wwPDB EM Validation Summary Report

Aug 28, 2025 – 03:15 PM EDT

PDB ID	:	9CI3 / pdb_00009ci3
EMDB ID	:	EMD-45609
Title	:	Structure of the LRRK2/14-3-3 complex
Authors	:	Martinez Fiesco, J.A.; Zhang, P.
Deposited on	:	2024-07-02
Resolution	:	3.96 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:

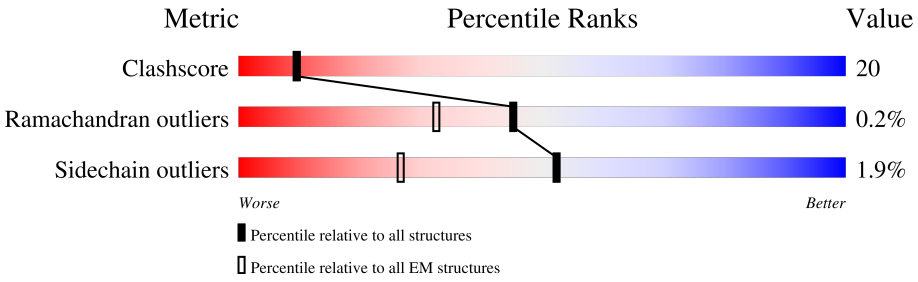
EMDB validation analysis	:	0.0.1.dev126
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.0rc1
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.45.1

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 3.96 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)
Clashscore	210492	15764
Ramachandran outliers	207382	16835
Sidechain outliers	206894	16415

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	B	265	43% 55% 35% 9%
1	C	265	32% 54% 34% • 11%
2	A	2562	28% 36% 23% • 41%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 15926 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 14-3-3 protein gamma.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	C	237	Total	C	N	O	S	0	0
			1909	1190	325	384	10		
1	B	240	Total	C	N	O	S	0	0
			1935	1204	330	391	10		

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	-17	MET	-	initiating methionine	UNP P61981
C	-16	GLY	-	expression tag	UNP P61981
C	-15	SER	-	expression tag	UNP P61981
C	-14	HIS	-	expression tag	UNP P61981
C	-13	HIS	-	expression tag	UNP P61981
C	-12	HIS	-	expression tag	UNP P61981
C	-11	HIS	-	expression tag	UNP P61981
C	-10	HIS	-	expression tag	UNP P61981
C	-9	HIS	-	expression tag	UNP P61981
C	-8	SER	-	expression tag	UNP P61981
C	-7	GLY	-	expression tag	UNP P61981
C	-6	GLU	-	expression tag	UNP P61981
C	-5	ASN	-	expression tag	UNP P61981
C	-4	LEU	-	expression tag	UNP P61981
C	-3	TYR	-	expression tag	UNP P61981
C	-2	PHE	-	expression tag	UNP P61981
C	-1	GLN	-	expression tag	UNP P61981
C	0	GLY	-	expression tag	UNP P61981
B	-17	MET	-	initiating methionine	UNP P61981
B	-16	GLY	-	expression tag	UNP P61981
B	-15	SER	-	expression tag	UNP P61981
B	-14	HIS	-	expression tag	UNP P61981
B	-13	HIS	-	expression tag	UNP P61981
B	-12	HIS	-	expression tag	UNP P61981
B	-11	HIS	-	expression tag	UNP P61981
B	-10	HIS	-	expression tag	UNP P61981

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Chain	Residue	Modelled	Actual	Comment	Reference
B	-9	HIS	-	expression tag	UNP P61981
B	-8	SER	-	expression tag	UNP P61981
B	-7	GLY	-	expression tag	UNP P61981
B	-6	GLU	-	expression tag	UNP P61981
B	-5	ASN	-	expression tag	UNP P61981
B	-4	LEU	-	expression tag	UNP P61981
B	-3	TYR	-	expression tag	UNP P61981
B	-2	PHE	-	expression tag	UNP P61981
B	-1	GLN	-	expression tag	UNP P61981
B	0	GLY	-	expression tag	UNP P61981

- Molecule 2 is a protein called Leucine-rich repeat serine/threonine-protein kinase 2.

Mol	Chain	Residues	Atoms						AltConf	Trace
2	A	1521	Total	C	N	O	P	S	0	0
			12054	7711	2074	2197	2	70		

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-34	MET	-	initiating methionine	UNP Q5S007
A	-33	GLY	-	expression tag	UNP Q5S007
A	-32	SER	-	expression tag	UNP Q5S007
A	-31	ASP	-	expression tag	UNP Q5S007
A	-30	TYR	-	expression tag	UNP Q5S007
A	-29	LYS	-	expression tag	UNP Q5S007
A	-28	ASP	-	expression tag	UNP Q5S007
A	-27	HIS	-	expression tag	UNP Q5S007
A	-26	ASP	-	expression tag	UNP Q5S007
A	-25	GLY	-	expression tag	UNP Q5S007
A	-24	ASP	-	expression tag	UNP Q5S007
A	-23	TYR	-	expression tag	UNP Q5S007
A	-22	LYS	-	expression tag	UNP Q5S007
A	-21	ASP	-	expression tag	UNP Q5S007
A	-20	HIS	-	expression tag	UNP Q5S007
A	-19	ASP	-	expression tag	UNP Q5S007
A	-18	ILE	-	expression tag	UNP Q5S007
A	-17	ASP	-	expression tag	UNP Q5S007
A	-16	TYR	-	expression tag	UNP Q5S007
A	-15	LYS	-	expression tag	UNP Q5S007
A	-14	ASP	-	expression tag	UNP Q5S007
A	-13	ASP	-	expression tag	UNP Q5S007

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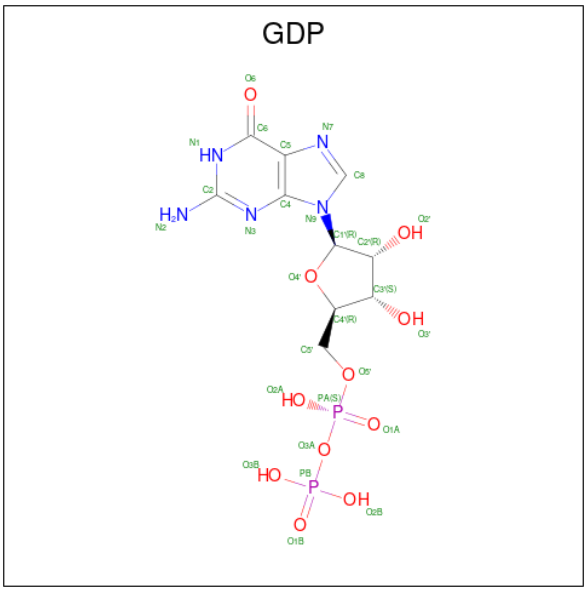
Chain	Residue	Modelled	Actual	Comment	Reference
A	-12	ASP	-	expression tag	UNP Q5S007
A	-11	ASP	-	expression tag	UNP Q5S007
A	-10	LYS	-	expression tag	UNP Q5S007
A	-9	LEU	-	expression tag	UNP Q5S007
A	-8	GLY	-	expression tag	UNP Q5S007
A	-7	LEU	-	expression tag	UNP Q5S007
A	-6	GLU	-	expression tag	UNP Q5S007
A	-5	VAL	-	expression tag	UNP Q5S007
A	-4	LEU	-	expression tag	UNP Q5S007
A	-3	PHE	-	expression tag	UNP Q5S007
A	-2	GLN	-	expression tag	UNP Q5S007
A	-1	GLY	-	expression tag	UNP Q5S007
A	0	PRO	-	expression tag	UNP Q5S007
A	50	HIS	ARG	variant	UNP Q5S007

- Molecule 3 is GUANOSINE-5'-DIPHOSPHATE (CCD ID: GDP) (formula: $C_{10}H_{15}N_5O_{11}P_2$).



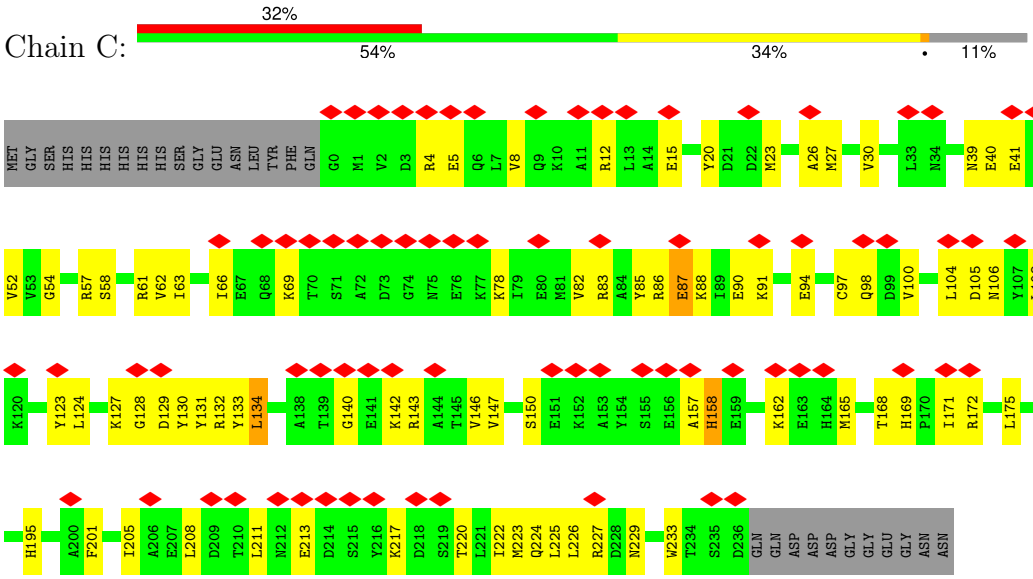
Mol	Chain	Residues	Atoms					AltConf
3	A	1	Total	C	N	O	P	0
			28	10	5	11	2	

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.

