wwPDB EM Validation Summary Report (i)

Mar 19, 2024 – 01:57 PM JST

PDB ID	:	5GOA
EMDB ID	:	EMD-9529
Title	:	Cryo-EM structure of RyR2 in open state
Authors	:	Peng, W.; Wu, J.P.; Yan, N.
Deposited on	:	2016-07-26
Resolution	:	4.20 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:

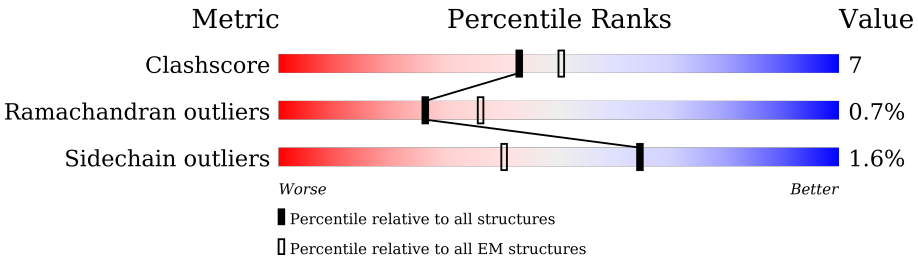
EMDB validation analysis	:	0.0.1.dev70
MolProbity	:	4.02b-467
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 4.20 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	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

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	4968	14% 54% 14% · 31%
1	B	4968	14% 54% 14% · 31%
1	C	4968	14% 54% 14% · 31%
1	D	4968	14% 53% 14% · 31%

2 Entry composition (i)

There are 2 unique types of molecules in this entry. The entry contains 105072 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 RyR2.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	3423	Total 26267	C 16741	N 4498	O 4874	S 154	0	0
1	B	3423	Total 26267	C 16741	N 4498	O 4874	S 154	0	0
1	C	3423	Total 26267	C 16741	N 4498	O 4874	S 154	0	0
1	D	3423	Total 26267	C 16741	N 4498	O 4874	S 154	0	0

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

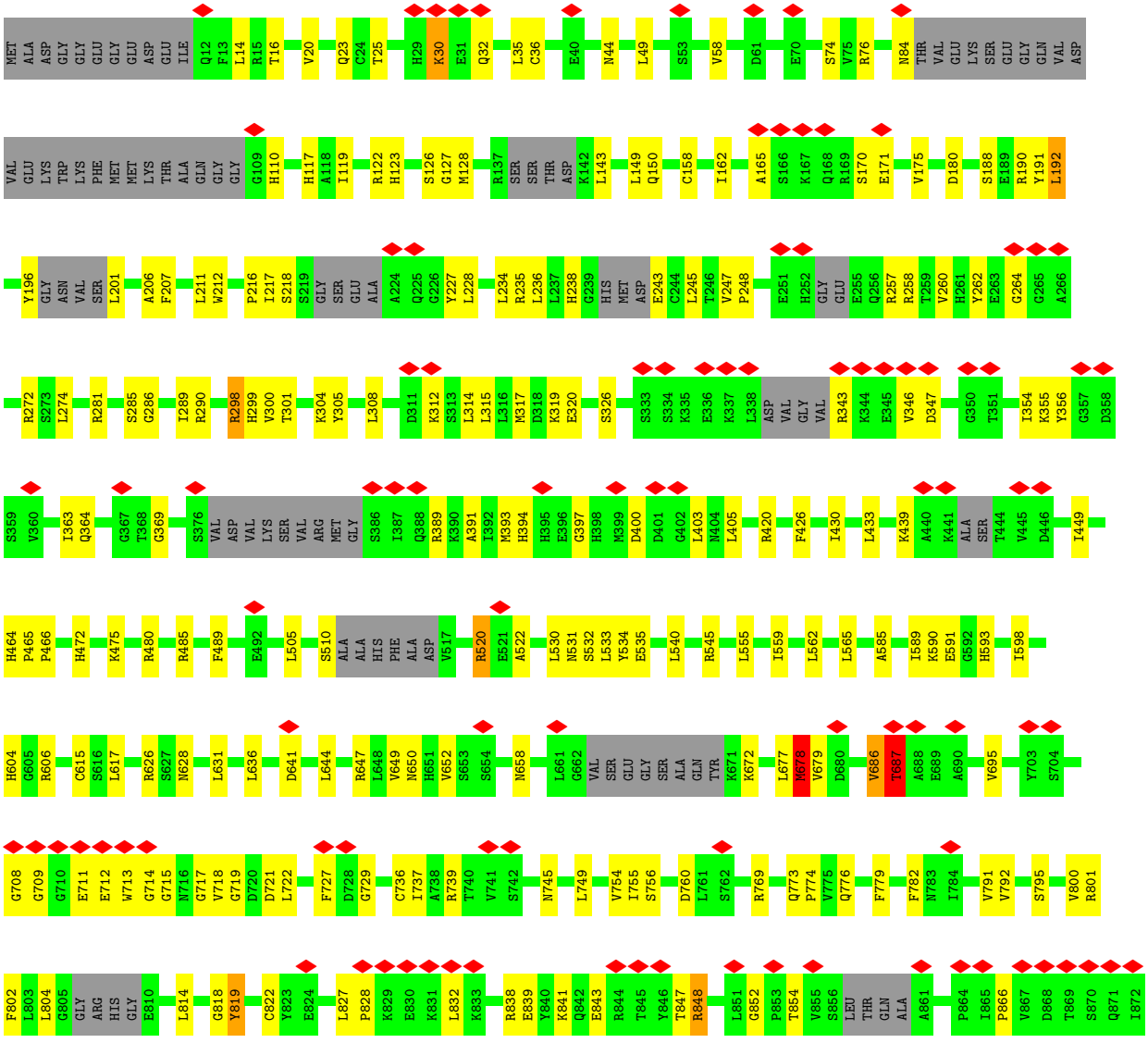
Mol	Chain	Residues	Atoms		AltConf
2	A	1	Total 1	Zn 1	0
2	B	1	Total 1	Zn 1	0
2	C	1	Total 1	Zn 1	0
2	D	1	Total 1	Zn 1	0

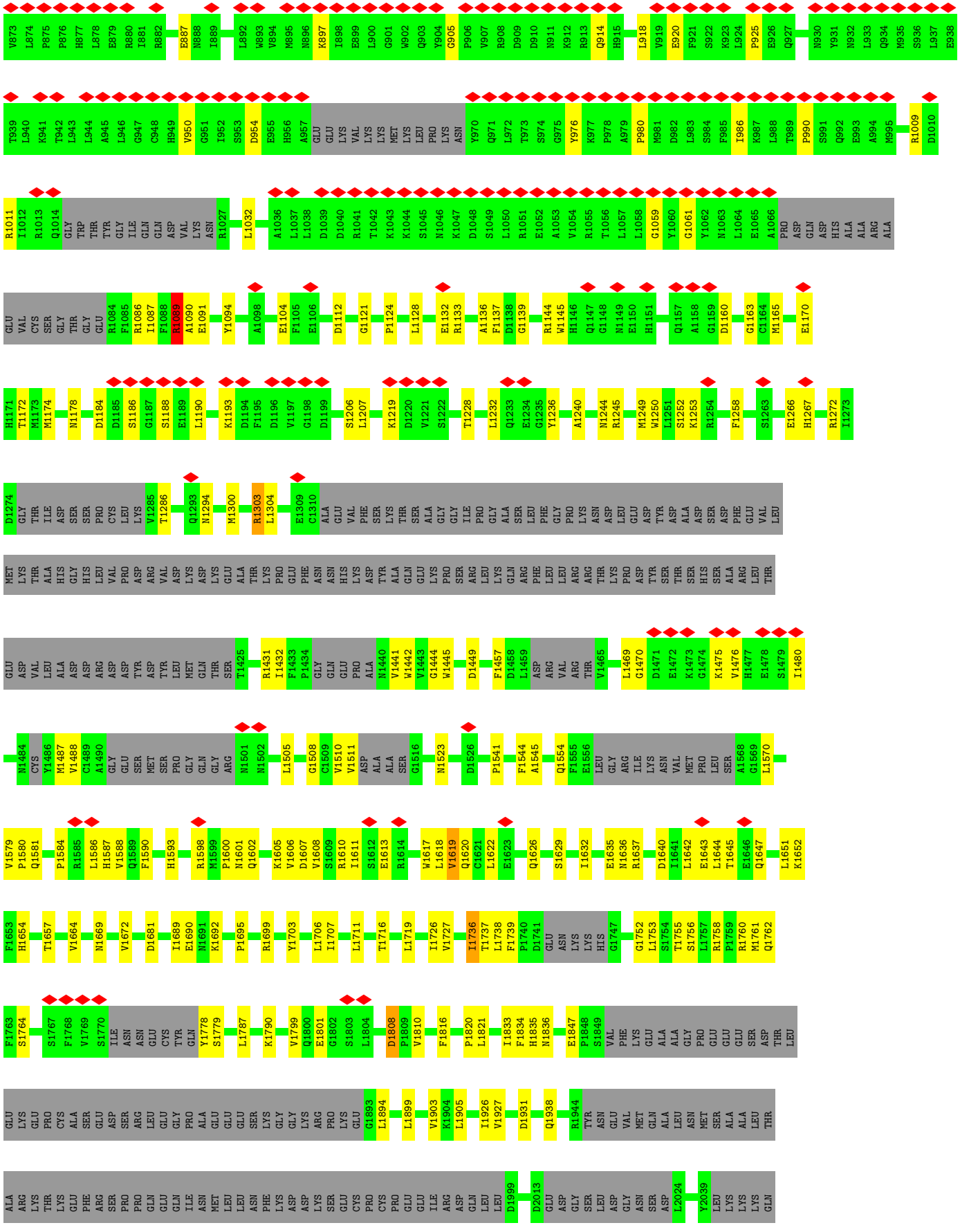
3 Residue-property plots (i)

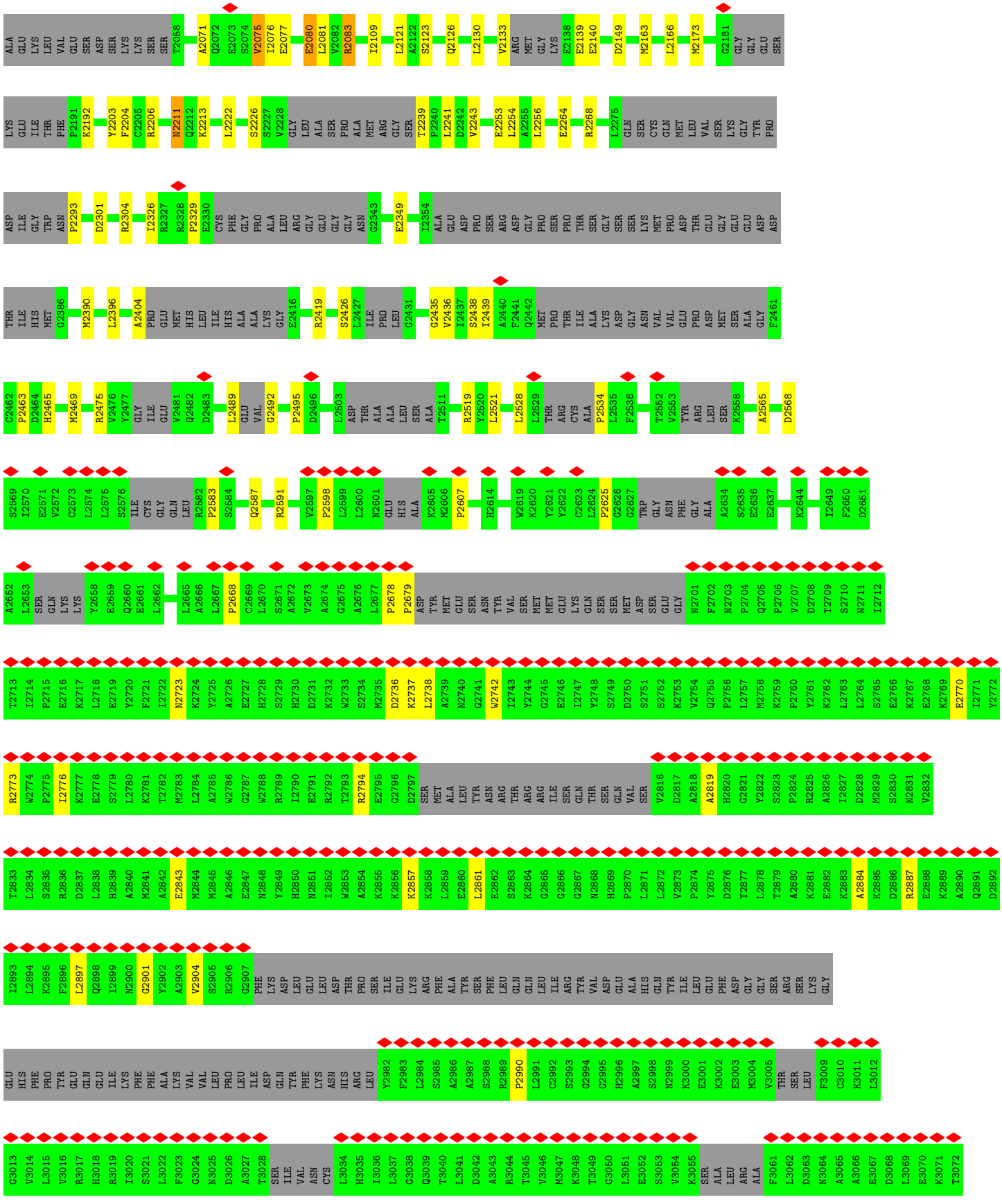
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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.

