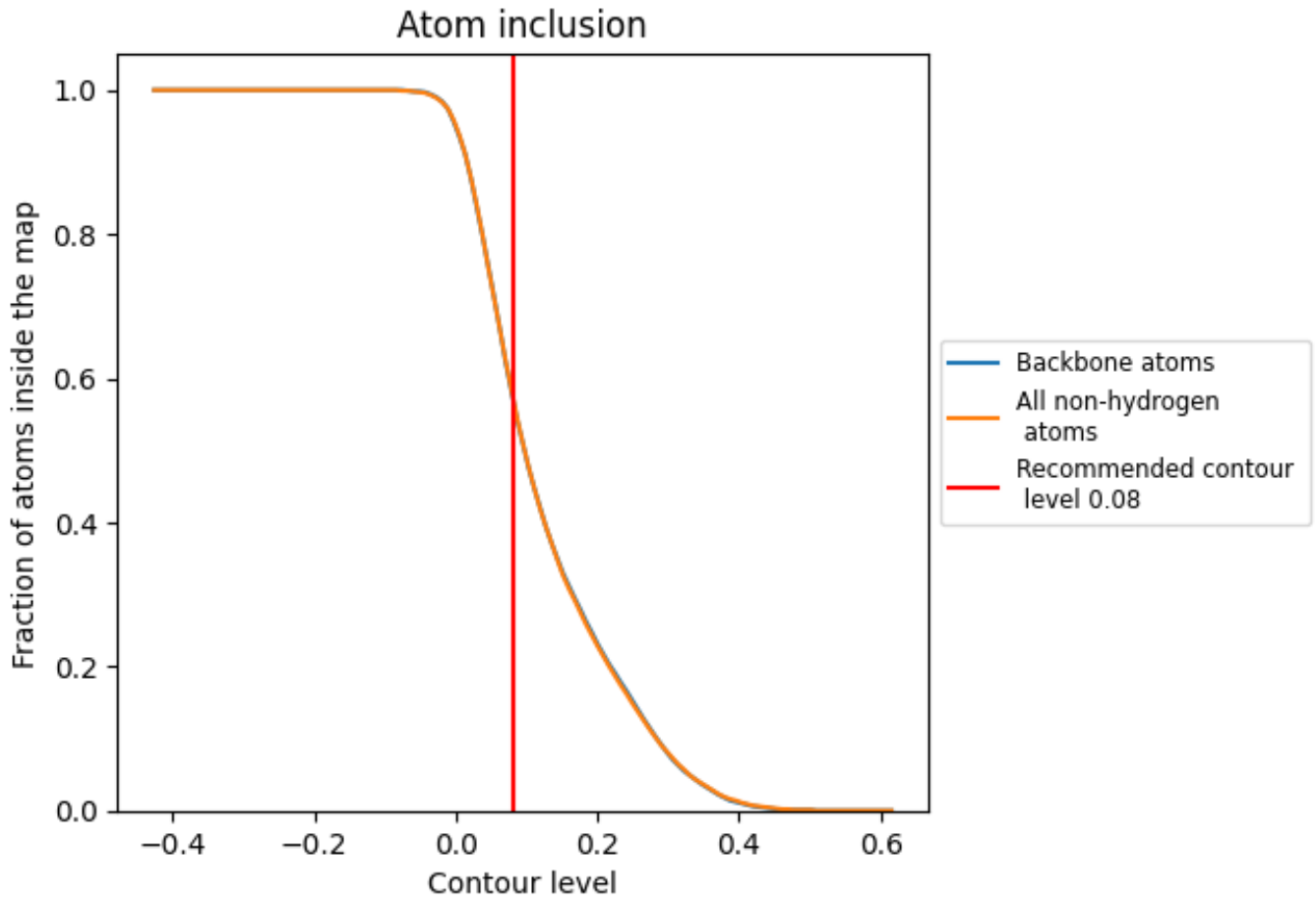
9.3 Atom inclusion mapped to coordinate model



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 (0.08).

9.4 Atom inclusion (i)



At the recommended contour level, 58% of all backbone atoms, 58% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.08) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5780	0.3170
A	0.6280	0.3280
B	0.5340	0.3060