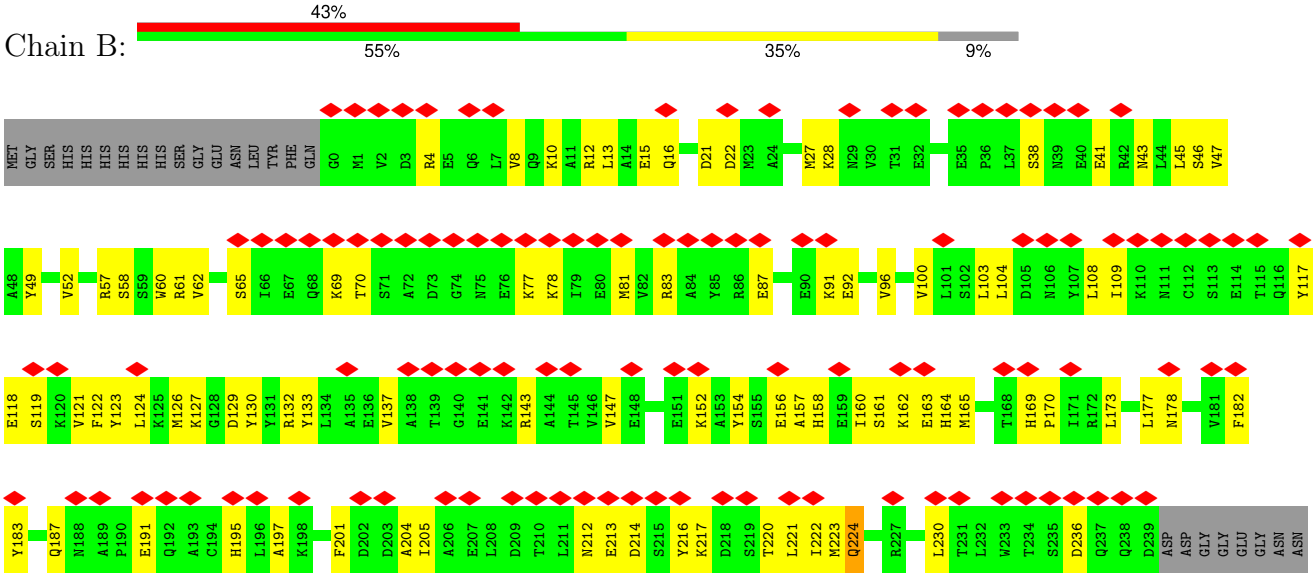
• Molecule 1: 14-3-3 protein gamma

Chain C:



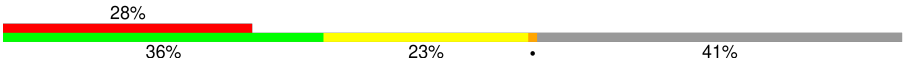
• Molecule 1: 14-3-3 protein gamma

Chain B:

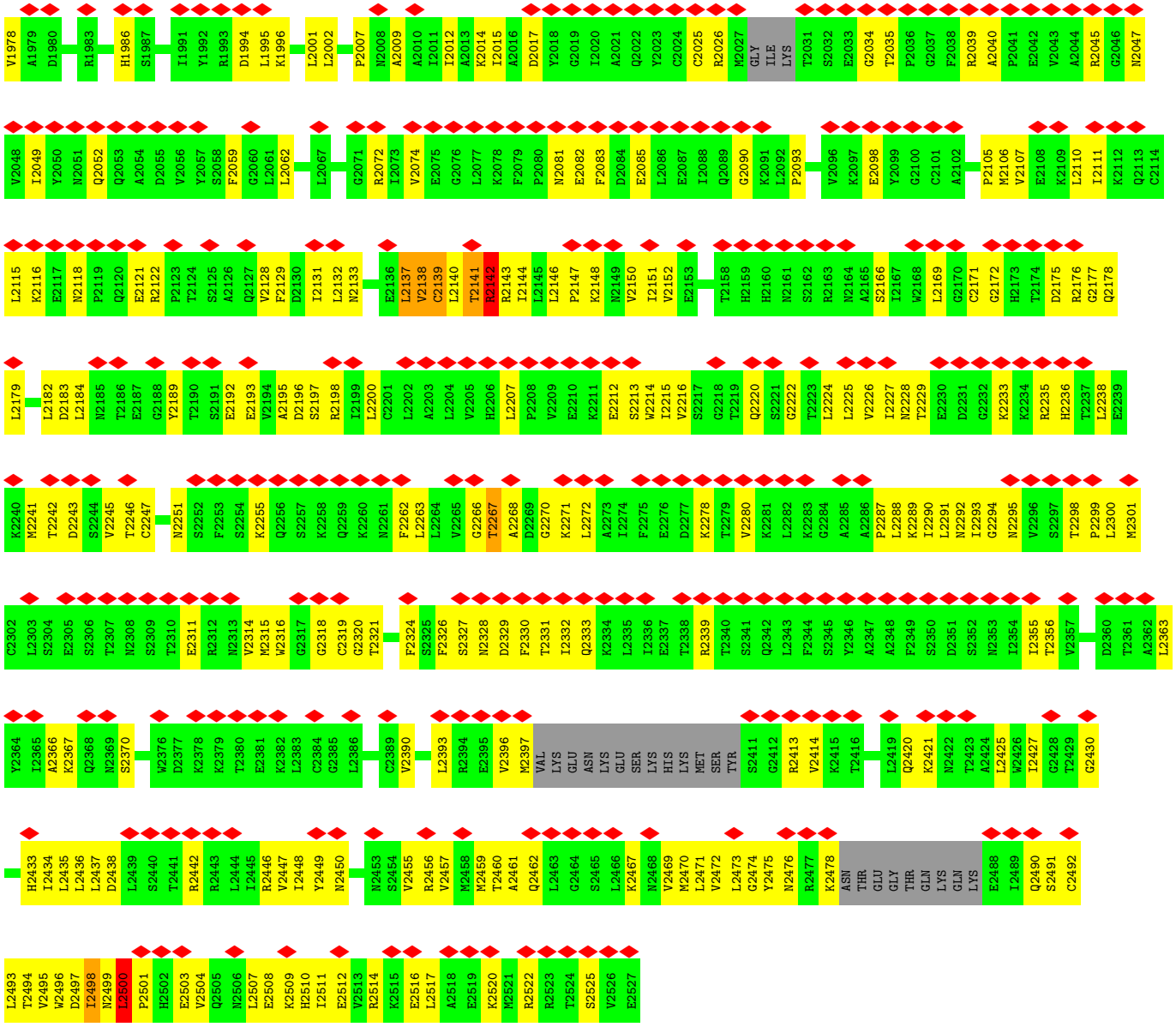


• Molecule 2: Leucine-rich repeat serine/threonine-protein kinase 2

Chain A:




F1050 P1051 S1052 Y1053 L1054 L1055 K1056 M1057 S1058 C1059 I1060 A1061 N1062 S1066 R1067 N1068 G1071 P1072 S1073 V1074 V1075 L1076 D1077 P1078 T1079 V1080 K1081 C1082 P1083 T1084 L1085 K1086 Q1087 F1088 S1091 Y1092 N1093 Q1094 L1095 S1096 F1097 E1100 N1101 L1102 T1103 D1104 V1105 V1106 E1107 K1108 L1109 E1110 L1114 E1115 G1116
N1117 K1118 I1119 S1120 G1121 I1122 C1123 R1127 L1128 K1129 E1130 L1134 N1135 L1136 S1137 K1138 N1139 H1140 I1141 S1142 S1143 L1144 S1145 E1146 N1147 F1148 L1149 E1150 P1153 K1154 V1155 E1156 S1157 F1158 S1159 A1160 R1161 M1162 N1163 F1164 L1165 M1168 P1169 F1170 L1171 P1172 P1173 S1174 M1175 T1176 I1177 L1178 K1179 L1180 S1181 Q1182
N1183 K1184 F1185 S1186 C1187 I1188 P1189 E1190 A1191 I1192 L1193 N1194 L1195 P1196 H1197 L1198 R1199 S1200 L1201 D1202 M1203 S1204 S1205 N1206 D1207 I1208 Q1209 Y1210 L1211 P1212 G1213 P1214 A1215 H1216 W1217 K1218 S1219 L1220 N1221 L1222 R1223 E1224 L1225 L1226 F1227 S1228 H1229 N1230 Q1231 I1232 S1233 I1234 L1235 D1236 L1237 S1238 E1239 K1240 A1241 Y1242
L1243 W1244 S1245 R1246 K1249 L1250 H1251 L1252 L1257 K1258 E1259 I1260 E1263 I1264 G1265 C1266 L1267 E1268 N1269 L1270 T1271 S1272 L1273 D1274 V1275 S1276 Y1277 N1278 L1279 E1280 L1281 R1282 S1283 F1284 P1285 N1286 E1287 M1288 G1289 K1290 L1291 S1292 K1293 I1294 W1295 D1296 L1297 P1298 L1299 D1300 E1301 L1302 H1303 L1304 N1305 F1306 D1307
F1308 K1309 H1310 I1311 G1312 C1313 K1314 A1315 K1316 D1317 I1318 I1319 R1320 F1321 L1322 Q1323 Q1324 R1325 L1326 K1327 K1328 A1329 V1330 N1333 R1334 M1335 K1336 L1337 M1338 I1339 V1340 G1341 N1342 G1346 L1351 Q1352 Q1353 L1354 M1355 K1356 T1357 K1358 K1359 S1360 D1361 L1362 G1363 M1364 Q1365 V1369 G1370 I1371 D1372 V1373 K1374 D1375
W1376 P1377 I1378 R1381 D1382 K1383 R1384 K1385 R1386 D1387 L1388 V1389 V1392 F1395 F1401 Y1402 S1403 T1404 H1405 P1406 H1407 F1408 M1409 Y1415 L1416 A1417 V1418 G1424 Q1425 D1429 A1430 M1431 K1432 P1433 W1434 L1435 F1436 N1437 I1438 K1439 S1444 I1448 L1449 L1454 D1455 V1456 S1457 ASP GLU LYS
GLN ARG K1463 K1468 L1474 N1475 K1476 R1477 P1480 A1481 I1482 Y1485 V1488 N1489 A1490 T1491 E1492 E1493 L1497 A1498 K1499 L1500 R1501 K1502 T1503 I1504 I1505 N1506 E1507 S1508 L1509 K1512 I1513 Q1516 L1517 V1518 V1519 G1520 Q1521 I1522 I1523 P1524 D1525 C1526 Y1527 V1528 E1529 L1530 I1533 I1534 L1535
S1536 E1537 R1538 K1539 T1543 E1544 F1545 I1548 D1549 R1550 K1551 R1552 Q1555 L1556 V1557 R1558 E1559 N1560 Q1561 L1562 Q1563 L1564 D1565 E1566 N1567 E1568 L1569 H1574 F1575 L1576 S1579 G1580 V1581 L1582 L1583 H1584 F1585 Q1586 D1587 P1588 A1589 L1590 Q1591 L1592 S1593 D1594 L1595 Y1596 F1597 V1598 E1599 W1602 L1603
I1606 M1607 A1608 Q1609 I1610 L1611 V1615 E1616 G1617 C1618 P1619 K1620 H1621 P1622 K1623 G1624 I1625 E1632 K1633 F1634 L1635 S1636 K1637 LYS ARG LYS PHE PRO LYS N1644 Y1645 M1646 S1647 Q1648 Y1649 F1650 K1651 L1652 L1653 E1654 K1655 F1656 Q1657 I1658 A1659 LEU PRO ILE GLY GLU GLU TYR LEU L1668 V1669 L1673 S1674
D1675 H1676 R1677 I1680 E1681 L1682 P1683 H1684 C1685 E1686 N1687 S1688 E1689 R1693 L1694 Y1695 P1701 M1702 G1703 F1704 W1705 S1706 R1707 L1708 I1709 N1710 R1711 L1712 L1713 E1714 P1717 Y1718 MET LEU SER GLY ARG GLU ARG A1726 L1727 R1728 P1729 N1730 R1731 M1732 Y1733 W1734 R1735 Q1736 G1737 I1738 Y1739 W1742
L1749 V1750 H1758 L1763 K1764 V1767 R1771 K1772 I1775 L1776 L1777 V1780 V1781 I1784 W1791 E1797 I1798 D1799 I1800 C1801 G1802 E1803 G1804 E1805 W1811 Y1814 S1815 D1818 G1819 E1820 E1821 H1822 L1826 L1827 D1828 D1829 L1830 M1831 A1834 E1835 E1836 G1837 D1838 L1839 L1840 V1841
D1844 Q1845 P1846 R1847 P1851 Q1854 D1858 A1862 D1863 L1864 P1865 R1866 N1867 I1868 M1869 L1870 D1873 E1874 L1875 E1876 F1877 E1878 Q1879 A1880 P1881 E1882 F1883 L1884 L1885 G1886 D1887 G1888 S1889 F1890 G1891 S1892 V1893 Y1894 R1895 A1896 A1897 Y1898 E1899 G1900 E1901 E1902 V1905 K1906 I1907 F1908 N1909 K1910 H1911
T1912 S1913 L1914 R1915 L1916 L1917 R1918 Q1919 E1920 L1921 V1922 V1923 L1924 C1925 H1926 L1927 H1928 H1929 P1930 S1931 L1932 I1933 S1934 L1935 G1939 I1940 R1941 P1942 R1943 M1944 L1945 V1946 H1947 E1948 L1949 A1950 L1955 D1956 R1957 L1958 L1959 Q1960 Q1961 D1962 K1963 A1964 S1965 L1966 T1967 R1968 Q1971 H1972 R1973 I1974 A1975 L1976 H1977


V1978 A1979 D1980 R1983 H1986 S1987 I1991 Y1992 R1993 D1994 L1995 K1996 L2001 L2002 P2007 N2008 A2009 A2010 I2011 I2012 A2013 K2014 I2015 A2016 D2017 Y2018 G2019 I2020 A2021 Q2022 Y2023 C2024 C2025 R2026 M2027 GLY ILE LYS T2031 S2032 E2033 G2034 T2035 P2036 G2037 F2038 R2039 A2040 P2041 E2042 V2043 A2044 R2045 G2046 N2047
V2048 I2049 Y2050 N2051 Q2052 Q2053 A2054 D2055 V2056 Y2057 S2058 F2059 G2060 L2061 L2062 L2067 G2071 R2072 I2073 V2074 E2075 G2076 L2077 K2078 F2079 P2080 N2081 E2082 F2083 D2084 E2085 L2086 E2087 I2088 Q2089 G2090 K2091 L2092 P2093 V2096 K2097 E2098 Y2099 G2100 C2101 A2102 P2105 M2106 V2107 E2108 K2109 L2110 I2111 K2112 Q2113 C2114
L2115 K2116 E2117 N2118 P2119 Q2120 E2121 R2122 P2123 T2124 S2125 A2126 Q2127 V2128 F2129 D2130 I2131 L2132 N2133 E2136 L2137 V2138 C2139 L2140 T2141 R2142 R2143 T2144 L2145 L2146 P2147 K2148 N2149 V2150 I2151 V2152 E2153 T2158 H2159 H2160 N2161 S2162 R2163 N2164 A2165 S2166 I2167 W2168 L2169 G2170 C2171 G2172 H2173 T2174 D2175 R2176 G2177 Q2178
L2179 L2182 D2183 L2184 N2185 T2186 E2187 G2188 Y2189 T2190 S2191 E2192 E2193 V2194 A2195 D2196 S2197 R2198 I2199 L2200 C2201 L2202 A2203 L2204 V2205 H2206 L2207 P2208 V2209 E2210 K2211 E2212 S2213 W2214 I2215 V2216 S2217 G2218 T2219 Q2220 S2221 G2222 T2223 L2224 L2225 V2226 I2227 N2228 T2229 E2230 D2231 G2232 K2233 K2234 R2235 H2236 T2237 L2238 E2239
K2240 M2241 T2242 D2243 S2244 V2245 T2246 C2247 N2251 S2252 F2253 S2254 K2255 Q2256 S2257 K2258 Q2259 K2260 N2261 F2262 L2263 L2264 V2265 G2266 T2267 A2268 D2269 G2270 K2271 L2272 A2273 I2274 F2275 E2276 D2277 K2278 T2279 V2280 K2281 L2282 K2283 G2284 A2285 A2286 P2287 L2288 K2289 I2290 L2291 N2292 I2293 G2294 N2295 V2296 S2297 T2298 P2299 L2300 M2301
C2302 L2303 S2304 E2305 S2306 T2307 N2308 S2309 T2310 E2311 R2312 N2313 V2314 M2315 W2316 G2317 G2318 C2319 G2320 T2321 F2324 S2325 F2326 S2327 N2328 D2329 F2330 T2331 I2332 Q2333 K2334 L2335 I2336 E2337 T2338 R2339 T2340 S2341 Q2342 L2343 F2344 S2345 Y2346 A2347 A2348 F2349 S2350 D2351 S2352 N2353 I2354 I2355 T2356 V2357 D2360 T2361 A2362 L2363
Y2364 I2365 A2366 K2367 Q2368 N2369 S2370 W2376 D2377 K2378 K2379 T2380 E2381 K2382 L2383 C2384 G2385 L2386 C2389 V2390 L2393 R2394 E2395 V2396 M2397 VAL LYS GLU ASN LYS GLU SER LYS HIS LYS MET SER TYR S2411 G2412 R2413 V2414 K2415 T2416 L2419 Q2420 K2421 N2422 T2423 A2424 L2425 W2426 I2427 G2428 T2429 G2430
H2433 I2434 L2435 L2436 L2437 D2438 L2439 S2440 T2441 R2442 R2443 L2444 I2445 R2446 V2447 I2448 Y2449 N2450 N2453 S2454 V2455 R2456 V2457 M2458 M2459 T2460 A2461 Q2462 L2463 G2464 S2465 L2466 K2467 N2468 V2469 M2470 L2471 V2472 L2473 G2474 Y2475 N2476 R2477 K2478 ASN THR GLU GLY THR GLN LYS GLN LYS E2488 I2489 Q2490 S2491 C2492
L2493 T2494 V2495 W2496 D2497 T2498 N2499 L2500 P2501 H2502 E2503 V2504 Q2505 N2506 L2507 E2508 K2509 H2510 I2511 E2512 V2513 R2514 K2515 E2516 L2517 A2518 E2519 K2520 M2521 R2522 R2523 T2524 S2525 V2526 E2527