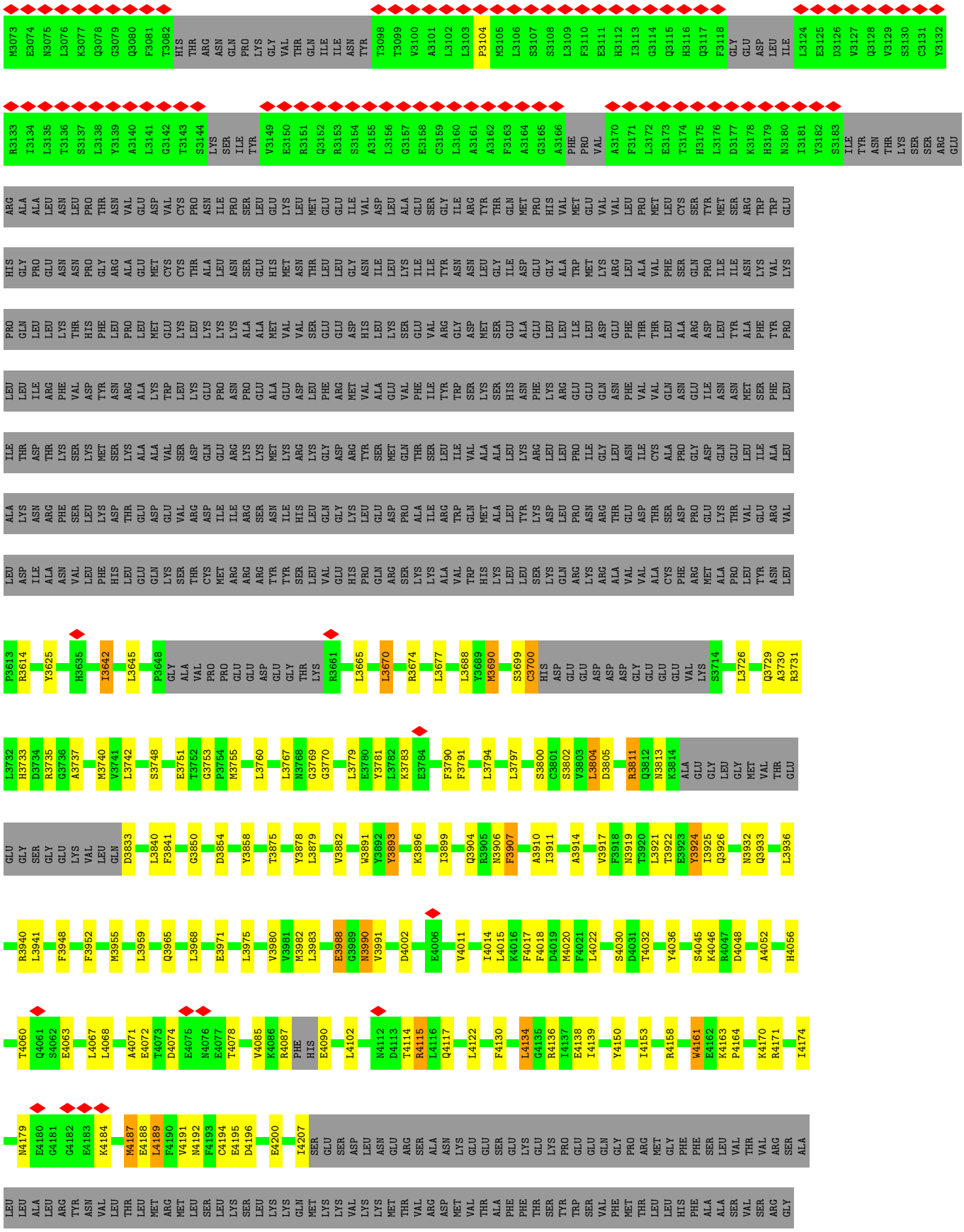
- Molecule 1: RyR2

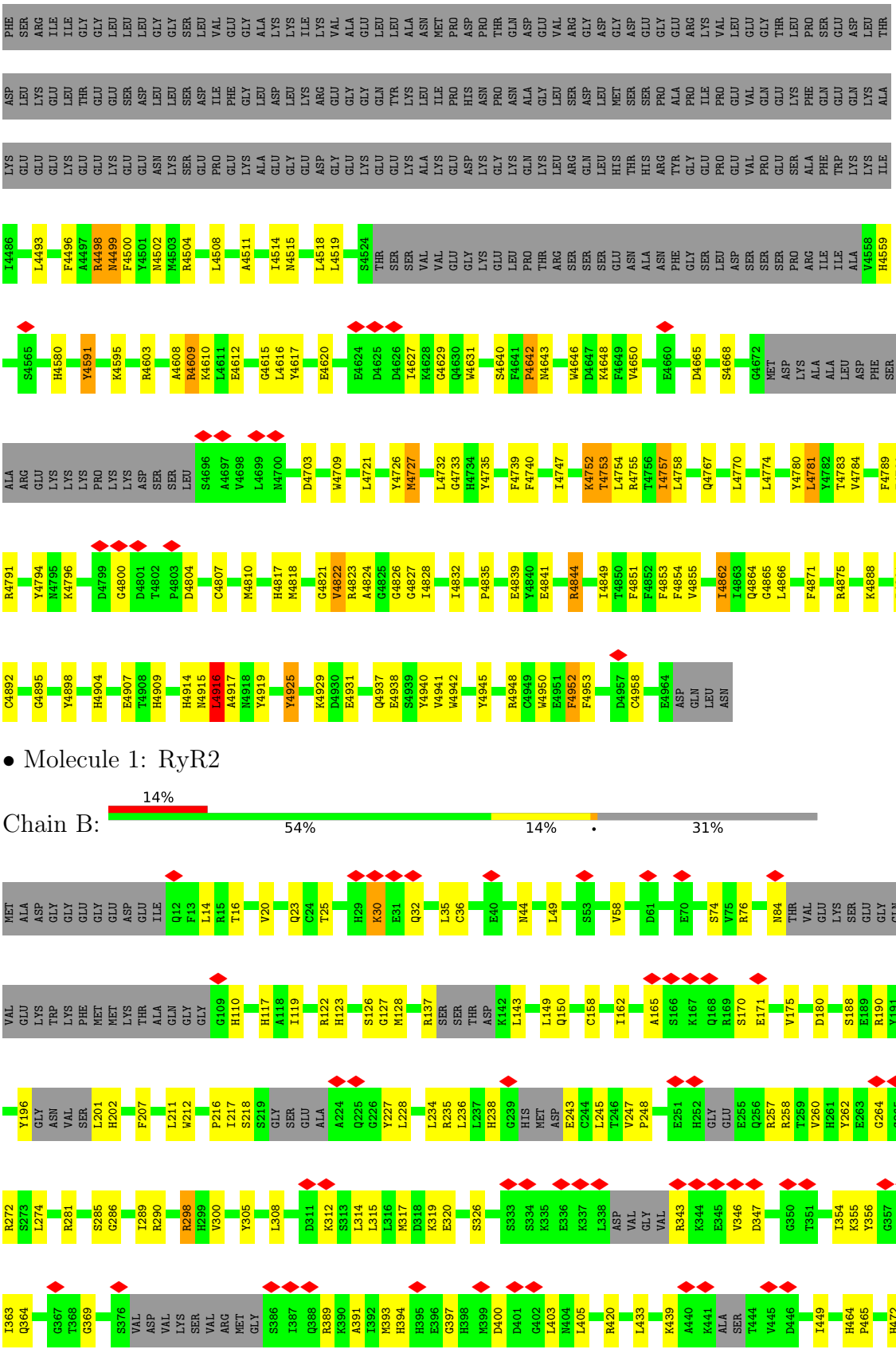
Chain A:




V873 L874 P875 P876 H877 L878 E879 R880 I881 R882 E887 N888 I889 L892 W893 V894 M895 N896 K897 I898 E899 L900 G901 W902 Q903 Y904 G905 P906 V907 R908 D909 D910 N911 K912 R913 Q914 H915 L918 V919 E920 F921 S922 K923 L924 P925 E926 Q927 N930 Y931 N932 L933 Q934 M935 S936 L937 E938
T939 L940 K941 T942 L943 L944 A945 L946 G947 C948 H949 V950 G951 I952 S953 D954 E955 H956 A957 GLU GLU LYS VAL LYS LYS MET LYS LEU PRO LYS ASN Y970 Q971 L972 T973 S974 G975 Y976 K977 P978 A979 P980 M981 D982 L983 S984 F985 I986 K987 L988 T989 P990 S991 Q992 E993 A994 M995 R1009 D1010
R1011 I1012 R1013 Q1014 GLY TRP THR TYR GLY ILE GLN GLN ASP VAL LYS ASN R1027 L1032 A1036 L1037 L1038 D1039 D1040 R1041 T1042 K1043 K1044 S1045 N1046 K1047 D1048 S1049 L1050 R1051 E1052 A1053 V1054 R1055 T1056 L1057 L1058 G1059 Y1060 G1061 Y1062 N1063 L1064 E1065 A1066 PRO ASP GLN ASP HIS ALA ALA ARG ALA
GLU VAL CYS SER GLY THR GLY GLU R1084 F1085 R1086 I1087 F1088 R1089 A1090 E1091 Y1094 A1098 E1104 F1105 E1106 D1112 G1121 P1124 L1128 E1132 R1133 A1136 F1137 D1138 G1139 R1144 W1145 H1146 Q1147 G1148 N1149 E1150 H1151 Q1157 A1158 G1159 D1160 G1163 C1164 M1165 E1170
H1171 T1172 M1173 M1174 N1178 D1184 D1185 S1186 G1187 S1188 E1189 L1190 K1193 D1194 F1195 D1196 V1197 G1198 D1199 S1206 L1207 K1219 D1220 V1221 S1222 T1228 L1232 Q1233 E1234 G1235 Y1236 A1240 N1244 R1245 M1249 W1250 L1251 S1252 K1253 R1254 F1258 S1263 E1266 H1267 R1272 I1273
D1274 GLY THR ILE ASP SER SER PRO CYS LEU LYS V1285 T1286 Q1293 N1294 M1300 R1303 L1304 E1309 C1310 ALA GLU VAL PHE SER LYS THR SER ALA GLY GLY ILE PRO GLY ALA SER LEU PHE GLY PRO LYS ASN ASP LEU GLU ASP TYR ASP ALA ASP SER ASP PHE GLU VAL LEU
MET LYS THR ALA HIS GLY HIS LEU VAL PRO ASP ARG VAL ASP LYS ASP LYS GLU ALA THR LYS PRO GLU PHE ASN ASN HIS LYS ASP TYR ALA GLN GLU LYS PRO SER ARG LEU LYS GLN ARG PHE LEU LEU ARG ARG THR LYS PRO ASP GLY SER HIS SER SER ALA ARG LEU THR
GLU ASP VAL LEU ALA ASP ASP ARG ASP ASP TYR ASP TYR LEU MET GLN THR SER T1425 R1431 I1432 F1433 P1434 GLY GLN GLU PRO ALA N1440 V1441 W1442 Y1443 G1444 W1445 D1449 F1457 D1458 L1459 ASP ARG VAL ARG THR V1465 L1469 G1470 D1471 E1472 K1473 G1474 K1475 V1476 H1477 E1478 S1479 I1480
N1484 CYS Y1486 M1487 V1488 C1489 A1490 GLY GLU SER MET SER PRO GLY GLN GLY ARG N1501 N1502 L1505 G1508 C1509 V1510 V1511 ASP ALA ALA SER G1516 N1523 D1526 P1541 F1544 A1545 Q1554 F1555 E1556 LEU GLY ARG ILE LYS ASN VAL MET PRO LEU SER A1568 G1569 L1570
V1579 P1580 Q1581 P1584 R1585 L1586 H1587 V1588 Q1589 F1590 H1593 R1598 M1599 P1600 N1601 Q1602 K1605 V1606 D1607 V1608 S1609 R1610 I1611 S1612 E1613 R1614 W1617 L1618 V1619 Q1620 C1621 L1622 E1623 Q1626 S1629 I1632 E1635 N1636 R1637 D1640 I1641 L1642 E1643 L1644 T1645 E1646 Q1647 L1651 K1652
F1653 H1654 T1657 V1664 N1669 V1672 D1681 I1689 E1690 N1691 K1692 P1695 R1699 Y1703 L1706 I1707 L1711 T1716 L1719 I1726 V1727 I1736 T1737 L1738 F1739 P1740 D1741 GLU ASN LYS LYS HIS G1747 G1752 L1753 S1754 T1755 S1756 L1757 R1758 P1759 R1760 M1761 Q1762
F1763 S1764 S1767 F1768 V1769 S1770 ILE ASN ASN GLU CYS TYR GLN Y1778 S1779 L1787 K1790 V1799 Q1800 E1801 G1802 S1803 L1804 D1808 P1809 V1810 F1816 P1820 L1821 I1833 F1834 H1835 N1836 E1847 P1848 S1849 VAL PHE LYS GLU ALA ALA GLY PRO GLU GLU GLU SER ASP THR LEU
GLU LYS GLU PRO CYS ALA SER SER ARG LEU GLU GLU GLY PRO ALA GLU GLU SER LYS GLY GLY LYS ARG PRO LYS GLU G1893 L1894 L1899 V1903 K1904 L1905 I1926 V1927 D1931 Q1938 R1944 TYR ASN GLU VAL MET GLN ALA ALA LEU ASN MET SER ALA ALA LEU THR
ALA ARG LYS THR LYS GLU PHE ARG SER PRO PRO GLN GLU GLN ILE ASN MET LEU LEU ASN PHE LYS ASP ASP LYS SER GLU CYS PRO CYS PRO GLU GLU ILE ARG ASP GLN LEU LEU D1999 D2013 GLU ASP GLY SER LEU ASP GLY ASN SER ASP L2024 Y2039 LEU LYS LYS LYS GLN