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	432285	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS TALOS	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	1200	Depositor
Magnification	Not provided	
Image detector	GATAN K3 BIOCONTINUUM (6k x 4k)	Depositor
Maximum map value	2.360	Depositor
Minimum map value	-0.002	Depositor
Average map value	0.001	Depositor
Map value standard deviation	0.020	Depositor
Recommended contour level	0.122	Depositor
Map size (Å)	325.62, 325.62, 325.62	wwPDB
Map dimensions	402, 402, 402	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.81, 0.81, 0.81	Depositor

5 Model quality

5.1 Standard geometry

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

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	B	0.17	0/1963	0.46	0/2648
1	C	0.17	0/1937	0.43	0/2613
2	A	0.19	0/12271	0.46	6/16603 (0.0%)
All	All	0.18	0/16171	0.46	6/21864 (0.0%)

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
2	A	0	1

There are no bond length outliers.

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	938	PRO	CA-N-CD	-9.96	98.06	112.00
2	A	938	PRO	CB-CA-C	7.04	123.18	111.56
2	A	938	PRO	N-CA-CB	-6.67	96.25	103.25
2	A	2142	ARG	N-CA-C	6.30	116.77	107.88
2	A	2500	LEU	N-CA-C	5.83	122.68	109.81

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	A	2142	ARG	Sidechain

5.2 Too-close contacts (i)

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	B	1935	0	1898	84	0
1	C	1909	0	1878	82	0
2	A	12054	0	12234	475	0
3	A	28	0	12	0	0
All	All	15926	0	16022	626	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 20.

The worst 5 of 626 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)
2:A:1240:LYS:HD2	2:A:1243:LEU:HD22	1.54	0.90
1:C:225:LEU:O	1:C:229:ASN:ND2	2.08	0.87
2:A:1437:ASN:HD21	2:A:1702:MET:HE3	1.37	0.86
1:C:57:ARG:NH2	2:A:935:SEP:O2P	2.11	0.84
2:A:2456:ARG:NH1	2:A:2475:TYR:OH	2.11	0.83

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	B	238/265 (90%)	236 (99%)	2 (1%)	0	100	100
1	C	235/265 (89%)	231 (98%)	4 (2%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
2	A	1499/2562 (58%)	1356 (90%)	140 (9%)	3 (0%)	44 76
All	All	1972/3092 (64%)	1823 (92%)	146 (7%)	3 (0%)	45 76

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	A	938	PRO
2	A	940	PHE
2	A	1713	LEU

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	B	211/231 (91%)	209 (99%)	2 (1%)	75 83
1	C	208/231 (90%)	203 (98%)	5 (2%)	44 62
2	A	1346/2310 (58%)	1320 (98%)	26 (2%)	52 69
All	All	1765/2772 (64%)	1732 (98%)	33 (2%)	52 69

5 of 33 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	A	2397	MET
2	A	2436	LEU
2	A	2500	LEU
2	A	1192	ILE
2	A	1175	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 19 such sidechains are listed below:

Mol	Chain	Res	Type
2	A	1854	GLN
2	A	2420	GLN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
2	A	2506	ASN
2	A	1986	HIS
2	A	1068	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)

2 non-standard protein/DNA/RNA residues 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	SEP	A	910	2	8,9,10	1.60	1 (12%)	7,12,14	1.30	1 (14%)
2	SEP	A	935	2	8,9,10	1.57	1 (12%)	7,12,14	1.52	1 (14%)

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	SEP	A	910	2	-	1/6/8/10	-
2	SEP	A	935	2	-	5/6/8/10	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	935	SEP	P-O1P	3.47	1.61	1.50
2	A	910	SEP	P-O1P	3.47	1.61	1.50

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	935	SEP	OG-CB-CA	3.57	111.62	108.14
2	A	910	SEP	OG-CB-CA	2.88	110.94	108.14

There are no chirality outliers.

5 of 6 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	935	SEP	N-CA-CB-OG
2	A	935	SEP	C-CA-CB-OG
2	A	935	SEP	CB-OG-P-O1P
2	A	935	SEP	CB-OG-P-O2P
2	A	935	SEP	CB-OG-P-O3P

There are no ring outliers.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	910	SEP	3	0
2	A	935	SEP	1	0

5.5 Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6 Ligand geometry (i)

1 ligand is 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	GDP	A	2601	-	25,30,30	0.95	1 (4%)	30,47,47	1.13	3 (10%)

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	GDP	A	2601	-	-	2/12/32/32	0/3/3/3

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	2601	GDP	C6-N1	-2.20	1.34	1.37

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	A	2601	GDP	C8-N7-C5	2.96	107.58	102.55
3	A	2601	GDP	O4'-C1'-N9	2.34	111.84	108.75
3	A	2601	GDP	C5-C6-N1	2.08	118.03	114.07

There are no chirality outliers.

All (2) torsion outliers are listed below:

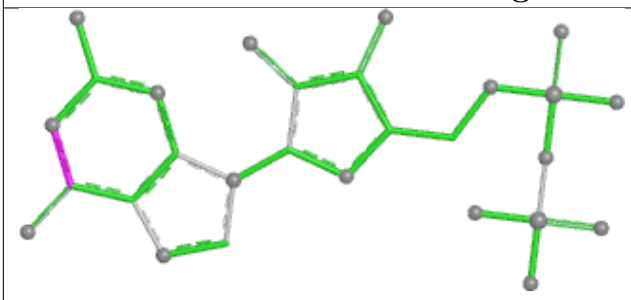
Mol	Chain	Res	Type	Atoms
3	A	2601	GDP	O4'-C4'-C5'-O5'
3	A	2601	GDP	C3'-C4'-C5'-O5'

There are no ring outliers.

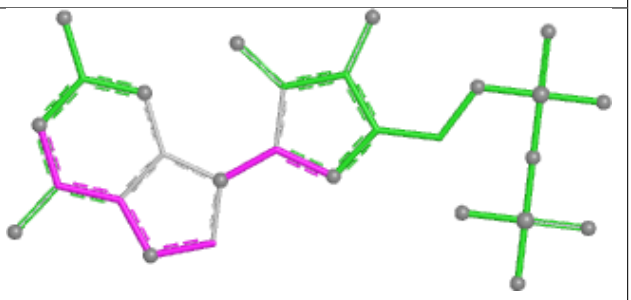
No monomer is involved in short contacts.

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.

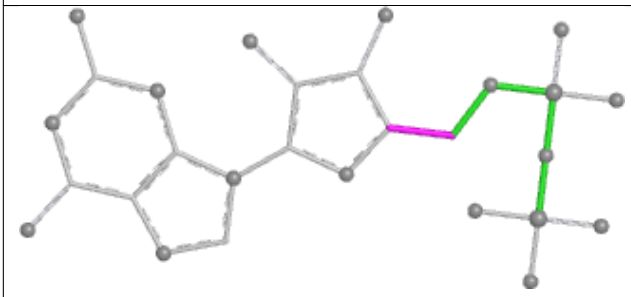
Ligand GDP A 2601



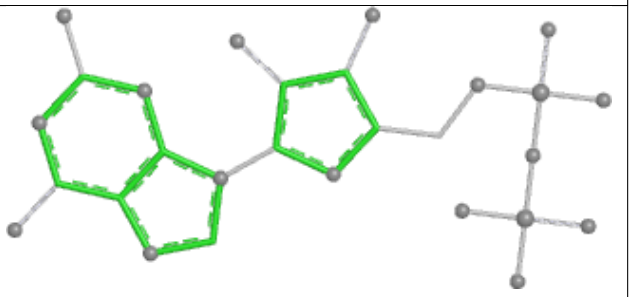
Bond lengths



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

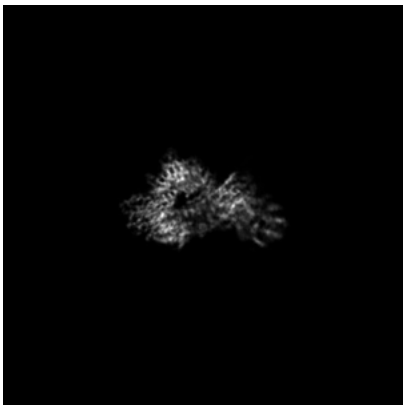
This section contains visualisations of the EMDB entry EMD-45609. These allow visual inspection of the internal detail of the map and identification of artifacts.

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

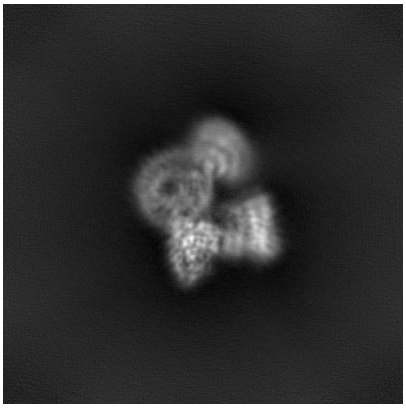
X



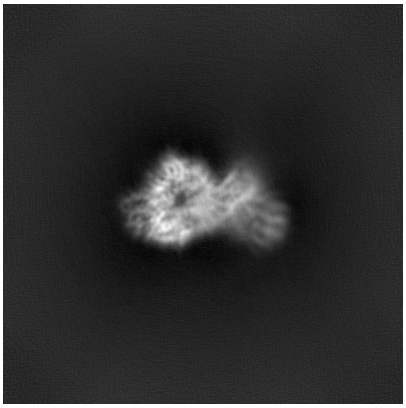
Y

Z

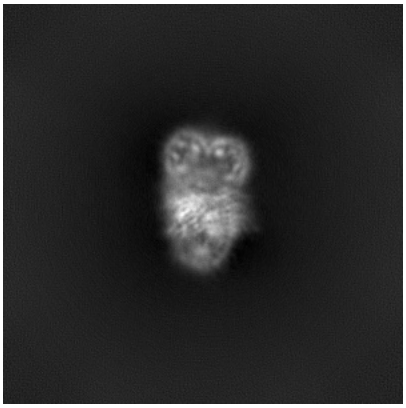
6.1.2 Raw map



X



Y



Z

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

6.2 Central slices (i)

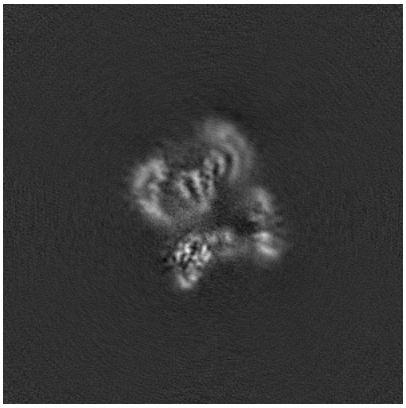
6.2.1 Primary map

X Index: 201

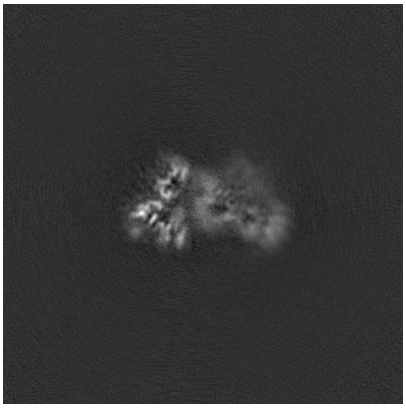
Y Index: 201

Z Index: 201

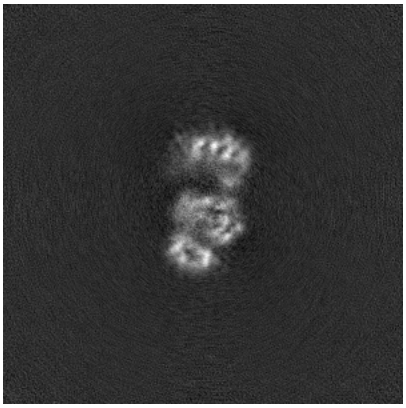
6.2.2 Raw map



X Index: 201



Y Index: 201



Z Index: 201

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

6.3 Largest variance slices (i)

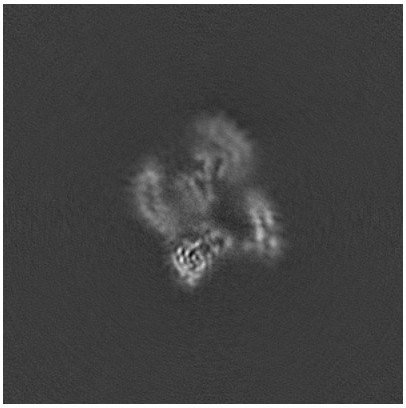
6.3.1 Primary map

X Index: 193

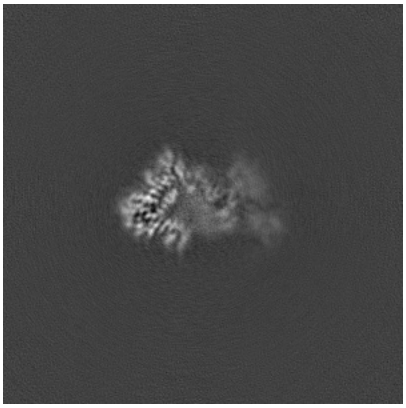
Y Index: 189

Z Index: 167

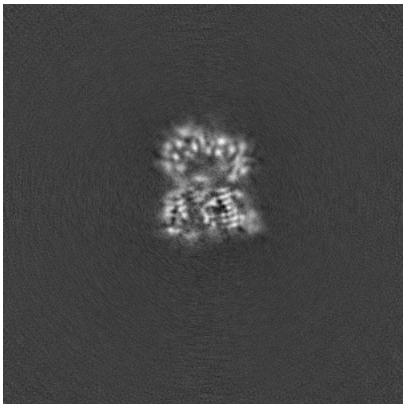
6.3.2 Raw map



X Index: 193



Y Index: 189

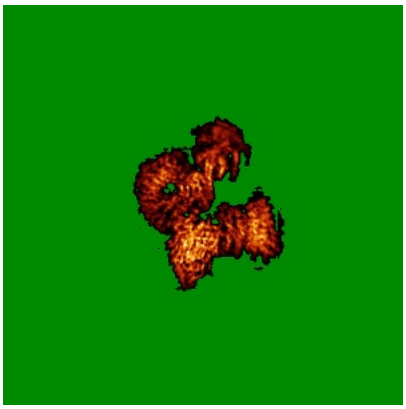


Z Index: 166

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

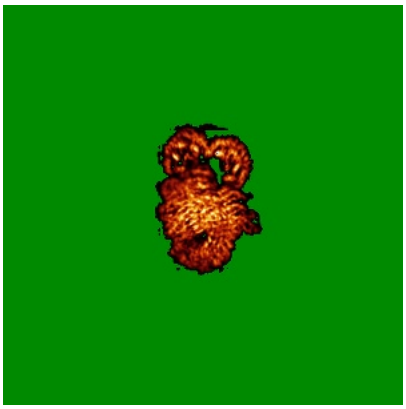
6.4 Orthogonal standard-deviation projections (False-color) (i)

6.4.1 Primary map



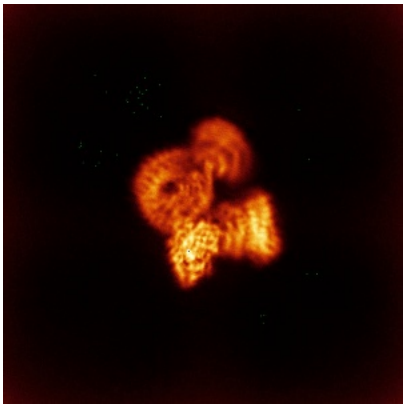
X

Y

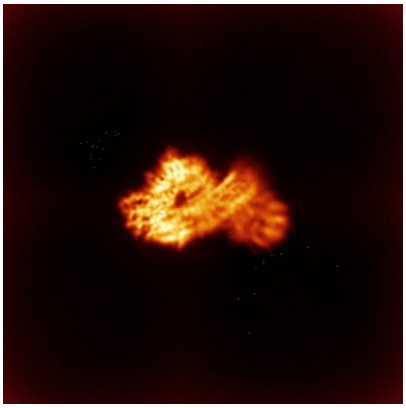


Z

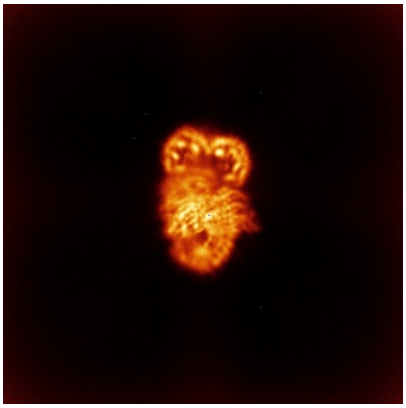
6.4.2 Raw map



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.