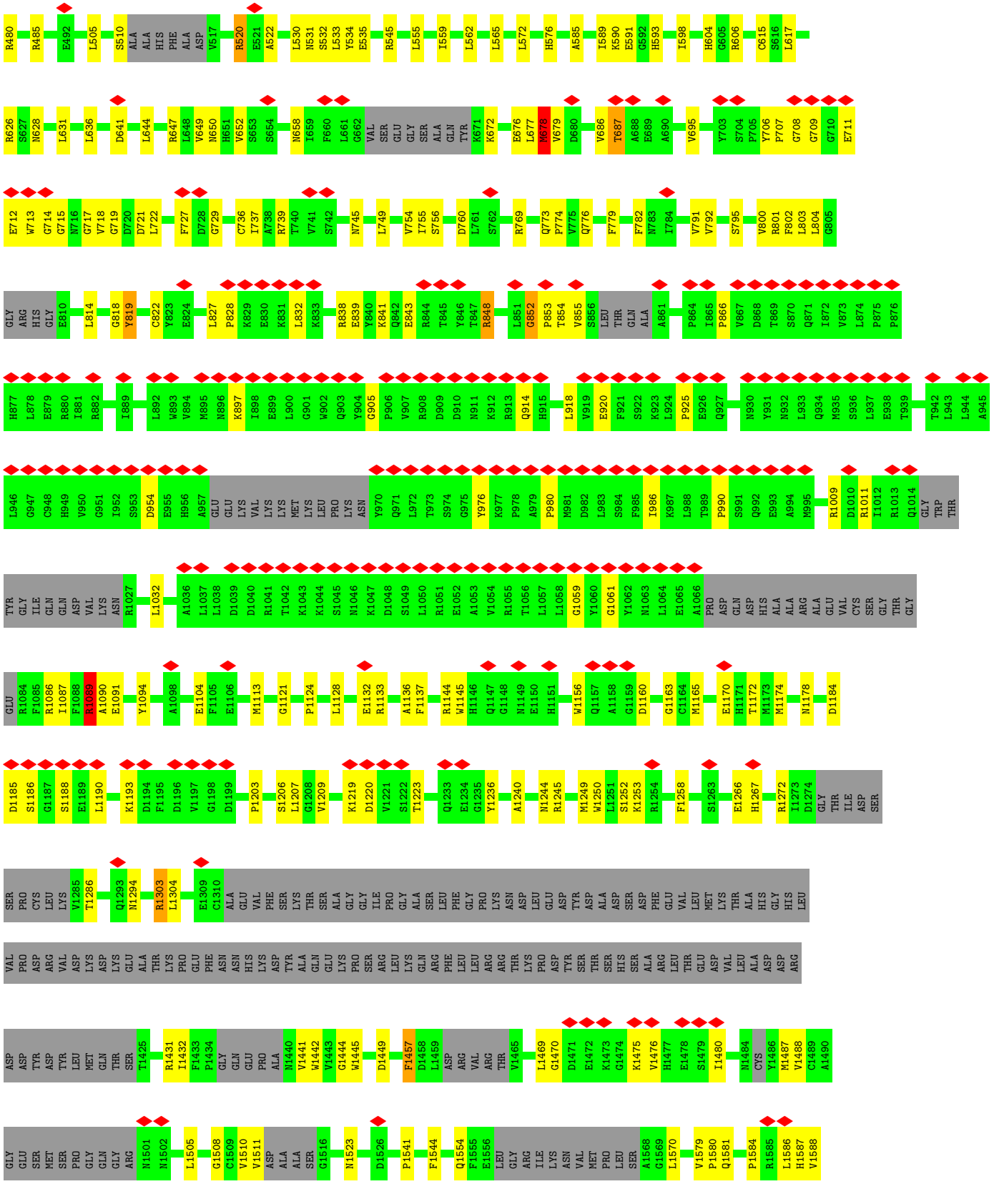






• Molecule 1: RyR2

Chain B: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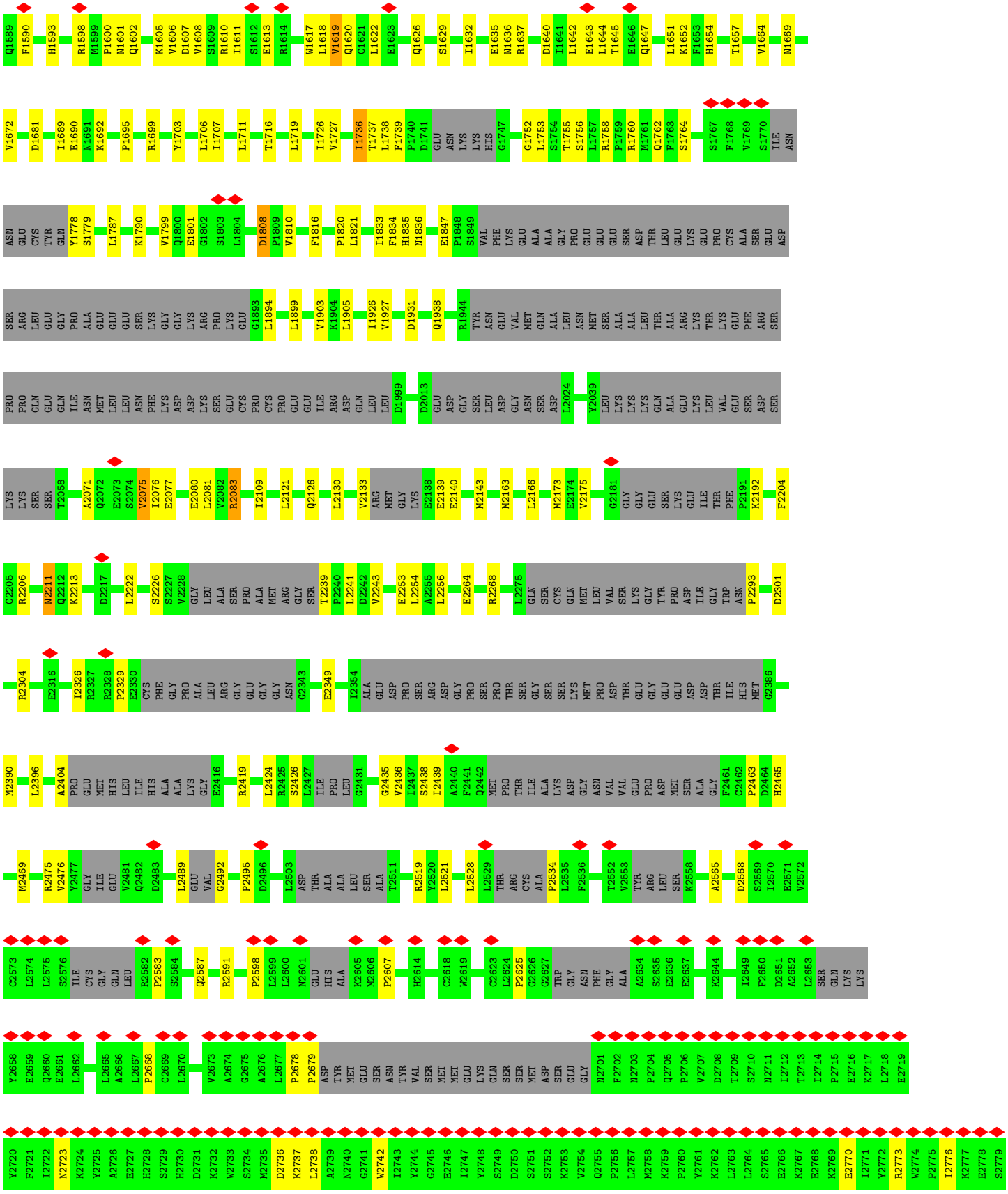
R626 S627 N628 L631 L636 D641 L644 R647 L648 V649 N650 H651 V652 S653 S654 N658 I659 F660 L661 G662 VAL SER GLU GLY SER ALA GLN TYR K671 K672 E676 L677 M678 V679 D680 V686 T687 A688 E689 A690 V695 Y703 S704 P705 Y706 P707 G708 G709 G710 E711
E712 W713 G714 G715 N716 G717 V718 G719 D720 D721 L722 F727 D728 G729 C736 I737 A738 R739 T740 V741 S742 N745 L749 V754 I755 S756 D760 L761 S762 R769 Q773 P774 V775 Q776 F779 F782 N783 I784 V791 V792 S795 V800 R801 F802 L803 L804 G805
GLY ARG HIS GLY E810 L814 G818 Y819 C822 Y823 E824 L827 P828 K829 E830 K831 L832 K833 R838 E839 Y840 K841 Q842 E843 R844 T845 Y846 T847 R848 L851 G852 P853 T854 V855 S856 LEU THR GLN ALA A861 P864 I865 P866 V867 D868 T869 S870 Q871 I872 V873 L874 P875 P876
H877 L878 E879 R880 I881 R882 I889 L892 W893 V894 M895 N896 K897 I898 E899 L900 G901 W902 Q903 Y904 G905 P906 V907 R908 D909 D910 N911 K912 R913 Q914 H915 L918 V919 E920 F921 S922 K923 L924 P925 E926 Q927 N930 Y931 N932 L933 Q934 M935 S936 L937 E938 T939 T942 L943 L944 A945
L946 G947 C948 H949 V950 G951 I952 S953 D954 E955 H956 A957 GLU GLU LYS VAL LYS LYS MET LYS LEU PRO LYS ASN Y970 Q971 L972 T973 S974 G975 Y976 K977 P978 A979 P980 M981 D982 L983 S984 F985 I986 K987 L988 T989 P990 S991 Q992 E993 A994 M995 R1009 D1010 R1011 I1012 R1013 Q1014 GLY TRP THR
TYR GLY ILE GLN GLN ASP VAL LYS ASN R1027 L1032 A1036 L1037 L1038 D1039 D1040 R1041 T1042 K1043 K1044 S1045 N1046 K1047 D1048 S1049 L1050 R1051 E1052 A1053 V1054 R1055 T1056 L1057 L1058 G1059 Y1060 G1061 Y1062 N1063 L1064 E1065 A1066 PRO ASP GLN ASP HIS ALA ALA ARG ALA GLU VAL CYS SER GLY THR GLY
GLU R1084 F1085 R1086 I1087 F1088 R1089 A1090 E1091 Y1094 A1098 E1104 F1105 E1106 M1113 G1121 P1124 L1128 E1132 R1133 A1136 F1137 R1144 W1145 H1146 Q1147 G1148 N1149 E1150 H1151 W1156 Q1157 A1158 G1159 D1160 G1163 C1164 M1165 E1170 H1171 T1172 M1173 M1174 N1178 D1184
D1185 S1186 G1187 S1188 E1189 L1190 K1193 D1194 F1195 D1196 V1197 G1198 D1199 P1203 S1206 L1207 G1208 V1209 K1219 D1220 V1221 S1222 T1223 Q1233 E1234 G1235 Y1236 A1240 N1244 R1245 M1249 W1250 L1251 S1252 K1253 R1254 F1258 S1263 E1266 H1267 R1272 I1273 D1274 GLY THR ILE ASP SER
SER PRO CYS LEU LYS V1285 T1286 Q1293 N1294 R1303 L1304 E1309 C1310 ALA GLU VAL PHE SER LYS THR SER ALA GLY GLY ILE PRO GLY ALA SER LEU PHE GLY PRO LYS ASN ASP LEU GLU ASP TYR ASP ALA ASP SER ASP PHE GLU VAL LEU MET LYS THR ALA HIS GLY HIS LEU
VAL PRO ASP ARG VAL ASP LYS ASP GLU ALA THR LYS PRO GLU PHE ASN ASN HIS LYS ASP TYR ALA GLN GLU LYS PRO SER ARG LEU LYS GLN ARG PHE LEU LEU ARG ARG THR LYS PRO ASP TYR SER THR SER HIS SER ALA ARG LEU THR GLU ASP VAL LEU ALA ASP ASP ARG
ASP ASP TYR ASP TYR LEU MET GLN THR SER T1425 R1431 I1432 F1433 P1434 GLY GLN GLU PRO ALA N1440 V1441 W1442 V1443 G1444 W1445 D1449 F1457 D1458 L1459 ASP ARG VAL ARG THR V1465 L1469 G1470 D1471 E1472 K1473 G1474 K1475 V1476 H1477 E1478 S1479 I1480 M1484 CYS Y1486 M1487 V1488 C1489 A1490
GLY GLU SER MET SER PRO GLY GLN GLY ARG N1501 N1502 L1505 G1508 C1509 V1510 V1511 ASP ALA ALA SER G1516 N1523 D1526 P1541 F1544 Q1554 F1555 E1556 LEU GLY ARG ILE LYS ASN VAL MET PRO LEU SER A1568 G1569 L1570 V1579 P1580 Q1581 P1584 R1585 L1586 H1587 V1588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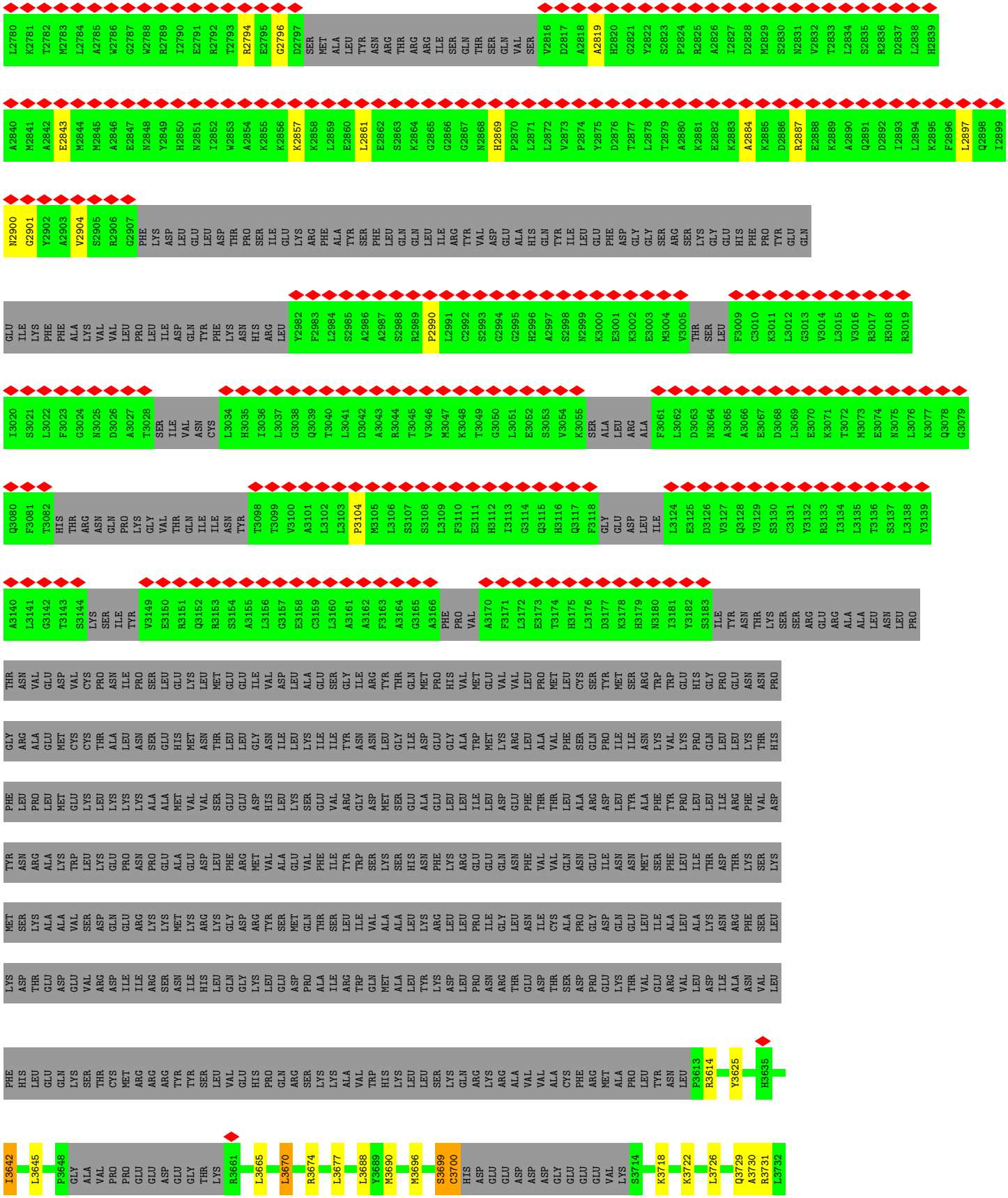
V1672 D1681 I1689 E1690 N1691 K1692 P1695 R1699 Y1703 L1706 I1707 L1711 T1716 L1719 I1726 V1727 I1736 T1737 L1738 F1739 P1740 D1741 GLU ASN LYS LYS HIS G1747 G1752 L1753 S1754 T1755 S1756 L1757 R1758 P1759 R1760 M1761 Q1762 F1763 S1764 S1767 F1768 V1769 S1770 ILE ASN
ASN GLU CYS TYR GLN Y1778 S1779 L1787 K1790 V1799 Q1800 E1801 G1802 S1803 L1804 D1808 P1809 V1810 F1816 P1820 L1821 I1833 F1834 H1835 N1836 E1847 P1848 S1849 VAL PHE LYS GLU ALA ALA GLY PRO GLU GLU GLU SER ASP THR LEU GLU LYS GLU PRO CYS ALA SER GLU ASP
SER ARG LEU GLU GLY PRO ALA GLU GLU GLU SER LYS GLY GLY LYS ARG PRO LYS GLU G1893 L1894 L1899 V1903 K1904 L1905 I1926 V1927 D1931 Q1938 R1944 TYR ASN GLU VAL MET GLN ALA LEU ASN MET SER ALA ALA LEU THR ALA ARG LYS THR LYS GLU PHE ARG SER
PRO PRO GLN GLU GLN ILE ASN MET LEU LEU ASN PHE LYS ASP ASP LYS SER GLU CYS PRO CYS PRO GLU GLU ILE ARG ASP GLN LEU LEU D1999 D2013 GLU ASP GLY SER LEU ASP GLY ASN SER ASP L2024 Y2039 LEU LYS LYS LYS GLN ALA GLU LYS LEU VAL GLU SER ASP SER
LYS LYS SER SER T2058 A2071 Q2072 E2073 S2074 V2075 I2076 E2077 E2080 L2081 V2082 R2083 I2109 L2121 Q2126 L2130 V2133 ARG MET GLY LYS E2138 E2139 E2140 M2143 M2163 L2166 M2173 E2174 V2175 G2181 GLY GLY GLU SER LYS GLU ILE THR PHE P2191 K2192 F2204
C2205 R2206 N2211 Q2212 K2213 D2217 L2222 S2226 S2227 V2228 GLY LEU ALA SER PRO ALA MET ARG GLY SER T2239 P2240 L2241 D2242 V2243 E2253 L2254 A2255 L2256 E2264 R2268 L2275 GLN SER CYS GLN MET LEU VAL SER LYS GLY TYR PRO ASP ILE GLY TRP ASN P2293 D2301
R2304 E2316 I2326 R2327 R2328 P2329 E2330 CYS PHE GLY PRO ALA LEU ARG GLY GLU GLY GLY ASN G2343 E2349 I2354 ALA GLU ASP PRO SER ARG ASP GLY PRO SER PRO THR SER GLY SER SER LYS MET PRO ASP THR GLU GLY GLU GLU ASP ASP THR ILE HIS MET G2386
M2390 L2396 A2404 PRO GLU MET HIS LEU ILE HIS ALA ALA LYS GLY E2416 R2419 L2424 R2425 S2426 L2427 ILE PRO LEU G2431 G2435 V2436 I2437 S2438 I2439 A2440 F2441 Q2442 MET PRO THR ILE ALA LYS ASP GLY ASN VAL VAL GLU PRO ASP MET SER ALA GLY F2461 C2462 P2463 D2464 H2465
M2469 R2475 V2476 Y2477 GLY ILE GLU V2481 Q2482 D2483 L2489 GLU VAL G2492 P2495 D2496 L2503 ASP THR ALA ALA LEU SER ALA T2511 R2519 Y2520 L2521 L2528 L2529 THR ARG CYS ALA P2534 L2535 F2536 T2552 V2553 TYR ARG LEU SER K2558 A2565 D2568 S2569 I2570 E2571 V2572
C2573 L2574 L2575 S2576 ILE CYS GLY GLN LEU R2582 P2583 S2584 Q2587 R2591 P2598 L2599 L2600 N2601 GLU HIS ALA K2605 M2606 P2607 H2614 C2618 W2619 C2623 L2624 P2625 C2626 G2627 TRP GLY ASN PHE GLY ALA A2634 S2635 E2636 E2637 K2644 A2565 I2649 F2650 D2651 A2652 L2653 SER GLN LYS LYS
Y2658 E2659 Q2660 E2661 L2662 L2665 A2666 L2667 P2668 C2669 L2670 V2673 A2674 G2675 A2676 L2677 P2678 P2679 ASP TYR MET GLU SER ASN TYR VAL SER MET MET GLU LYS GLN SER SER MET ASP SER GLU GLY N2701 F2702 N2703 P2704 Q2705 P2706 V2707 D2708 T2709 S2710 N2711 I2712 T2713 I2714 P2715 E2716 K2717 L2718 E2719
Y2720 F2721 I2722 N2723 K2724 Y2725 A2726 E2727 H2728 S2729 H2730 D2731 K2732 W2733 S2734 M2735 D2736 K2737 L2738 A2739 N2740 G2741 W2742 I2743 Y2744 G2745 E2746 I2747 Y2748 S2749 D2750 S2751 S2752 K2753 V2754 Q2755 P2756 L2757 M2758 K2759 P2760 Y2761 K2762 L2763 L2764 S2765 E2766 K2767 E2768 K2769 E2770 I2771 Y2772 R2773 W2774 P2775 I2776 K2777 E2778 S2779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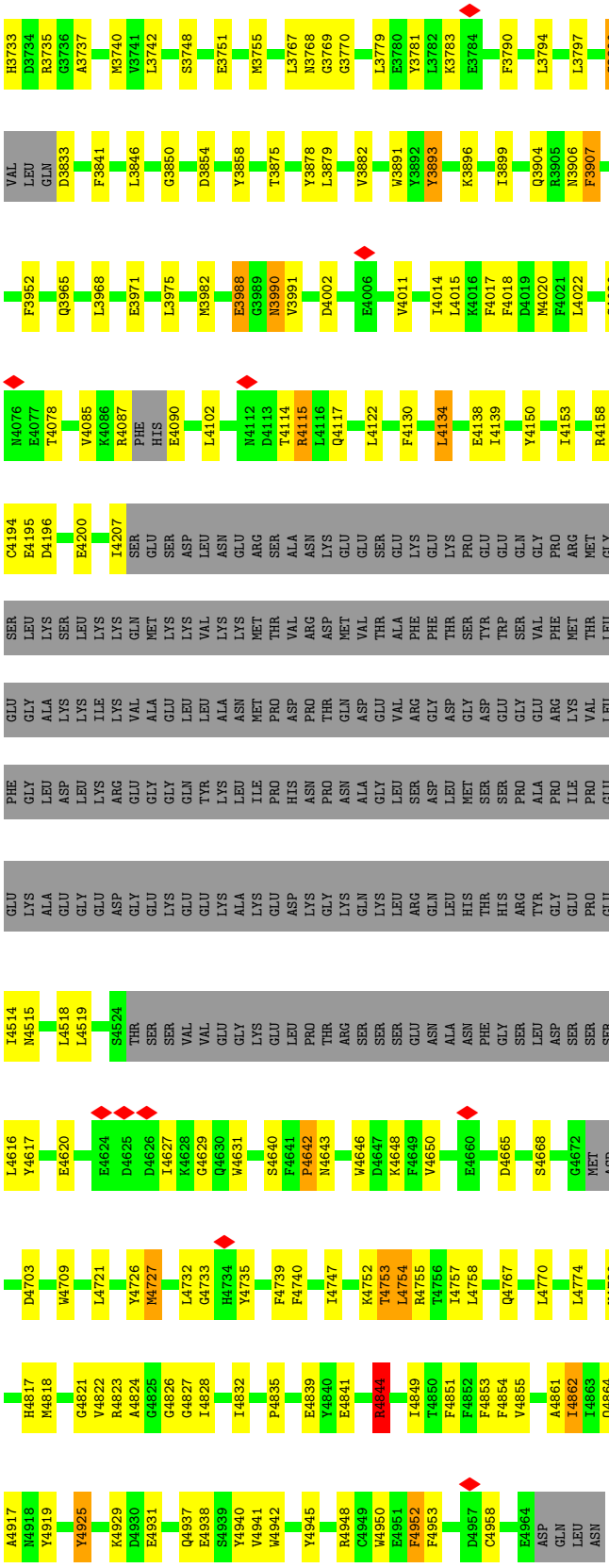
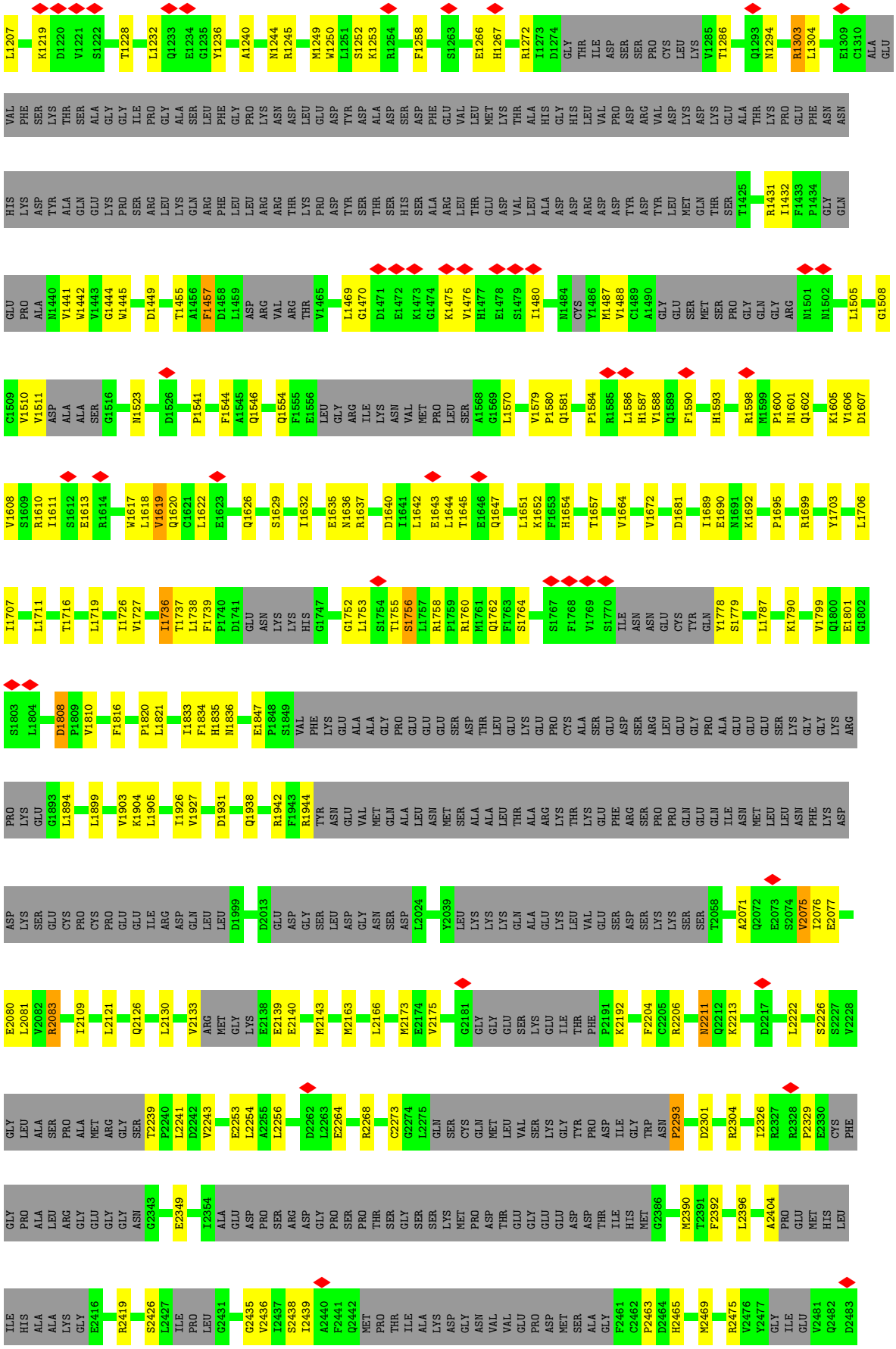
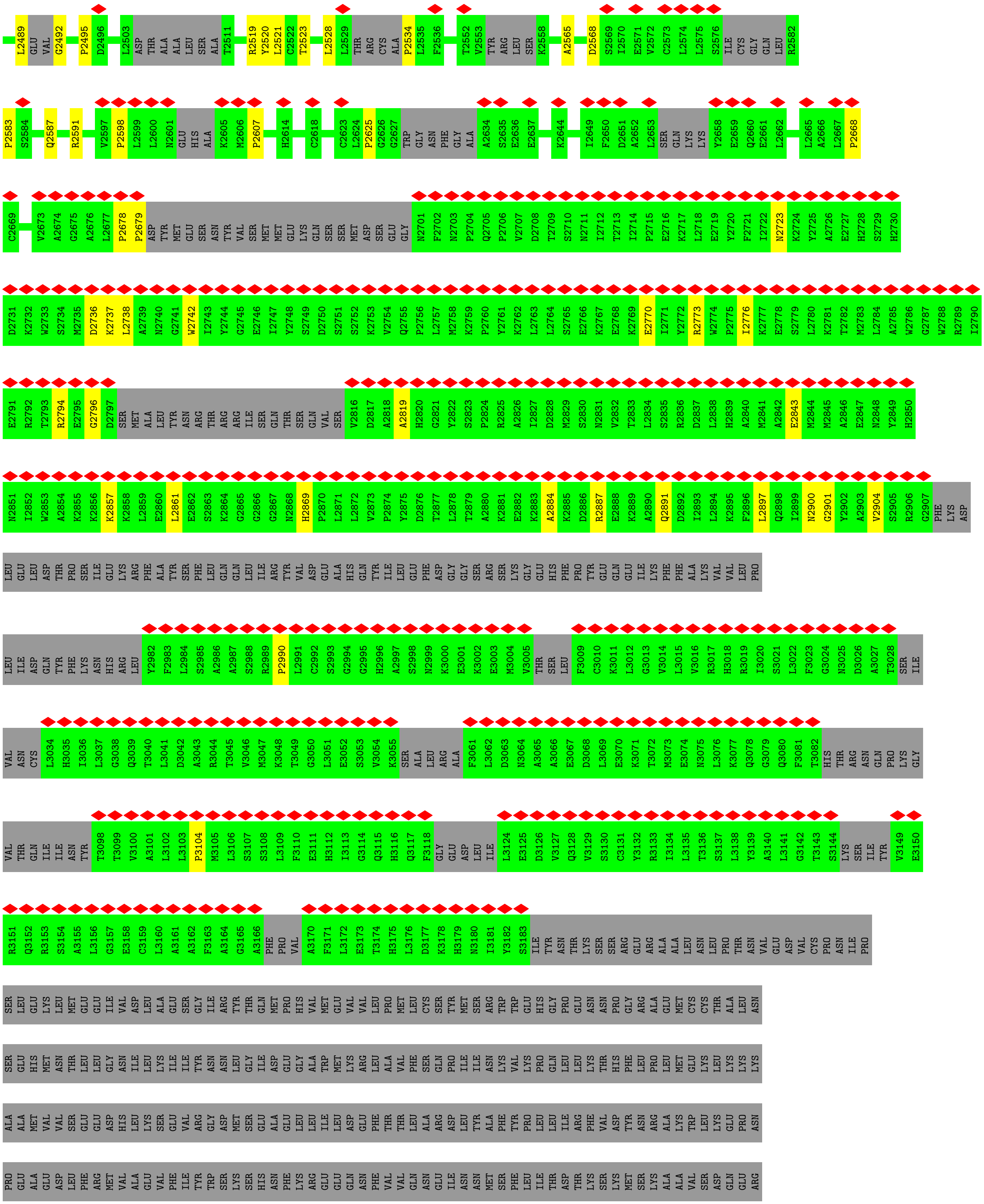
A2840 M2841 A2842 E2843 M2844 M2845 A2846 E2847 N2848 Y2849 H2850 N2851 I2852 W2853 A2854 K2855 K2856 K2857 K2858 L2859 E2860 L2861 E2862 S2863 K2864 G2865 G2866 G2867 N2868 H2869 P2870 L2871 L2872 V2873 P2874 Y2875 D2876 T2877 L2878 T2879 A2880 K2881 E2882 K2883 A2884 K2885 D2886 R2887 E2888 K2889 A2890 Q2891 D2892 I2893 L2894 K2895 F2896 L2897 Q2898 I2899
N2900 G2901 Y2902 A2903 V2904 S2905 R2906 G2907 PHE LYS ASP LEU GLU LEU ASP THR PRO SER ILE GLU LYS ARG PHE ALA TYR SER PHE LEU GLN GLN LEU ILE ARG TYR VAL ASP GLU ALA HIS GLN TYR ILE LEU GLU PHE ASP GLY GLY SER ARG SER LYS GLY GLU HIS PHE PRO TYR GLU GLN
GLU ILE LYS PHE PHE ALA LYS VAL VAL LEU PRO LEU ASP GLN TYR PHE LYS ASN HIS ARG LEU Y2982 F2983 L2984 S2985 A2986 A2987 S2988 R2989 P2990 L2991 C2992 S2993 G2994 G2995 H2996 A2997 S2998 N2999 K3000 E3001 K3002 E3003 M3004 V3005 THR SER LEU F3009 C3010 K3011 L3012 G3013 V3014 L3015 V3016 R3017 H3018 R3019
I3020 S3021 L3022 F3023 G3024 N3025 D3026 A3027 T3028 SER ILE VAL ASN CYS L3034 H3035 I3036 L3037 G3038 Q3039 T3040 L3041 D3042 A3043 R3044 T3045 V3046 M3047 K3048 T3049 G3050 L3051 E3052 S3053 V3054 K3055 SER ALA LEU ARG ALA F3061 L3062 D3063 N3064 A3065 A3066 E3067 D3068 L3069 E3070 K3071 T3072 M3073 E3074 N3075 L3076 K3077 Q3078 G3079
Q3080 F3081 T3082 HIS THR ARG ASN GLN PRO LYS GLY VAL THR GLN ILE ILE ASN TYR T3098 T3099 V3100 A3101 L3102 L3103 P3104 M3105 L3106 S3107 S3108 L3109 F3110 E3111 H3112 I3113 G3114 Q3115 H3116 Q3117 F3118 GLY GLU ASP LEU ILE L3124 E3125 D3126 V3127 Q3128 V3129 S3130 C3131 Y3132 R3133 I3134 L3135 T3136 S3137 L3138 Y3139
A3140 L3141 G3142 T3143 S3144 LYS SER ILE TYR V3149 E3150 R3151 Q3152 R3153 S3154 A3155 L3156 G3157 E3158 C3159 L3160 A3161 A3162 F3163 A3164 G3165 A3166 PHE PRO VAL A3170 F3171 L3172 E3173 T3174 H3175 L3176 D3177 K3178 H3179 N3180 I3181 Y3182 S3183 ILE TYR ASN THR LYS SER SER ARG GLU ARG ALA ALA LEU ASN LEU PRO
THR ASN VAL GLU ASP VAL CYS PRO ASN ILE PRO SER LEU GLU LYS LEU MET GLU GLU ILE VAL ASP LEU ALA GLU SER GLY ILE ARG TYR THR GLN MET PRO HIS VAL MET GLU VAL VAL LEU PRO MET LEU CYS SER TYR MET SER ARG TRP TRP GLU HIS GLY PRO GLU ASN ASN PRO
GLY ARG ALA GLU MET CYS CYS THR ALA LEU ASN SER GLU HIS MET ASN THR LEU LEU GLY ASN ILE LEU LYS ILE ILE TYR ASN ASN LEU GLY ILE ASP GLU GLY ALA TRP MET LYS ARG LEU ALA VAL PHE SER GLN PRO ILE ILE ASN LYS VAL LYS PRO GLN LEU LEU LYS THR HIS
PHE LEU PRO LEU MET GLU LYS LEU LYS LYS ALA ALA MET VAL VAL SER GLU GLU ASP HIS LEU LYS SER GLU VAL ARG GLY ASP MET SER GLU ALA GLU LEU LEU ILE LEU ASP GLU PHE THR THR LEU ALA ARG ASP LEU TYR ALA PHE TYR PRO LEU LEU ILE ARG PHE VAL ASP
TYR ASN ARG ALA LYS TRP LEU LYS GLU PRO ASN PRO GLU ALA GLU ASP LEU PHE ARG MET VAL ALA GLU VAL PHE ILE TYR TRP SER LYS SER HIS ASN PHE LYS ARG GLU GLU GLN ASN PHE VAL VAL GLN ASN GLU ILE ASN ASN MET SER PHE LEU ILE THR ASP THR LYS SER LYS
MET SER LYS ALA ALA VAL SER ASP GLN GLU ARG LYS LYS MET LYS ARG LYS GLY ASP ARG TYR SER MET GLN THR SER LEU ILE VAL ALA ALA LEU LYS ARG LEU LEU PRO ILE GLY LEU ASN ILE CYS ALA PRO GLY ASP GLN GLU LEU LEU ILE ALA ALA LEU ALA LYS ASN ARG PHE SER LEU
LYS ASP THR GLU ASP GLU VAL ARG ASP ILE ILE ILE ARG SER ASN ILE HIS LEU GLN GLY LYS LEU GLU ASP PRO ALA ILE ARG TRP GLN MET ALA ALA LEU TYR LYS ASP LEU PRO ASN ARG THR GLU ASP THR SER ASP PRO GLU LYS THR VAL GLU ARG VAL LEU ASP ILE ALA ASN VAL LEU
PHE HIS LEU GLU GLN LYS SER THR CYS MET ARG ARG ARG TYR TYR SER LEU VAL GLU HIS PRO GLN ARG SER LYS LYS ALA VAL TRP HIS LYS LEU LEU LEU SER LYS GLN ARG LYS ARG ALA VAL VAL ALA CYS PHE ARG MET ALA PRO LEU TYR ASN LEU P3613 R3614 Y3625 H3635
I3642 L3645 P3648 GLY ALA VAL PRO PRO GLU GLU ASP GLU GLY THR LYS R3661 L3665 L3670 R3674 L3677 L3688 Y3689 M3690 M3696 S3699 C3700 HIS ASP GLU GLU ASP ASP GLY GLU GLU GLU VAL LYS S3714 K3718 K3722 L3726 Q3729 A3730 R3731 L3732