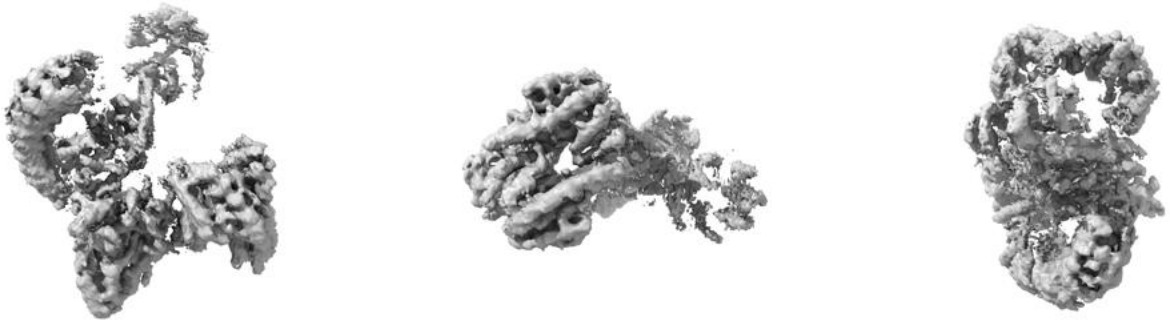
6.5 Orthogonal surface views (i)

6.5.1 Primary map

X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.122. 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.

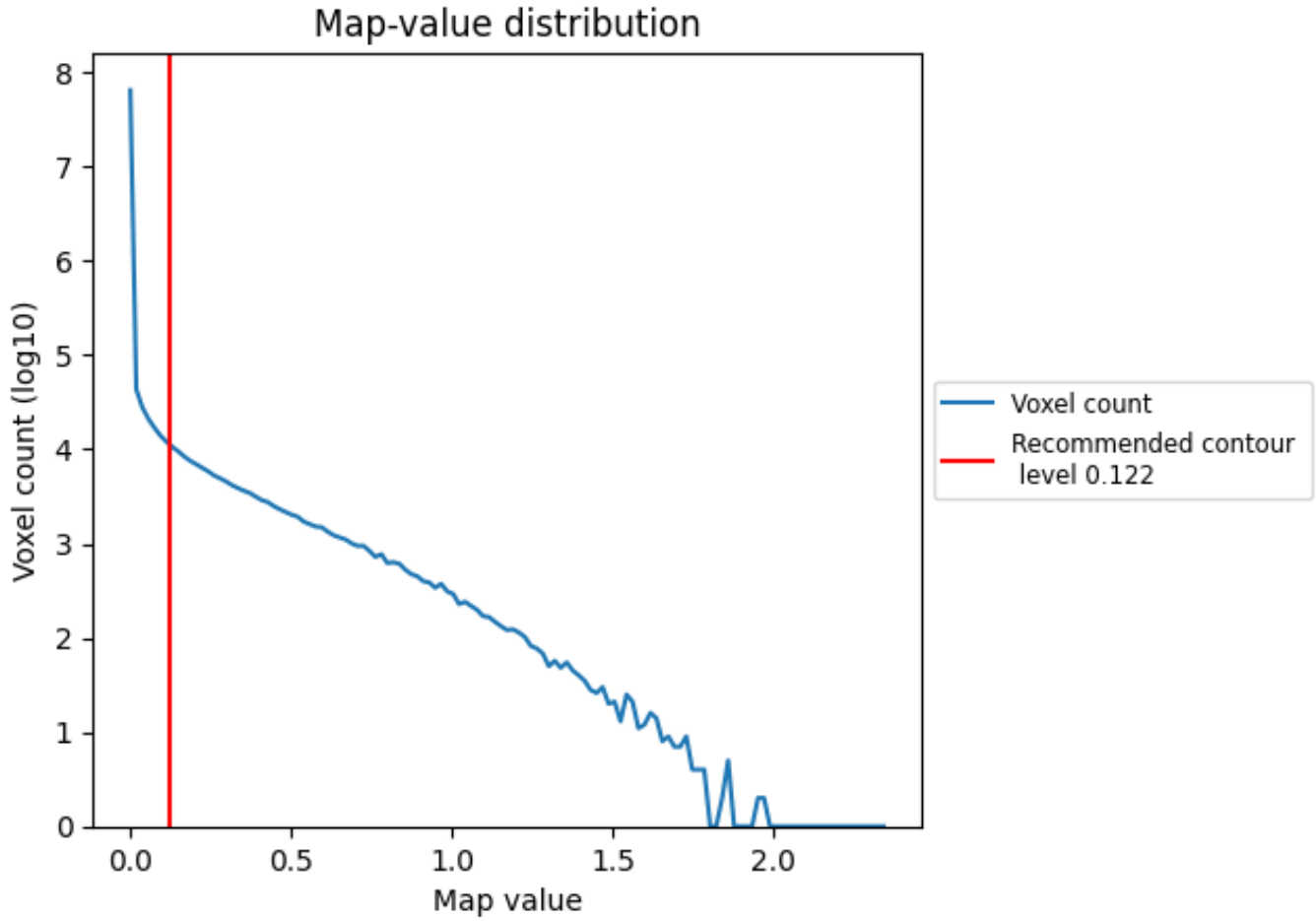
6.6 Mask visualisation (i)

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

7 Map analysis

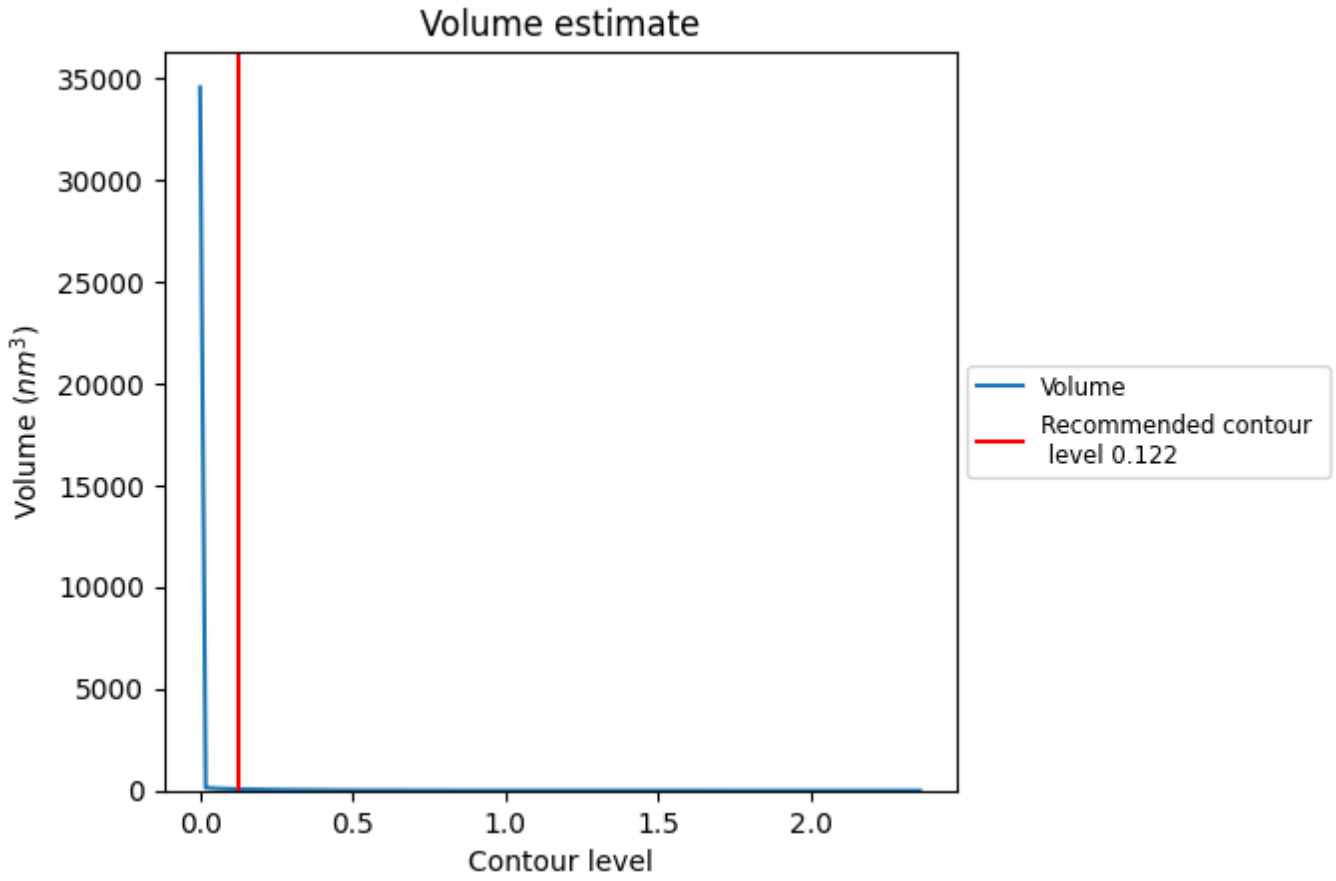
This section contains the results of statistical analysis of the map.

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.

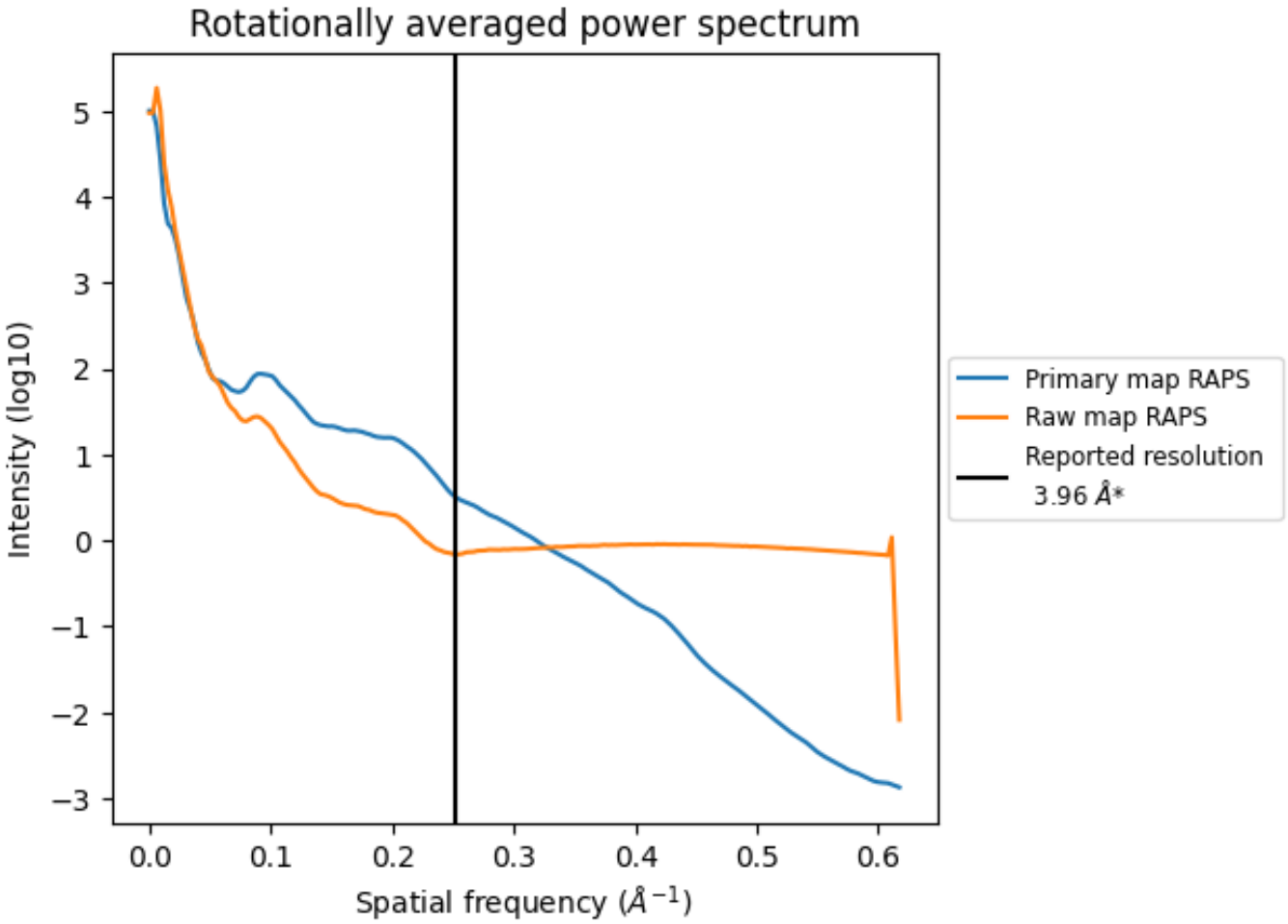
7.2 Volume estimate (i)



The volume at the recommended contour level is 71 nm^3; this corresponds to an approximate mass of 64 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)

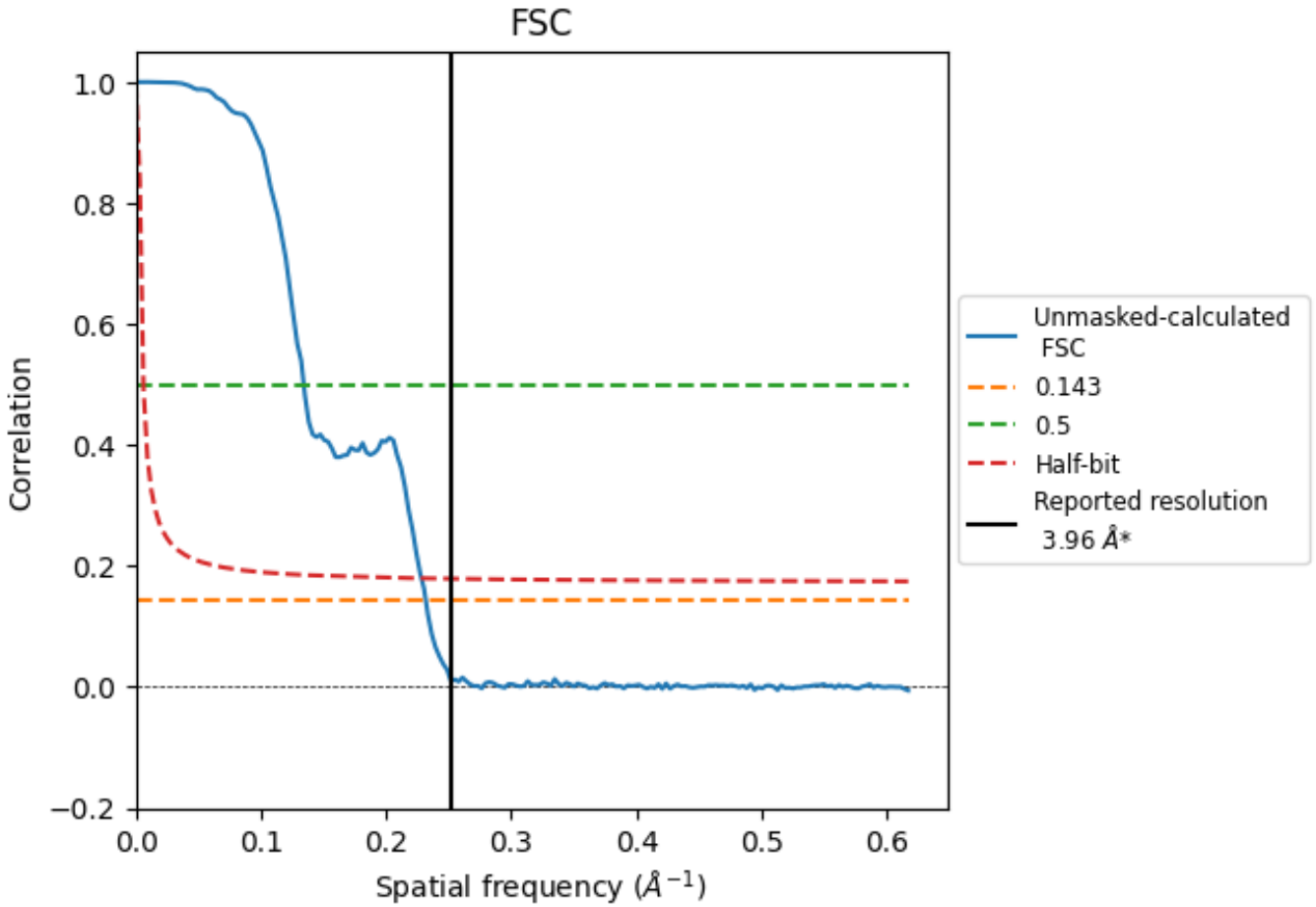


*Reported resolution corresponds to spatial frequency of 0.253 Å^{-1}

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 0.253 Å^{-1}

8.2 Resolution estimates (i)

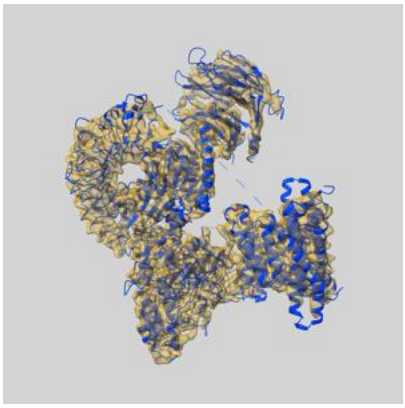
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.96	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.32	7.45	4.38

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps.