• Molecule 1: RyR2

Chain C:

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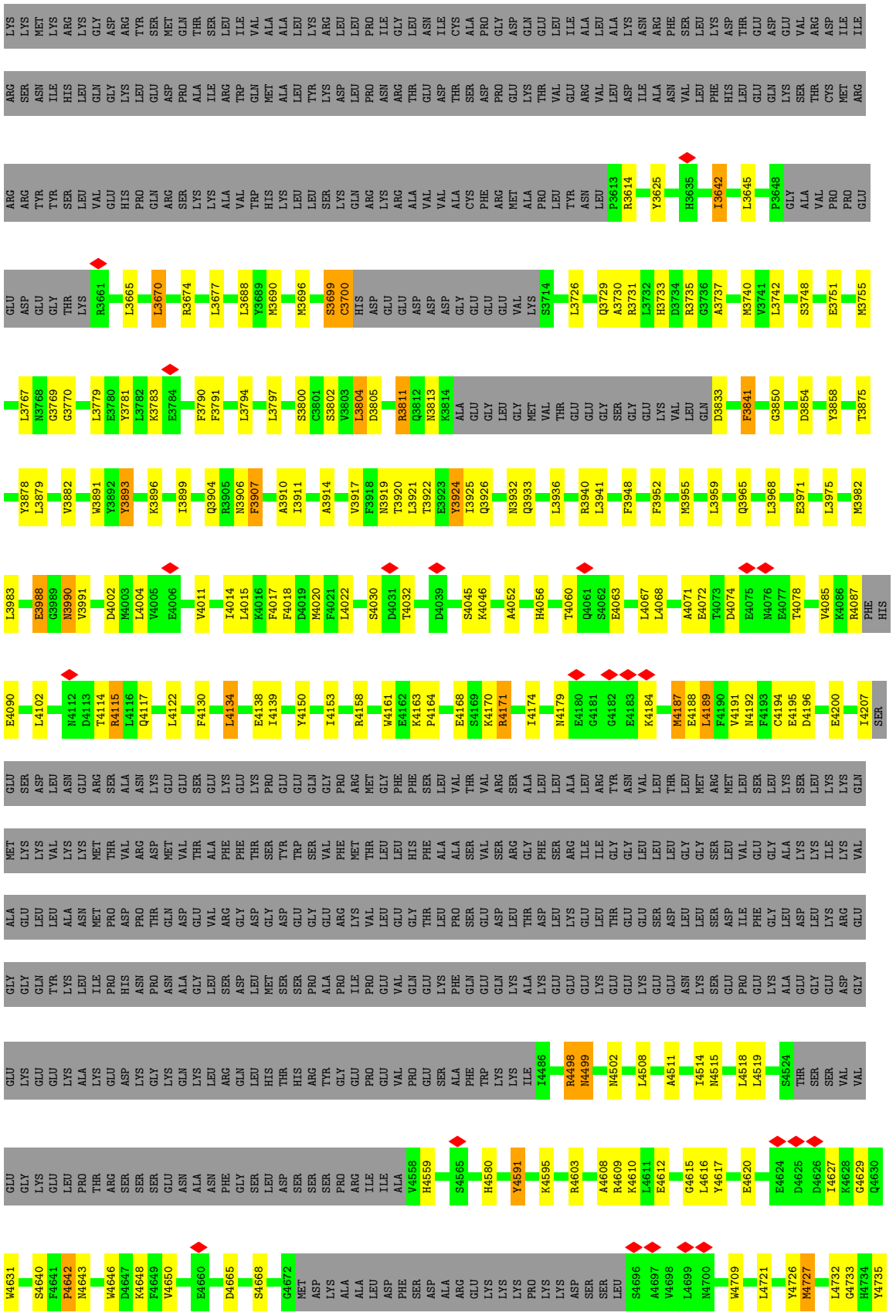
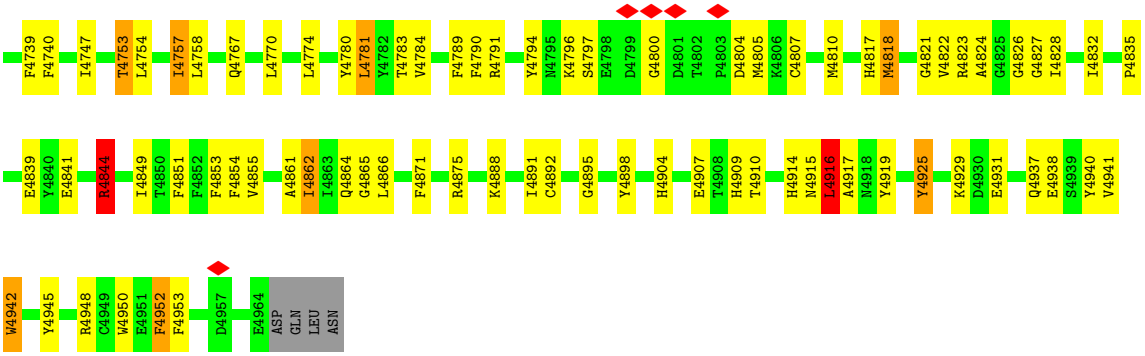
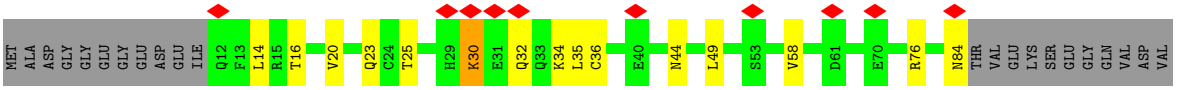
P2583 S2584 Q2587 R2591 V2597 P2598 L2599 L2600 N2601 GLU HIS ALA K2605 M2606 P2607 H2614 C2618 C2623 L2624 P2625 G2626 G2627 TRP GLY ASN PHE GLY ALA A2634 S2635 E2636 E2637 K2644 I2649 F2650 D2651 A2652 L2653 SER GLN LYS LYS Y2658 E2659 Q2660 E2661 L2662 L2665 A2666 L2667 P2668
C2669 V2673 A2674 G2675 A2676 L2677 P2678 P2679 ASP TYR MET GLU SER ASN TYR VAL SER MET MET GLU LYS GLN SER SER MET ASP SER GLU GLY N2701 F2702 N2703 P2704 Q2705 P2706 V2707 D2708 T2709 S2710 N2711 I2712 T2713 I2714 P2715 E2716 K2717 L2718 E2719 Y2720 F2721 I2722 N2723 K2724 Y2725 A2726 E2727 H2728 S2729 H2730
D2731 K2732 W2733 S2734 M2735 D2736 K2737 L2738 A2739 N2740 G2741 W2742 I2743 Y2744 G2745 E2746 I2747 Y2748 S2749 D2750 S2751 S2752 K2753 V2754 Q2755 P2756 L2757 M2758 K2759 P2760 Y2761 K2762 L2763 L2764 S2765 E2766 K2767 E2768 K2769 E2770 I2771 Y2772 R2773 W2774 P2775 I2776 K2777 E2778 S2779 L2780 K2781 T2782 M2783 L2784 A2785 W2786 G2787 W2788 R2789 I2790
E2791 R2792 T2793 R2794 E2795 G2796 D2797 SER MET ALA LEU TYR ASN ARG THR ARG ARG ILE SER GLN THR SER GLN VAL SER V2816 D2817 A2818 A2819 H2820 G2821 Y2822 S2823 P2824 R2825 A2826 I2827 D2828 M2829 S2830 N2831 V2832 T2833 L2834 S2835 R2836 D2837 L2838 H2839 A2840 M2841 A2842 E2843 M2844 M2845 A2846 E2847 N2848 Y2849 H2850
N2851 I2852 W2853 A2854 K2855 K2856 K2857 K2858 L2859 E2860 L2861 E2862 S2863 K2864 G2865 G2866 G2867 N2868 H2869 P2870 L2871 L2872 V2873 P2874 Y2875 D2876 T2877 L2878 T2879 A2880 K2881 E2882 K2883 A2884 K2885 D2886 R2887 E2888 K2889 A2890 Q2891 D2892 I2893 L2894 K2895 F2896 L2897 Q2898 I2899 N2900 G2901 Y2902 A2903 V2904 S2905 R2906 G2907 PHE LYS ASP
LEU GLU LEU ASP THR PRO SER ILE GLU LYS ARG PHE ALA TYR SER PHE LEU GLN GLN LEU ILE ARG TYR VAL ASP GLU ALA HIS GLN TYR ILE LEU GLU PHE ASP GLY GLY SER ARG SER LYS GLY GLU HIS PHE PRO TYR GLU GLN GLU ILE LYS PHE PHE ALA LYS VAL VAL LEU PRO
LEU ILE ASP GLN TYR PHE LYS ASN HIS ARG LEU Y2982 F2983 L2984 S2985 A2986 A2987 S2988 R2989 P2990 L2991 C2992 S2993 G2994 G2995 H2996 A2997 S2998 N2999 K3000 E3001 K3002 E3003 M3004 V3005 THR SER LEU F3009 C3010 K3011 L3012 G3013 V3014 L3015 V3016 R3017 H3018 R3019 I3020 S3021 L3022 F3023 G3024 N3025 D3026 A3027 T3028 SER ILE
VAL ASN CYS L3034 H3035 I3036 L3037 G3038 Q3039 T3040 L3041 D3042 A3043 R3044 T3045 V3046 M3047 K3048 T3049 G3050 L3051 E3052 S3053 V3054 K3055 SER ALA LEU ARG ALA F3061 L3062 D3063 N3064 A3065 A3066 E3067 D3068 L3069 E3070 K3071 T3072 M3073 E3074 N3075 L3076 K3077 Q3078 G3079 Q3080 F3081 T3082 HIS THR ARG ASN GLN PRO LYS GLY
VAL THR GLN ILE ILE ASN TYR T3098 T3099 V3100 A3101 L3102 L3103 P3104 M3105 L3106 S3107 S3108 L3109 F3110 E3111 H3112 I3113 G3114 Q3115 H3116 Q3117 F3118 GLY GLU ASP LEU ILE L3124 E3125 D3126 V3127 Q3128 V3129 S3130 C3131 Y3132 R3133 I3134 L3135 T3136 S3137 L3138 Y3139 A3140 L3141 G3142 T3143 S3144 LYS SER ILE TYR V3149 E3150
R3151 Q3152 R3153 S3154 A3155 L3156 G3157 E3158 C3159 L3160 A3161 A3162 F3163 A3164 G3165 A3166 PHE PRO VAL A3170 F3171 L3172 E3173 T3174 H3175 L3176 D3177 K3178 H3179 N3180 I3181 Y3182 S3183 ILE TYR ASN THR LYS SER SER ARG GLU ARG ALA ALA LEU ASN LEU PRO THR ASN VAL GLU ASP VAL CYS PRO ASN ILE PRO
SER LEU GLU LYS LEU MET GLU GLU ILE VAL ASP LEU ALA GLU SER GLY ILE ARG TYR THR GLN MET PRO HIS VAL MET GLU VAL VAL LEU PRO MET LEU CYS SER TYR MET SER ARG TRP TRP GLU HIS GLY PRO GLU ASN ASN PRO GLY ARG ALA GLU MET CYS CYS THR ALA LEU ASN
SER GLU HIS MET ASN THR LEU LEU GLY ASN ILE LEU LYS ILE ILE TYR ASN ASN LEU GLY ILE ASP GLU GLY ALA TRP MET LYS ARG LEU ALA VAL PHE SER GLN PRO ILE ILE ASN LYS VAL LYS PRO GLN LEU LEU LYS THR HIS PHE LEU PRO LEU MET GLU LYS LEU LYS LYS LYS
ALA ALA MET VAL VAL SER GLU GLU ASP HIS LEU LYS SER GLU VAL ARG GLY ASP MET SER GLU ALA GLU LEU LEU ILE LEU ASP GLU PHE THR THR LEU ALA ARG ASP LEU TYR ALA PHE TYR PRO LEU LEU ILE ARG PHE VAL ASP TYR ASN ARG ALA LYS TRP LEU LYS GLU PRO ASN
PRO GLU ALA GLU ASP LEU PHE ARG MET VAL ALA GLU VAL PHE ILE TYR TRP SER LYS SER HIS ASN PHE LYS ARG GLU GLU GLN ASN PHE VAL VAL GLN ASN GLU ILE ASN ASN MET SER PHE LEU ILE THR ASP THR LYS SER LYS MET SER LYS ALA ALA VAL SER ASP GLN GLU ARG