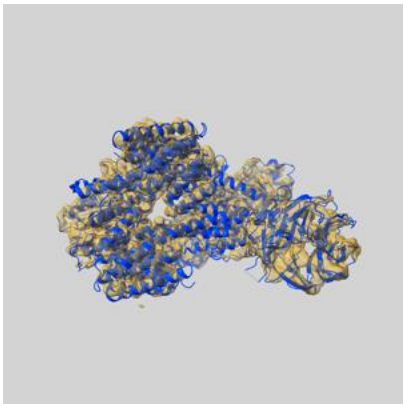
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-45609 and PDB model 9CI3. Per-residue inclusion information can be found in section 3 on page 6.

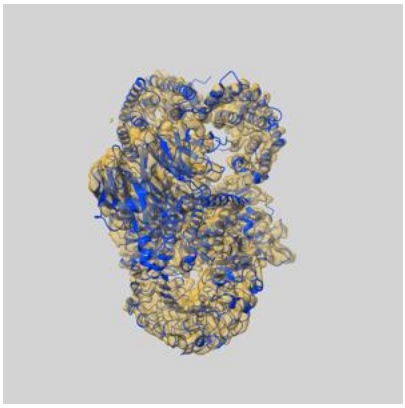
9.1 Map-model overlay



X



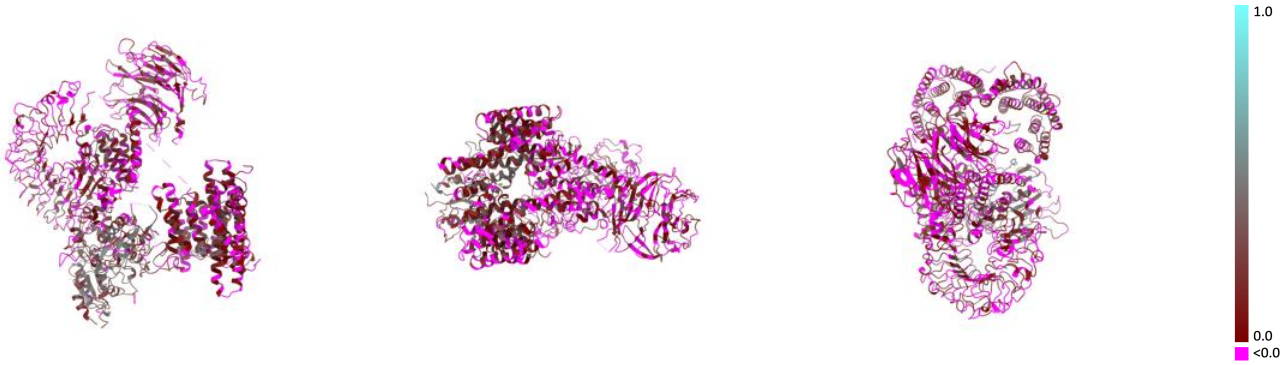
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.122 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.

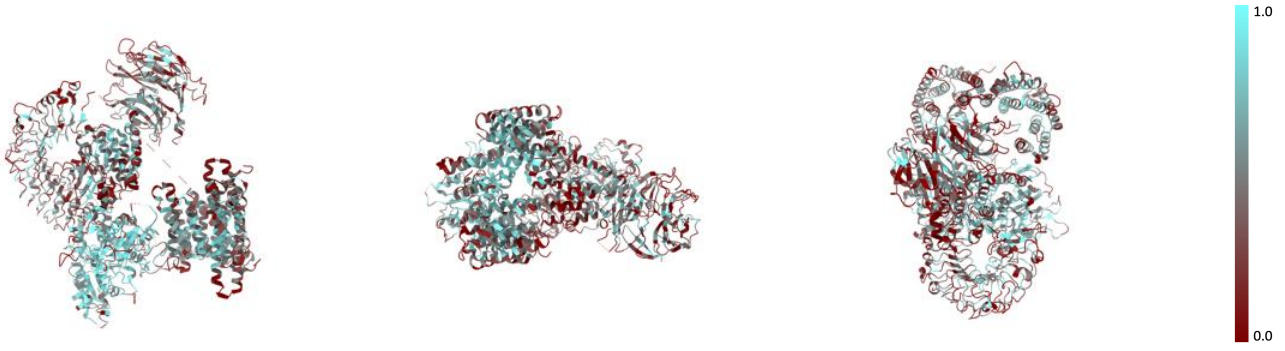
9.2 Q-score mapped to coordinate model



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.

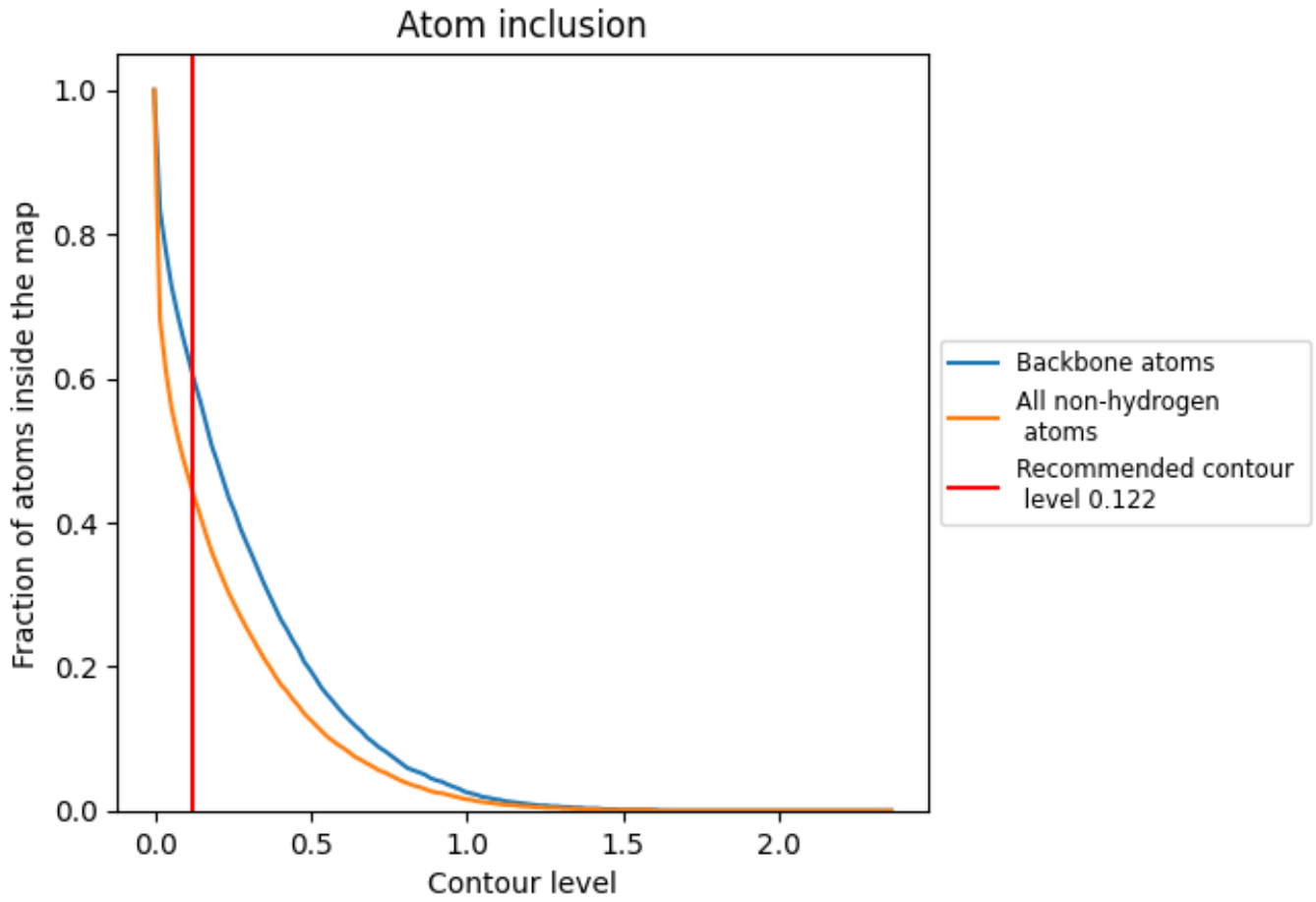
9.3 Atom inclusion mapped to coordinate model



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 (0.122).

9.4 Atom inclusion (i)



At the recommended contour level, 60% of all backbone atoms, 44% 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 (0.122) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.4410	0.1120
A	0.4380	0.1170
B	0.3980	0.0800
C	0.5030	0.1170