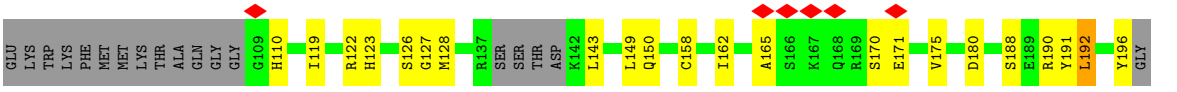


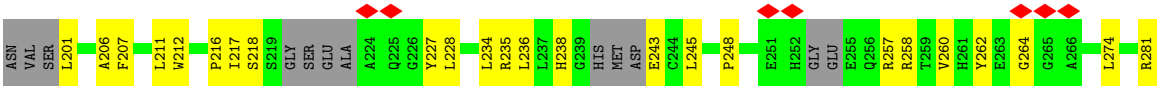


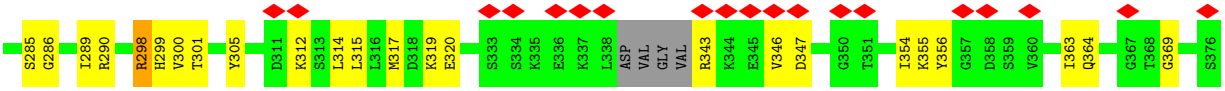
• Molecule 1: RyR2

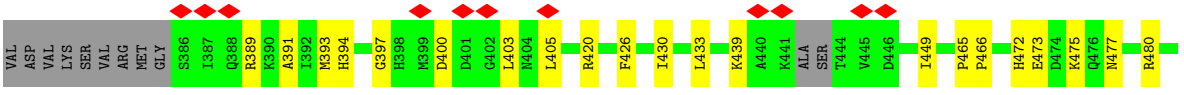
Chain D:

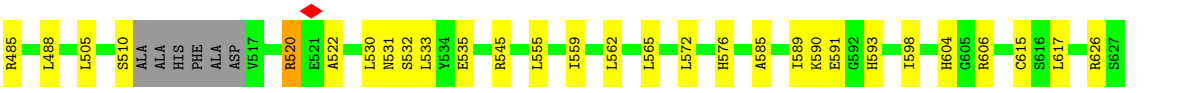


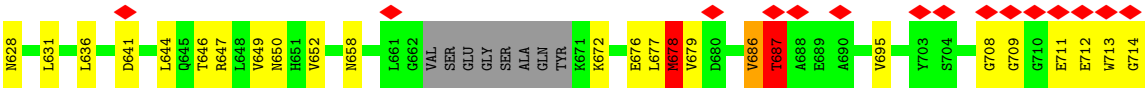


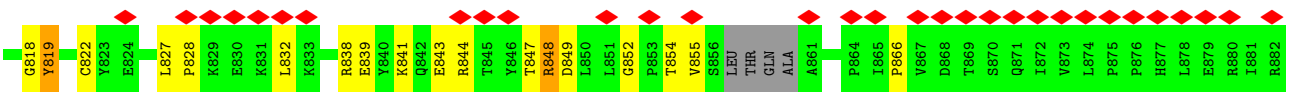


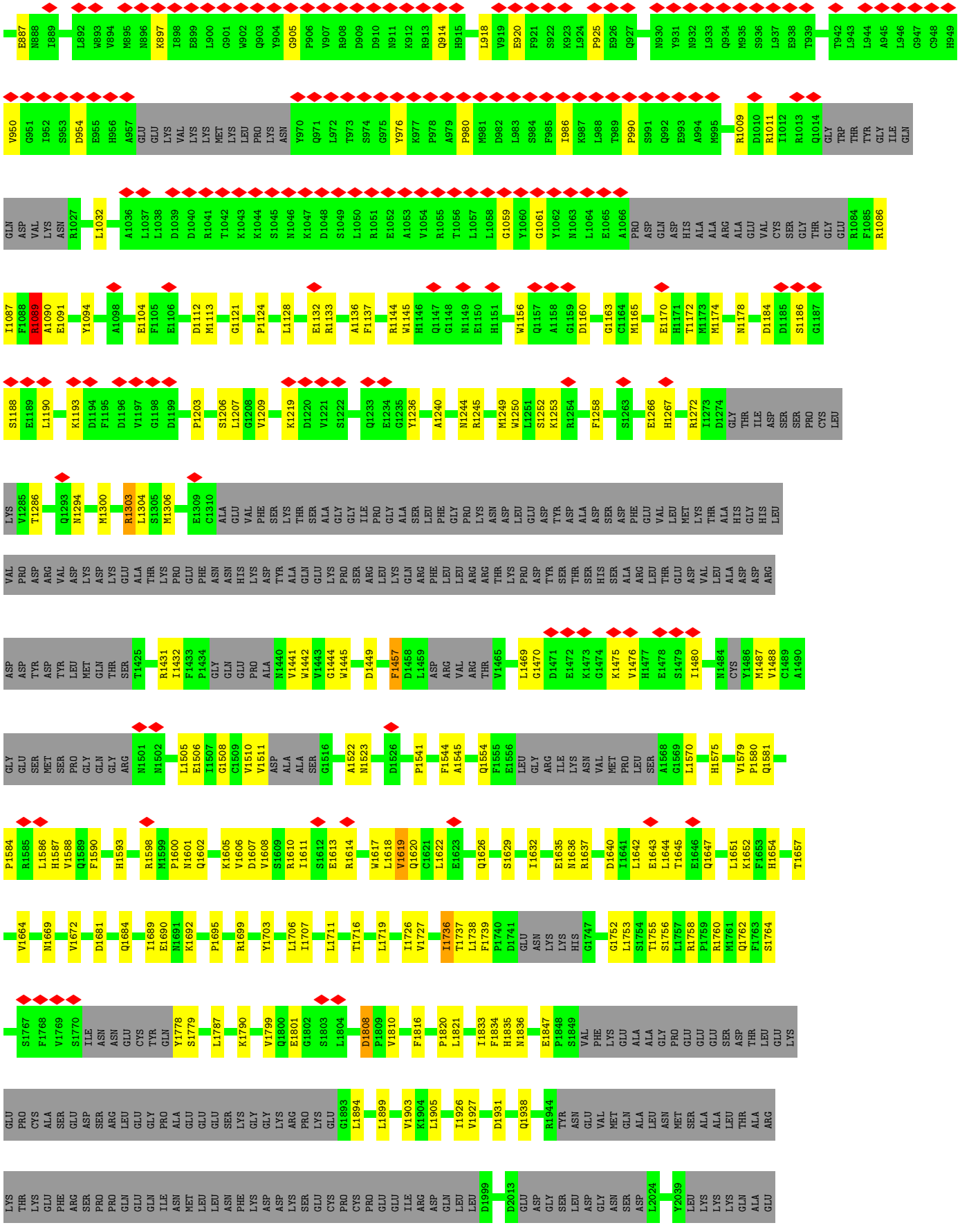


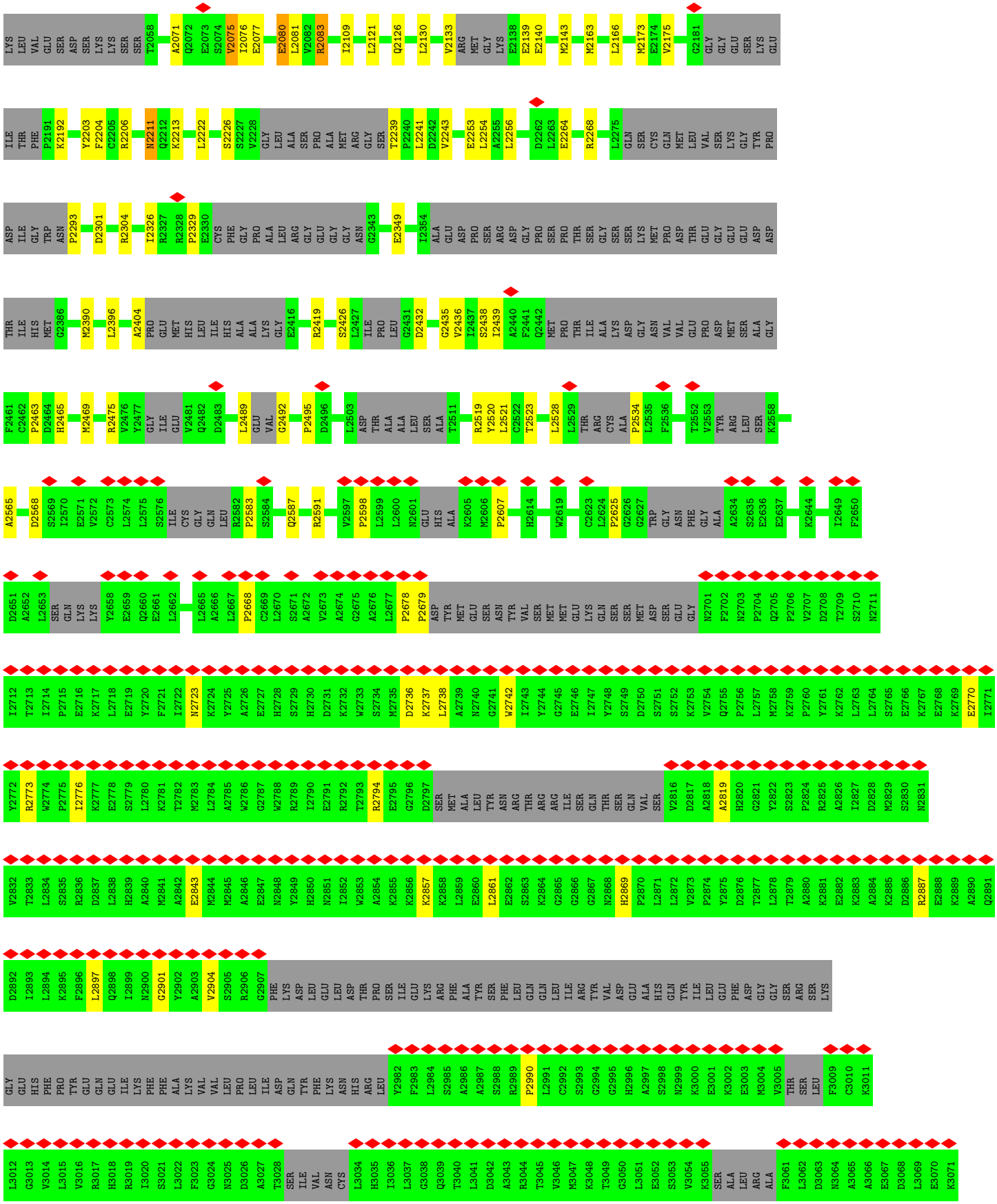








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ILE THR PHE P2191 K2192 Y2203 F2204 G2205 R2206 N2211 Q2212 K2213 L2222 S2226 S2227 V2228 GLY LEU ALA SER PRO ALA MET ARG GLY SER T2239 P2240 L2241 D2242 V2243 E2253 L2254 A2255 L2256 D2262 L2263 E2264 R2268 L2275 GLN SER CYS GLN MET LEU VAL SER LYS GLY TYR PRO
ASP ILE GLY TRP ASN P2293 D2301 R2304 I2326 R2327 R2328 P2329 E2330 CYS PHE GLY PRO ALA LEU ARG GLY GLU GLY GLY ASN G2343 E2349 I2354 ALA GLU ASP PRO SER ARG ASP GLY PRO SER PRO THR SER GLY SER SER LYS MET PRO ASP THR GLU GLY GLU GLU ASP ASP
THR ILE HIS MET G2386 M2390 L2396 A2404 PRO GLU MET HIS LEU ILE HIS ALA ALA LYS GLY E2416 R2419 S2426 L2427 ILE PRO LEU G2431 D2432 G2435 V2436 I2437 S2438 I2439 A2440 F2441 Q2442 MET PRO THR ILE ALA LYS ASP GLY GLY ASN VAL VAL GLU PRO ASP MET SER ALA GLY
F2461 C2462 P2463 D2464 H2465 M2469 R2475 V2476 Y2477 GLY ILE GLU V2481 Q2482 D2483 L2489 GLU VAL G2492 P2495 D2496 L2503 ASP THR ALA ALA LEU SER ALA T2511 R2519 Y2520 L2521 C2522 T2523 L2528 L2529 THR ARG CYS ALA P2534 L2535 F2536 T2552 V2553 TYR ARG LEU SER K2558
A2565 D2568 S2569 I2570 E2571 V2572 C2573 L2574 L2575 S2576 ILE CYS GLY GLN LEU R2582 P2583 S2584 Q2587 R2591 V2597 P2598 L2599 L2600 N2601 GLU HIS ALA K2605 M2606 P2607 H2614 W2619 C2623 L2624 P2625 G2626 G2627 TRP GLY ASN PHE GLY ALA A2634 S2635 E2636 E2637 K2644 I2649 F2650
D2651 A2652 L2653 SER GLN LYS LYS Y2658 E2659 Q2660 E2661 L2662 L2665 A2666 L2667 P2668 C2669 L2670 S2671 A2672 V2673 A2674 G2675 A2676 L2677 P2678 P2679 ASP TYR MET GLU SER ASN TYR VAL SER MET MET GLU LYS GLN SER SER MET ASP SER GLU GLY N2701 F2702 N2703 P2704 Q2705 P2706 V2707 D2708 T2709 S2710 N2711
I2712 T2713 I2714 P2715 E2716 K2717 L2718 E2719 Y2720 F2721 I2722 N2723 K2724 Y2725 A2726 E2727 H2728 S2729 H2730 D2731 K2732 W2733 S2734 M2735 D2736 K2737 L2738 A2739 N2740 G2741 W2742 I2743 Y2744 G2745 E2746 I2747 Y2748 S2749 D2750 S2751 S2752 K2753 V2754 Q2755 P2756 L2757 M2758 K2759 P2760 Y2761 K2762 L2763 L2764 S2765 E2766 K2767 E2768 K2769 E2770 I2771
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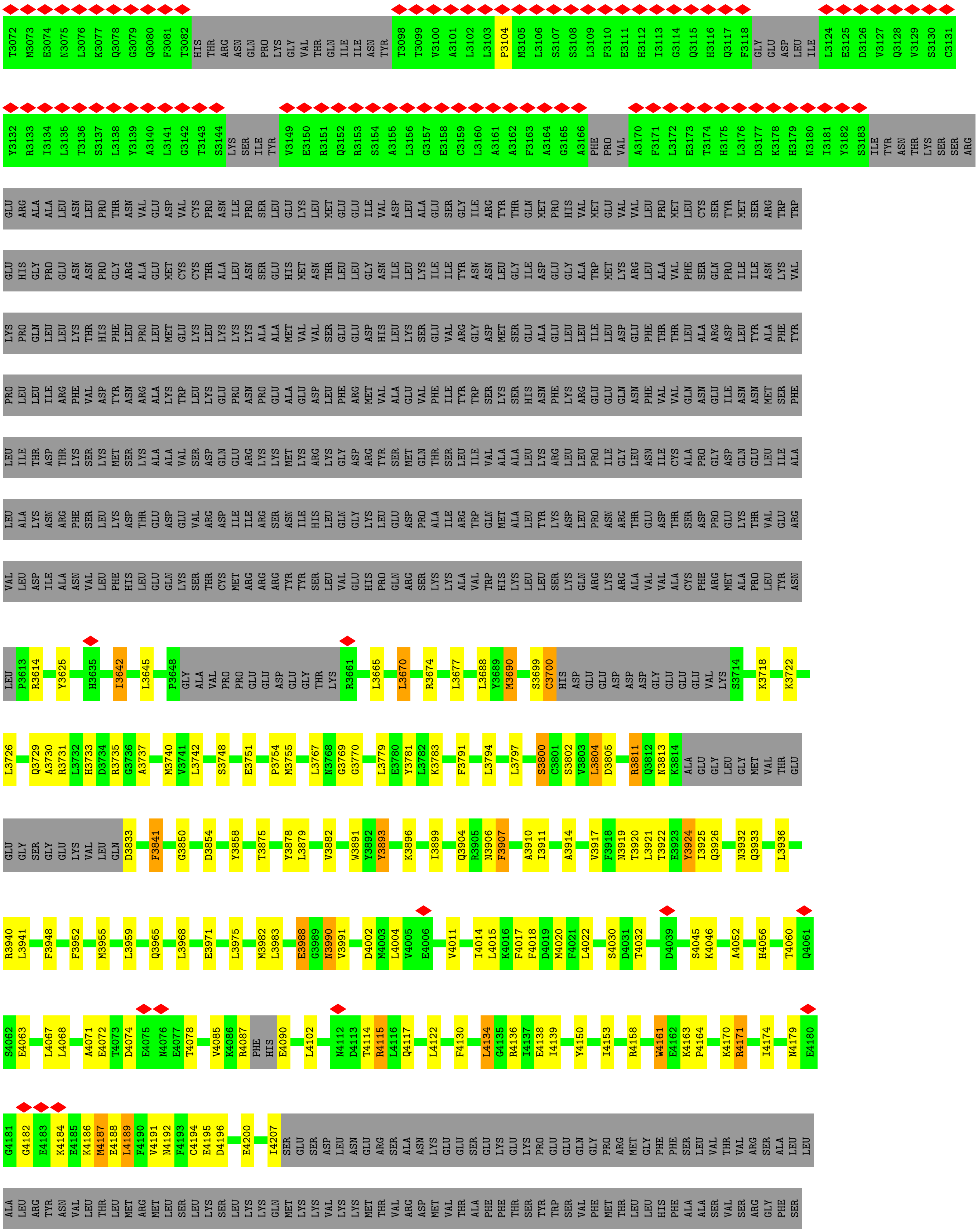
D2892 I2893 L2894 K2895 F2896 L2897 Q2898 I2899 N2900 G2901 Y2902 A2903 V2904 S2905 R2906 G2907 PHE LYS ASP LEU GLU LEU ASP THR PRO SER ILE GLU LYS ARG PHE ALA TYR SER PHE LEU GLN GLN LEU ILE ARG TYR VAL ASP GLU ALA HIS GLN TYR ILE LEU GLU PHE ASP GLY GLY SER ARG SER LYS
GLY GLU HIS PHE PRO TYR GLU GLN GLU ILE LYS PHE PHE ALA LYS VAL VAL LEU PRO LEU ILE ASP GLN TYR PHE LYS ASN HIS ARG LEU Y2982 F2983 L2984 S2985 A2986 A2987 S2988 R2989 P2990 L2991 C2992 S2993 G2994 G2995 H2996 A2997 S2998 N2999 K3000 E3001 K3002 E3003 M3004 V3005 THR SER LEU F3009 C3010 K3011
L3012 G3013 V3014 L3015 V3016 R3017 H3018 R3019 I3020 S3021 L3022 F3023 G3024 N3025 D3026 A3027 T3028 SER ILE VAL ASN CYS L3034 H3035 I3036 L3037 G3038 Q3039 T3040 L3041 D3042 A3043 R3044 T3045 V3046 M3047 K3048 T3049 G3050 L3051 E3052 S3053 V3054 K3055 SER ALA LEU ARG ALA F3061 L3062 D3063 N3064 A3065 A3066 E3067 D3068 L3069 E3070 K3071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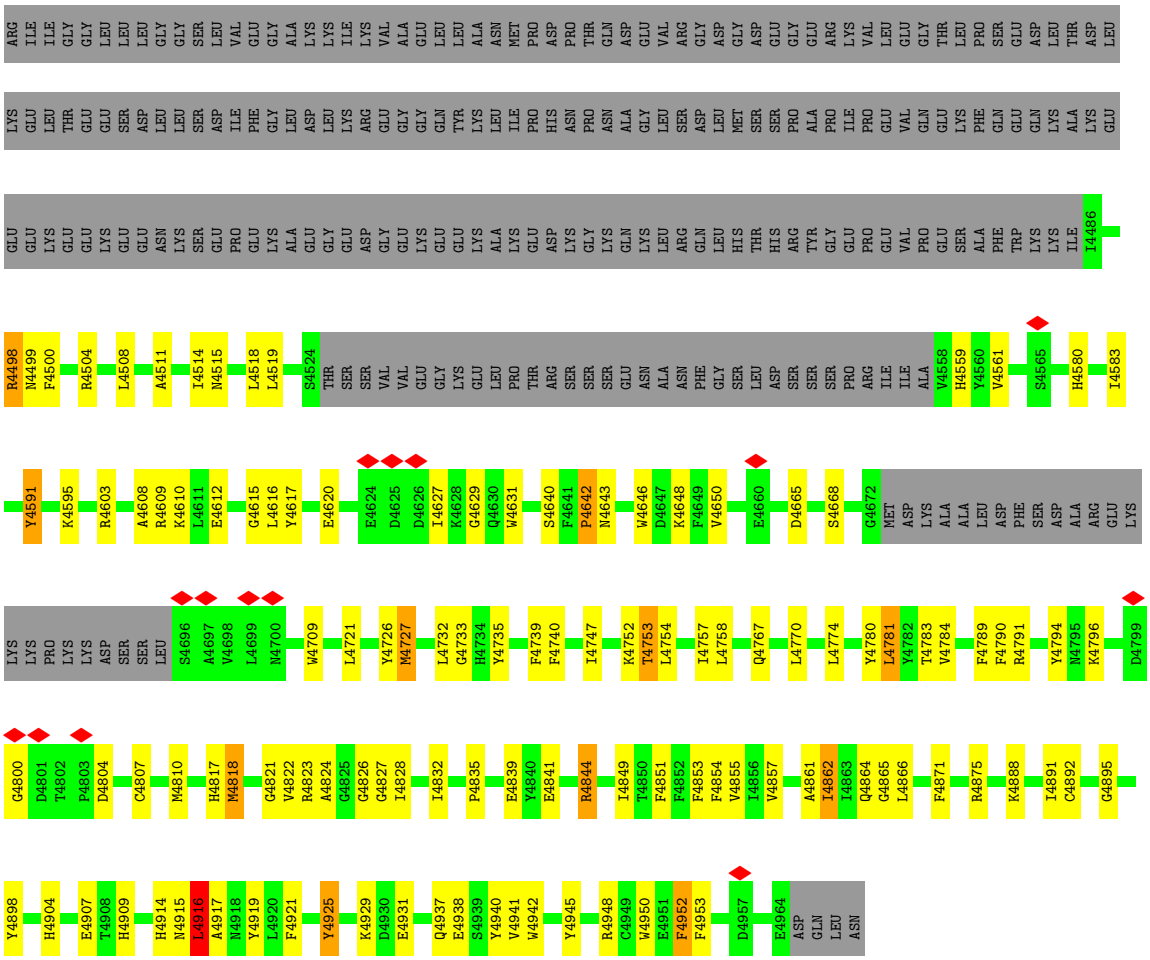
Y3132 R3133 I3134 L3135 T3136 S3137 L3138 Y3139 A3140 L3141 G3142 T3143 S3144 LYS SER ILE TYR V3149 E3150 R3151 Q3152 R3153 S3154 A3155 L3156 G3157 E3158 C3159 L3160 A3161 A3162 F3163 A3164 G3165 A3166 PHE PRO VAL A3170 F3171 L3172 E3173 T3174 H3175 L3176 D3177 K3178 H3179 N3180 I3181 Y3182 S3183 ILE TYR ASN THR LYS SER SER ARG
GLU ARG ALA ALA LEU ASN LEU PRO THR ASN VAL GLU ASP VAL CYS PRO ASN ILE PRO SER LEU GLU LYS LEU MET GLU GLU ILE VAL ASP LEU ALA GLU SER GLY ILE ARG TYR THR GLN MET PRO HIS VAL MET GLU VAL VAL LEU PRO MET LEU CYS SER TYR MET SER ARG TRP TRP
GLU HIS GLY PRO GLU ASN ASN PRO GLY ARG ALA GLU MET CYS CYS THR ALA LEU ASN SER GLU HIS MET ASN THR LEU LEU GLY ASN ILE LEU LYS ILE ILE TYR ASN ASN LEU GLY ILE ASP GLU GLY ALA TRP MET LYS ARG LEU ALA VAL PHE SER GLN PRO ILE ILE ASN LYS VAL
LYS PRO GLN LEU LEU LYS THR HIS PHE LEU PRO LEU MET GLU LYS LEU LYS LYS LYS ALA ALA MET VAL VAL SER GLU GLU ASP HIS LEU LYS SER GLU VAL ARG GLY ASP MET SER GLU ALA GLU LEU LEU ILE LEU ASP GLU PHE THR THR LEU ALA ARG ASP LEU TYR ALA PHE TYR
PRO LEU LEU ILE ARG PHE VAL ASP TYR ASN ARG ALA LYS TRP LEU LYS GLU PRO ASN PRO GLU ALA GLU ASP LEU PHE ARG MET VAL ALA GLU VAL PHE ILE TYR TRP SER LYS SER HIS ASN PHE LYS ARG GLU GLN ASN PHE VAL VAL GLN ASN GLU ILE ASN ASN MET SER PHE
LEU ILE THR ASP THR LYS SER LYS MET SER LYS ALA ALA VAL SER ASP GLN GLU ARG LYS LYS MET LYS ARG LYS GLY ASP ARG TYR SER MET GLN THR SER LEU ILE VAL ALA ALA LEU LYS ARG LEU LEU PRO ILE GLY LEU ASN ILE CYS ALA PRO GLY ASP GLN GLU LEU ILE ALA
LEU ALA LYS ASN ARG PHE SER LEU LYS ASP THR GLU ASP GLU VAL ARG ASP ILE ILE ARG SER ASN ILE HIS LEU GLN GLY LYS LEU GLU ASP PRO ALA ILE ARG TRP GLN MET ALA LEU TYR LYS ASP LEU PRO ASN ARG THR GLU ASP THR SER ASP PRO GLU LYS THR VAL GLU ARG
VAL LEU ASP ILE ALA ASN VAL LEU PHE HIS LEU GLU GLN LYS SER THR CYS MET ARG ARG ARG TYR TYR SER LEU VAL GLU HIS PRO GLN ARG SER LYS LYS ALA VAL TRP HIS LYS LEU LEU SER LYS GLN ARG LYS ARG ALA VAL VAL ALA CYS PHE ARG MET ALA PRO LEU TYR ASN
LEU P3613 R3614 Y3625 H3635 I3642 L3645 P3648 GLY ALA VAL PRO PRO GLU GLU ASP GLU GLY THR LYS R3661 L3665 L3670 R3674 L3677 L3688 Y3689 M3690 S3699 C3700 HIS ASP GLU GLU ASP ASP ASP GLY GLU GLU GLU VAL LYS S3714 K3718 K3722
L3726 Q3729 A3730 R3731 L3732 H3733 D3734 R3735 G3736 A3737 M3740 V3741 L3742 S3748 E3751 P3754 M3755 L3767 N3768 G3769 G3770 L3779 E3780 Y3781 L3782 K3783 F3791 L3794 L3797 S3800 C3801 S3802 V3803 L3804 D3805 R3811 Q3812 N3813 K3814 ALA GLU GLY LEU GLY MET VAL THR GLU
GLU GLY SER GLY GLU LYS VAL LEU GLN D3833 F3841 G3850 D3854 Y3858 T3875 Y3878 L3879 V3882 W3891 Y3892 Y3893 K3896 I3899 Q3904 R3905 N3906 F3907 A3910 I3911 A3914 V3917 F3918 N3919 T3920 L3921 T3922 E3923 Y3924 I3925 Q3926 N3932 Q3933 L3936
R3940 L3941 F3948 F3952 M3955 L3959 Q3965 L3968 E3971 L3975 M3982 L3983 E3988 G3989 N3990 V3991 D4002 M4003 L4004 V4005 E4006 V4011 I4014 L4015 K4016 F4017 F4018 D4019 M4020 F4021 L4022 S4030 D4031 T4032 D4039 S4045 K4046 A4052 H4056 T4060 Q4061
S4062 E4063 L4067 L4068 A4071 E4072 T4073 D4074 E4075 N4076 E4077 T4078 V4085 K4086 R4087 PHE HIS E4090 L4102 N4112 D4113 T4114 R4115 L4116 Q4117 L4122 F4130 L4134 G4135 R4136 I4137 E4138 I4139 Y4150 I4153 R4158 W4161 E4162 K4163 P4164 K4170 R4171 I4174 N4179 E4180
G4181 G4182 E4183 K4184 E4185 K4186 M4187 E4188 L4189 F4190 V4191 N4192 F4193 C4194 E4195 D4196 E4200 I4207 SER GLU SER ASP LEU ASN GLU ARG SER ALA ASN LYS GLU GLU SER GLU LYS GLU LYS PRO GLU GLU GLN GLY PRO ARG MET GLY PHE PHE SER LEU VAL THR VAL ARG SER ALA LEU LEU
ALA LEU ARG TYR ASN VAL LEU THR LEU MET ARG MET LEU SER LEU LYS SER LEU LYS LYS GLN MET LYS LYS VAL LYS LYS MET THR VAL ARG ASP MET VAL THR ALA PHE PHE THR SER TYR TRP SER VAL PHE MET THR LEU LEU HIS PHE ALA ALA SER VAL SER ARG GLY PHE SER


ARG ILE ILE GLY GLY LEU LEU LEU GLY GLY SER LEU VAL GLU GLY ALA LYS LYS ILE LYS VAL ALA GLU LEU LEU ALA ASN MET PRO ASP PRO THR GLN ASP GLU VAL ARG GLY ASP GLY ASP GLU GLY GLU ARG LYS VAL LEU GLU GLY THR LEU PRO SER GLU ASP LEU THR ASP LEU
LYS GLU LEU THR GLU GLU SER ASP LEU LEU SER ASP ILE PHE GLY LEU ASP LYS ARG GLU GLY GLN TYR LYS LEU ILE PRO HIS ASN PRO ASN ALA GLY LEU SER ASP SER PRO ALA PRO ILE PRO GLU VAL GLN GLU LYS PHE GLN GLU GLN LYS LYS ALA LYS GLU
GLU GLU LYS GLU GLU LYS GLU GLU ASN LYS SER GLU PRO GLU LYS ALA GLU GLY GLU ASP GLY GLU LYS GLU GLU LYS ALA LYS GLU ASP LYS GLY LYS GLU LEU PRO THR ARG SER SER GLY LYS GLY GLN LYS LEU ARG GLN LEU HIS THR HIS ARG TYR GLY GLU PRO GLU VAL PRO GLU SER ALA PHE TRP LYS LYS ILE I4486
R4498 N4499 F4500 R4504 L4508 A4511 I4514 N4515 L4518 L4519 S4524 THR SER SER VAL VAL GLU GLY LYS GLU LEU PRO THR ARG SER SER SER GLU ASN ALA ASN PHE GLY SER LEU ASP SER SER SER PRO ARG ILE ILE ALA V4558 H4559 Y4560 V4561 S4565 H4580 I4583
Y4591 K4595 R4603 A4608 R4609 K4610 L4611 E4612 G4615 L4616 Y4617 E4620 E4624 D4625 D4626 I4627 K4628 G4629 Q4630 W4631 S4640 F4641 P4642 N4643 W4646 D4647 K4648 F4649 V4650 E4660 D4665 S4668 G4672 MET ASP LYS ALA ALA LEU ASP PHE SER ASP ALA ARG GLU LYS
LYS LYS PRO LYS LYS ASP SER SER LEU S4696 A4697 V4698 L4699 N4700 W4709 L4721 Y4726 M4727 L4732 G4733 H4734 Y4735 F4739 F4740 I4747 K4752 T4753 L4754 I4757 L4758 Q4767 L4770 L4774 Y4780 L4781 Y4782 T4783 V4784 F4789 F4790 R4791 Y4794 N4795 K4796 D4799
G4800 D4801 T4802 P4803 D4804 C4807 M4810 H4817 M4818 G4821 V4822 R4823 A4824 G4825 G4826 G4827 I4828 I4832 P4835 E4839 Y4840 E4841 R4844 I4849 T4850 F4851 F4852 F4853 F4854 V4855 I4856 V4857 A4861 I4862 I4863 Q4864 G4865 L4866 F4871 R4875 K4888 I4891 C4892 G4895
Y4898 H4904 E4907 T4908 H4909 H4914 N4915 L4916 A4917 N4918 Y4919 L4920 F4921 Y4925 K4929 D4930 E4931 Q4937 E4938 S4939 Y4940 V4941 W4942 Y4945 R4948 C4949 W4950 E4951 F4952 F4953 D4957 E4964 ASP GLN LEU ASN

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	133196	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	44	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	FEI FALCON II (4k x 4k)	Depositor
Maximum map value	0.155	Depositor
Minimum map value	-0.067	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.006	Depositor
Recommended contour level	0.035	Depositor
Map size (Å)	546.0, 546.0, 546.0	wwPDB
Map dimensions	520, 520, 520	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.05, 1.05, 1.05	Depositor

5 Model quality

5.1 Standard geometry

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

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	1.09	70/26752 (0.3%)	1.00	96/36151 (0.3%)
1	B	1.09	66/26752 (0.2%)	1.00	95/36151 (0.3%)
1	C	1.08	67/26752 (0.3%)	1.00	95/36151 (0.3%)
1	D	1.09	67/26752 (0.3%)	1.00	99/36151 (0.3%)
All	All	1.08	270/107008 (0.3%)	1.00	385/144604 (0.3%)

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	23
1	B	0	23
1	C	0	24
1	D	0	23
All	All	0	93

The worst 5 of 270 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	3700	CYS	CB-SG	13.49	2.05	1.82
1	D	3700	CYS	CB-SG	13.43	2.05	1.82
1	A	3700	CYS	CB-SG	13.37	2.04	1.82
1	C	3700	CYS	CB-SG	13.08	2.04	1.82
1	B	3878	TYR	CG-CD1	-12.72	1.22	1.39

The worst 5 of 385 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	4948	ARG	NE-CZ-NH2	13.56	127.08	120.30
1	D	4948	ARG	NE-CZ-NH2	13.25	126.92	120.30
1	B	4948	ARG	NE-CZ-NH2	13.09	126.84	120.30
1	C	4948	ARG	NE-CZ-NH2	12.28	126.44	120.30
1	A	1089	ARG	NE-CZ-NH2	-9.54	115.53	120.30

There are no chirality outliers.

5 of 93 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	641	ASP	Peptide
1	A	686	VAL	Peptide
1	A	791	VAL	Peptide
1	A	818	GLY	Peptide
1	A	819	TYR	Peptide

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	A	26267	0	24896	381	0
1	B	26267	0	24897	372	0
1	C	26267	0	24897	370	0
1	D	26267	0	24896	377	0
2	A	1	0	0	0	0
2	B	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
All	All	105072	0	99586	1447	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 7.

The worst 5 of 1447 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:D:4818:MET:CG	1:D:4818:MET:SD	2.01	1.49

Continued on next page...

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:4818:MET:CG	1:C:4818:MET:SD	2.01	1.48
1:C:3700:CYS:CB	1:C:3700:CYS:SG	2.04	1.45
1:B:3700:CYS:CB	1:B:3700:CYS:SG	2.05	1.43
1:D:3700:CYS:SG	1:D:3700:CYS:CB	2.05	1.43

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	3289/4968 (66%)	2988 (91%)	279 (8%)	22 (1%)	22	62
1	B	3289/4968 (66%)	2994 (91%)	273 (8%)	22 (1%)	22	62
1	C	3289/4968 (66%)	2988 (91%)	280 (8%)	21 (1%)	25	64
1	D	3289/4968 (66%)	2986 (91%)	282 (9%)	21 (1%)	25	64
All	All	13156/19872 (66%)	11956 (91%)	1114 (8%)	86 (1%)	26	62

5 of 86 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	1737	THR
1	A	1756	SER
1	A	4071	ALA
1	B	1737	THR
1	B	1756	SER

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	2660/4355 (61%)	2616 (98%)	44 (2%)	60	78
1	B	2657/4355 (61%)	2617 (98%)	40 (2%)	65	80
1	C	2658/4355 (61%)	2615 (98%)	43 (2%)	62	79
1	D	2660/4355 (61%)	2616 (98%)	44 (2%)	60	78
All	All	10635/17420 (61%)	10464 (98%)	171 (2%)	64	79

5 of 171 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	4168	GLU
1	D	990	PRO
1	C	4187	MET
1	D	298	ARG
1	D	2126	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 169 such sidechains are listed below:

Mol	Chain	Res	Type
1	C	3990	ASN
1	D	1602	GLN
1	C	4559	HIS
1	D	238	HIS
1	D	2212	GLN

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 monosaccharides in this entry.

5.6 Ligand geometry (i)

Of 4 ligands modelled in this entry, 4 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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

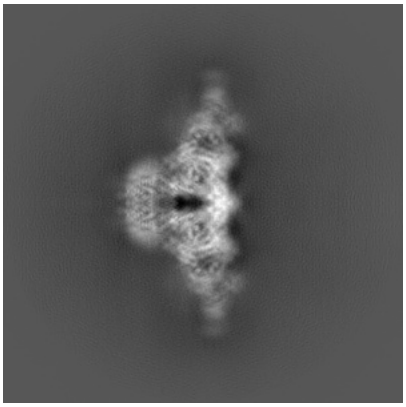
This section contains visualisations of the EMDB entry EMD-9529. These allow visual inspection of the internal detail of the map and identification of artifacts.

No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

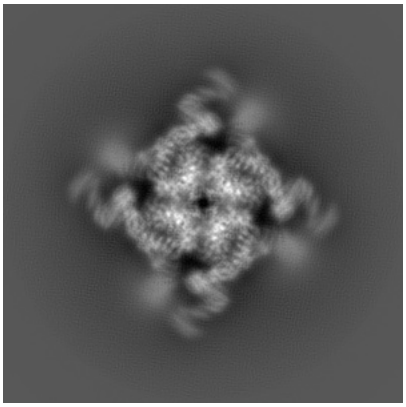
6.1 Orthogonal projections

6.1.1 Primary map

X



Y

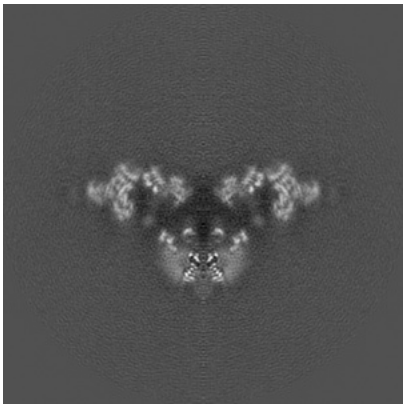


Z

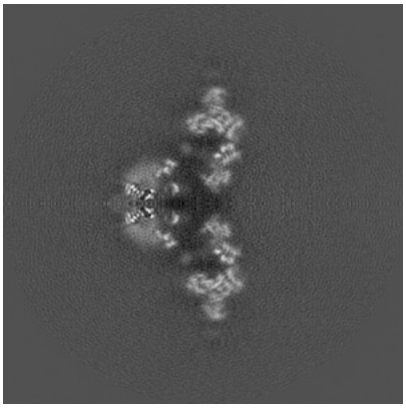
The images above show the map projected in three orthogonal directions.

6.2 Central slices

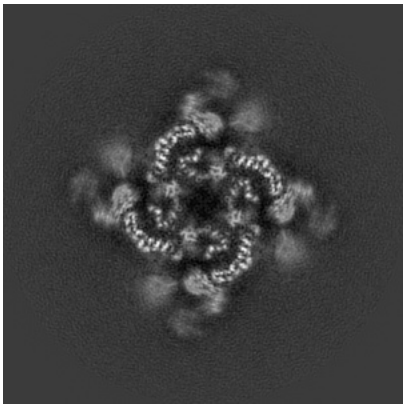
6.2.1 Primary map



X Index: 260



Y Index: 260



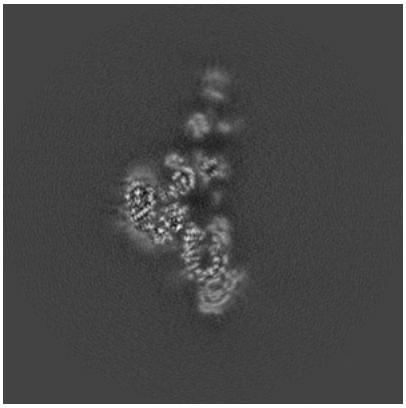
Z Index: 260

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

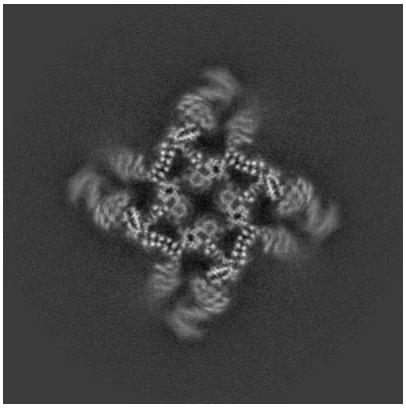
6.3 Largest variance slices (i)

6.3.1 Primary map

X Index: 276



Y Index: 244

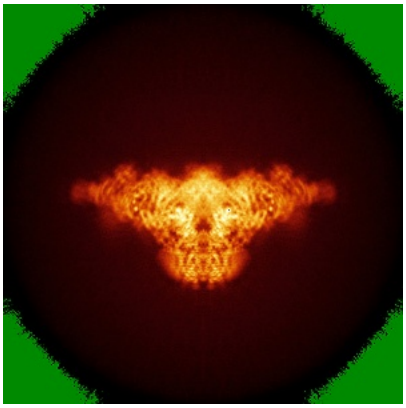


Z Index: 271

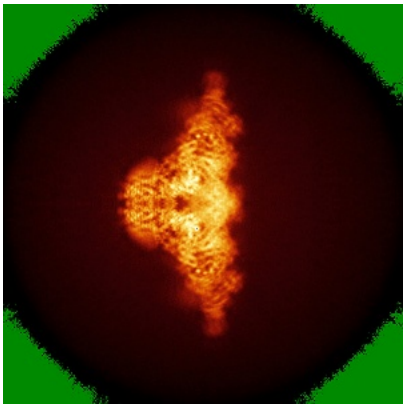
The images above show the largest variance slices of the map in three orthogonal directions.

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

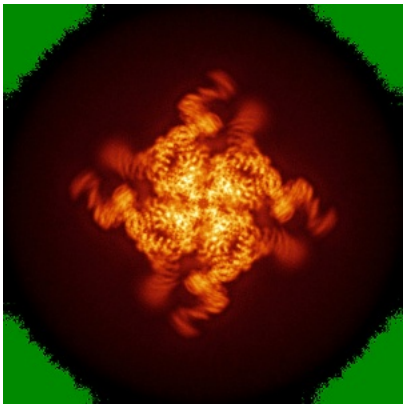
6.4.1 Primary map



X



Y

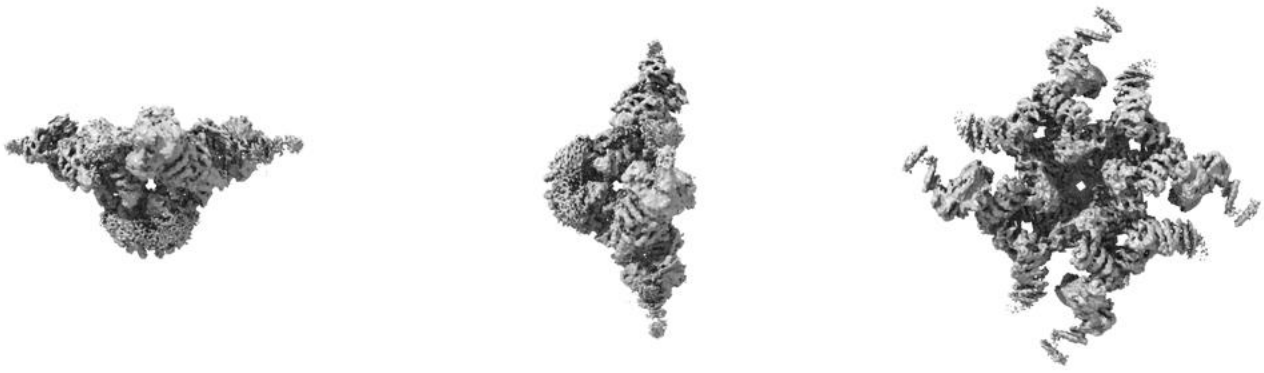


Z

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 0.035. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

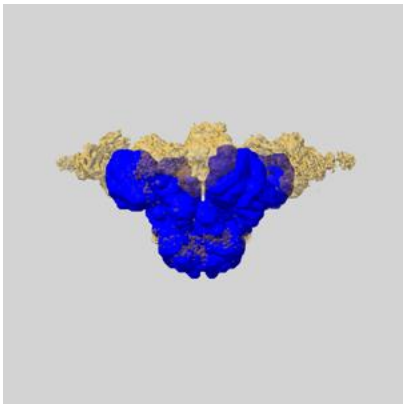
6.6 Mask visualisation (i)

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

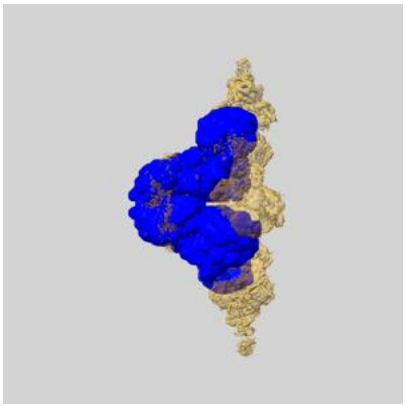
A mask typically either:

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

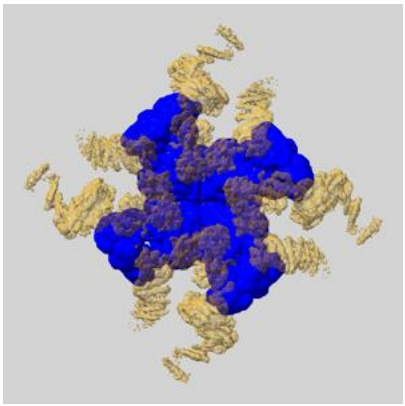
6.6.1 emd_9529_msk_1.map (i)



X



Y

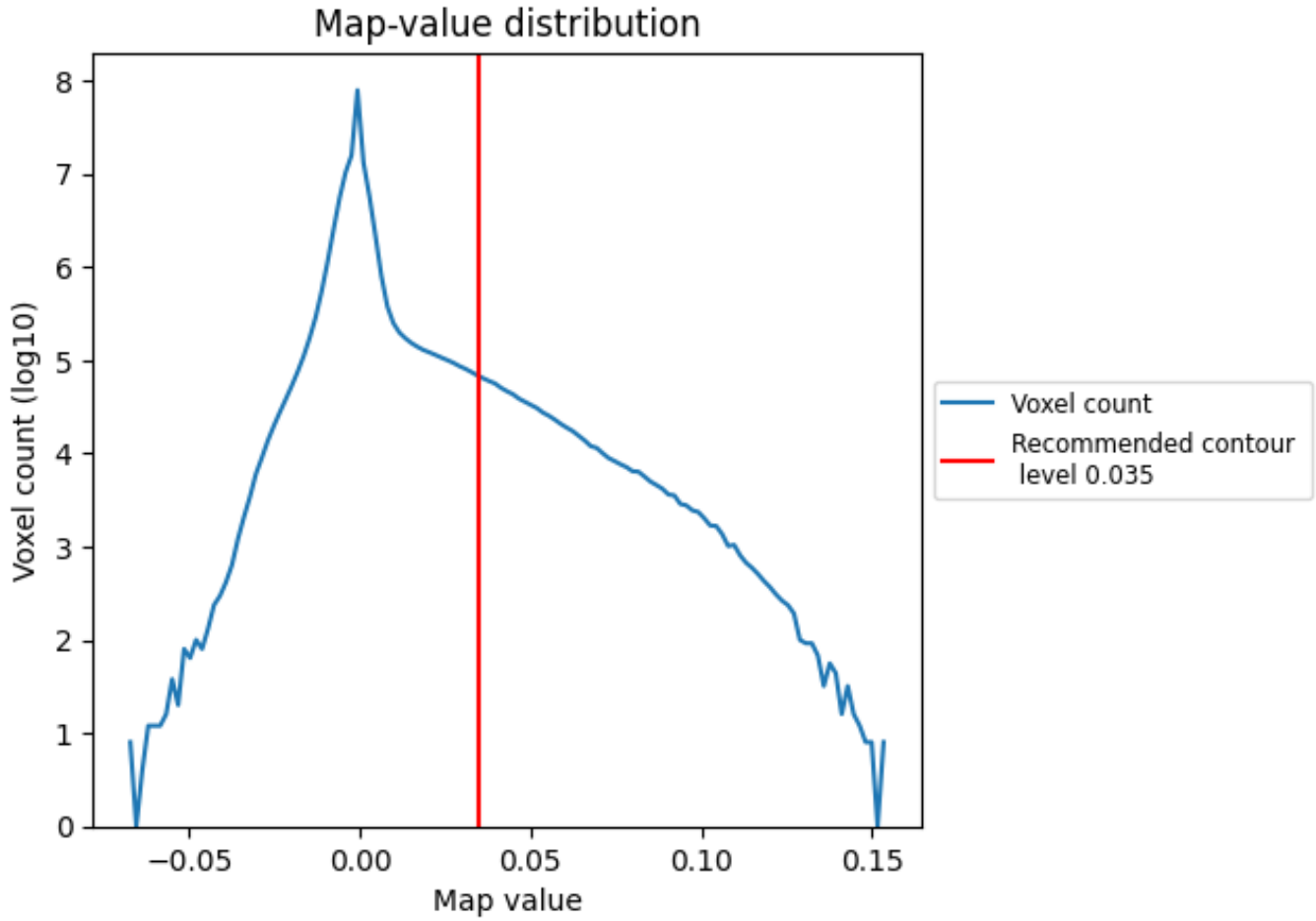


Z

7 Map analysis

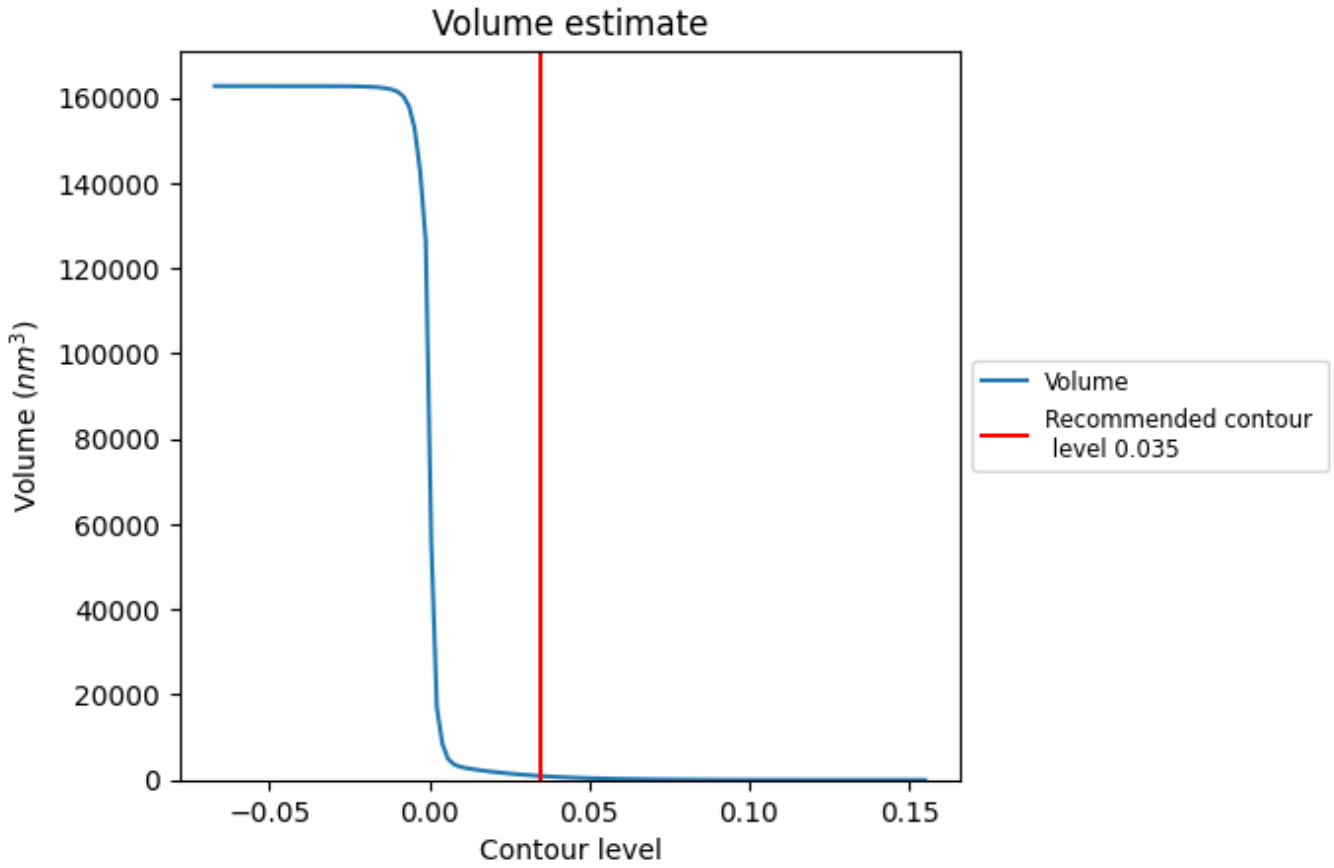
This section contains the results of statistical analysis of the map.

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.

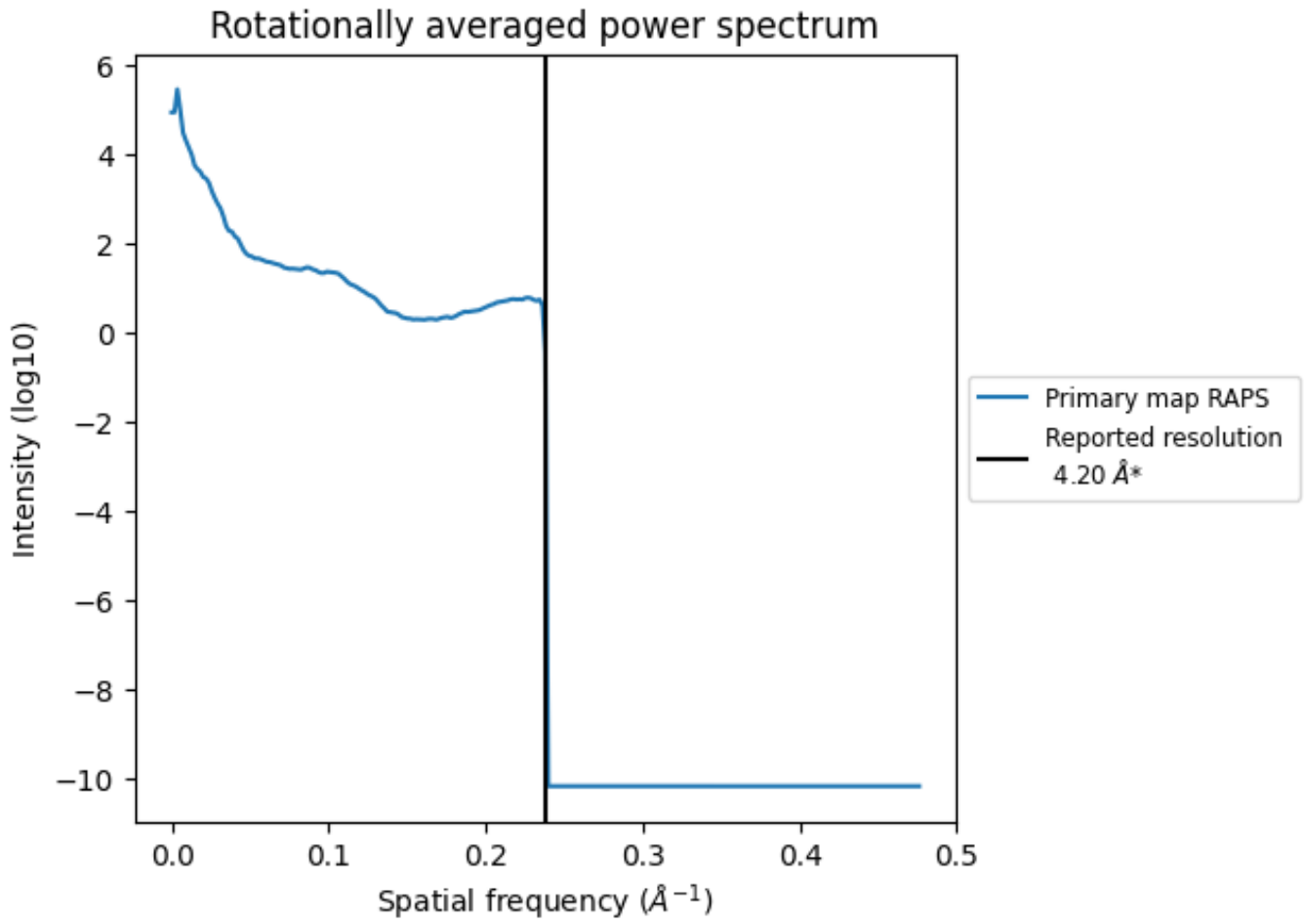
7.2 Volume estimate (i)



The volume at the recommended contour level is 919 nm^3; this corresponds to an approximate mass of 830 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 0.238 Å^{-1}

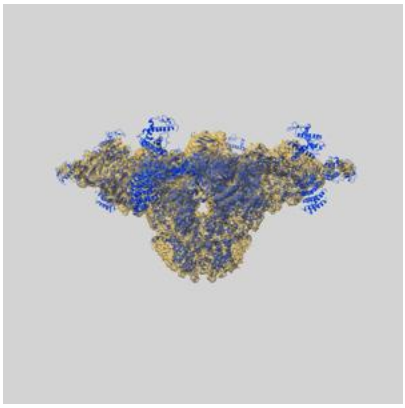
8 Fourier-Shell correlation (i)

This section was not generated. No FSC curve or half-maps provided.

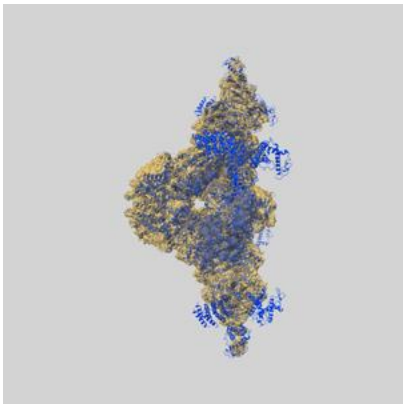
9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-9529 and PDB model 5GOA. Per-residue inclusion information can be found in section 3 on page 4.

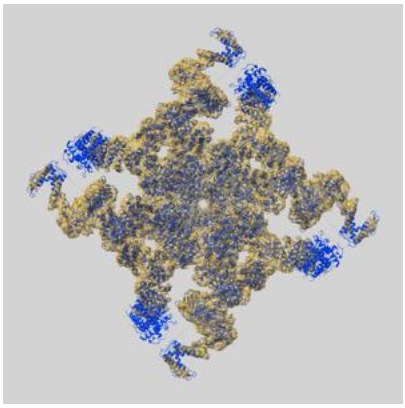
9.1 Map-model overlay



X



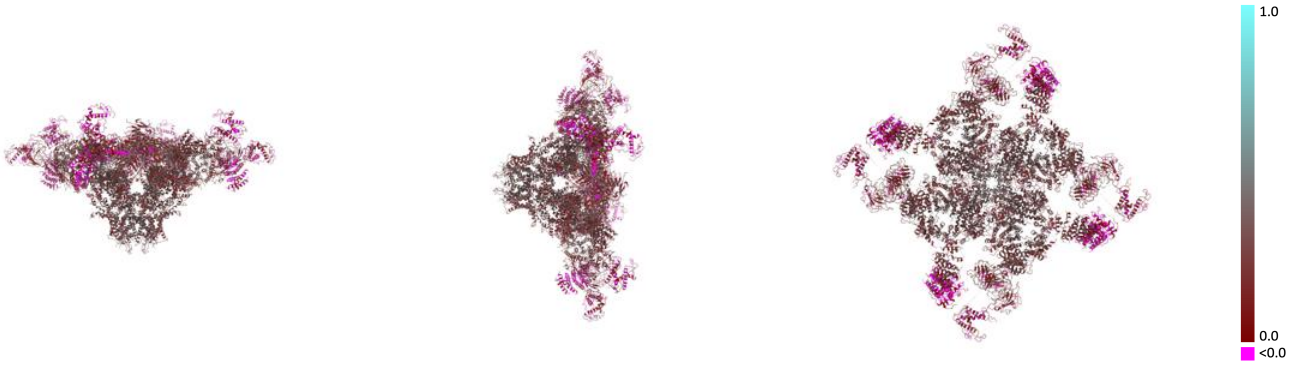
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.035 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.

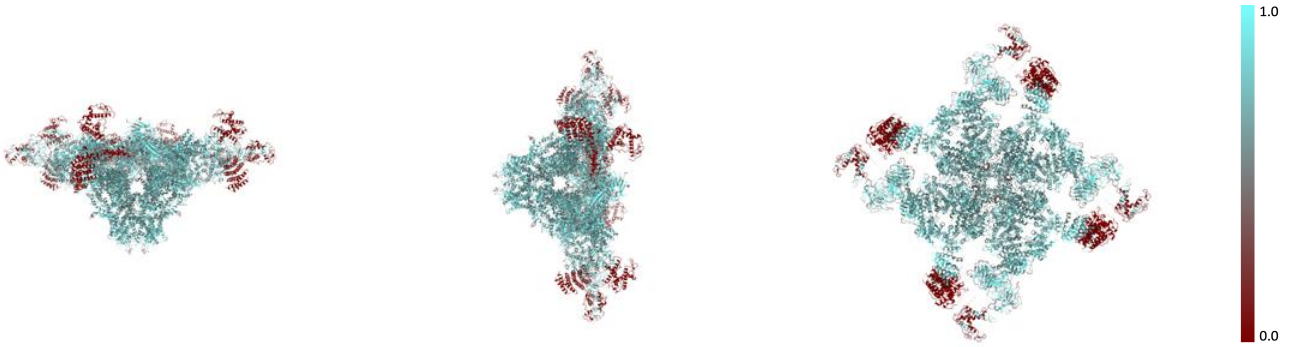
9.2 Q-score mapped to coordinate model



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.

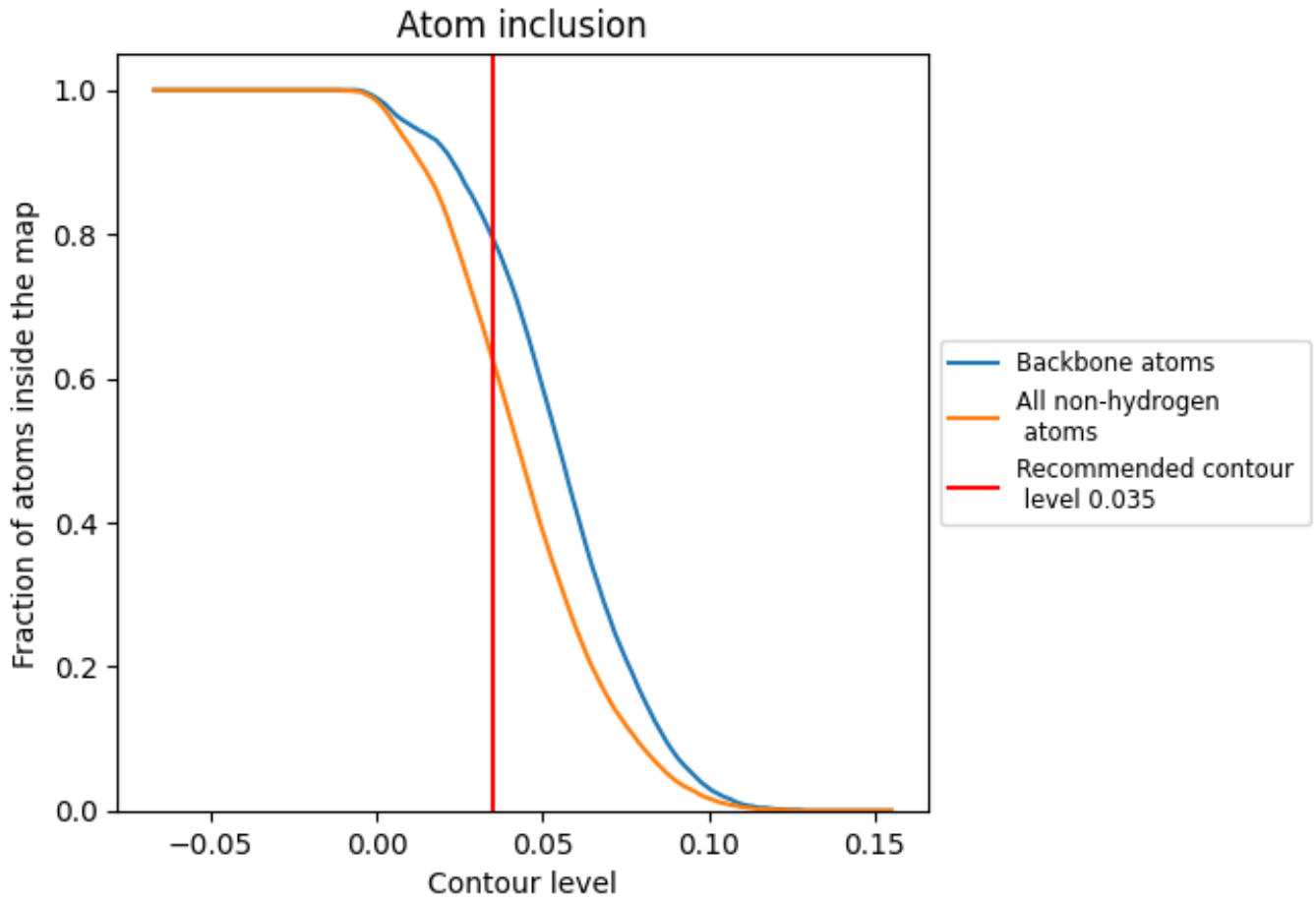
9.3 Atom inclusion mapped to coordinate model



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 (0.035).

9.4 Atom inclusion (i)



At the recommended contour level, 79% of all backbone atoms, 62% 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 (0.035) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.6230	0.2450
A	0.6230	0.2450
B	0.6240	0.2440
C	0.6230	0.2440
D	0.6230	0.2440