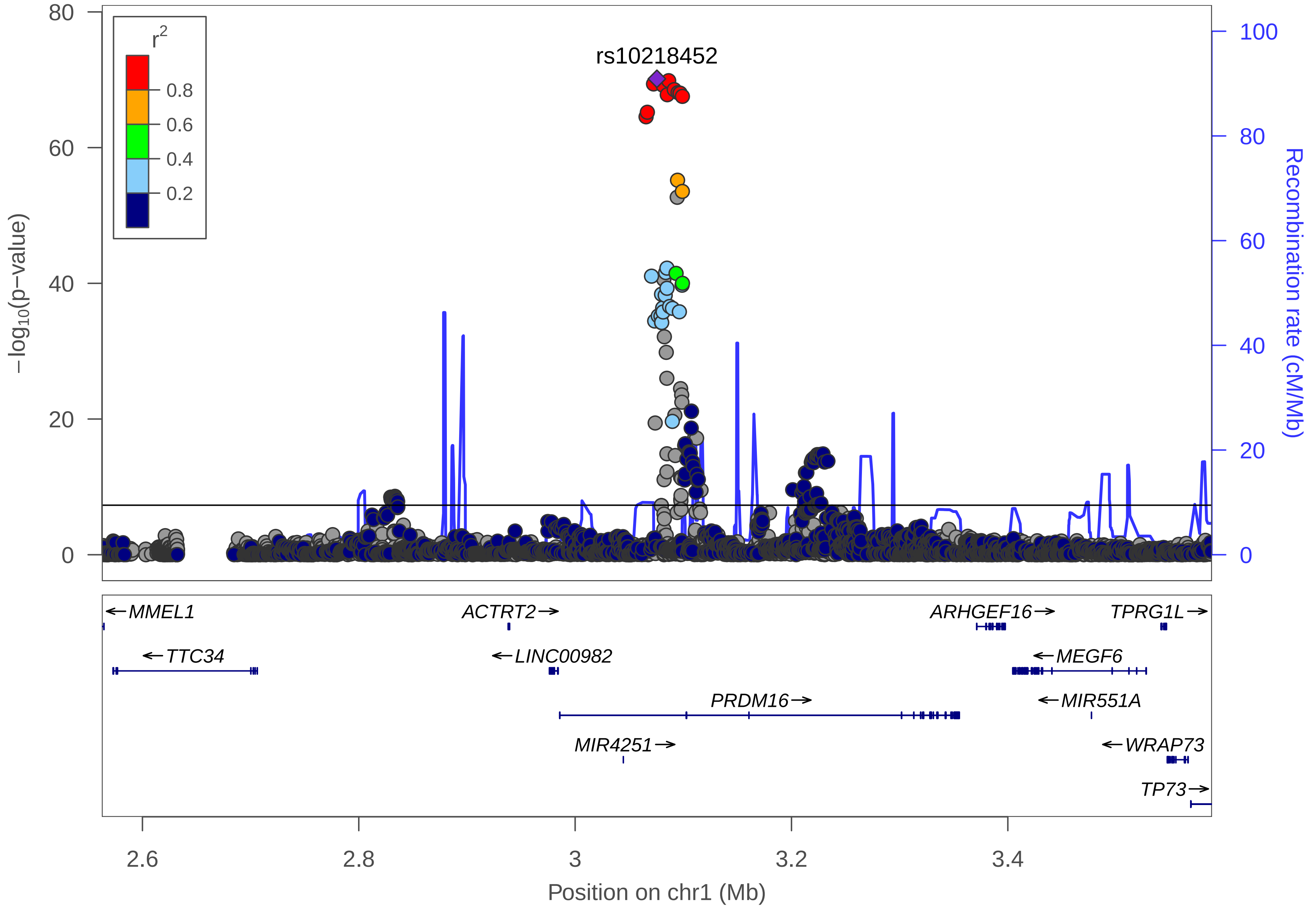
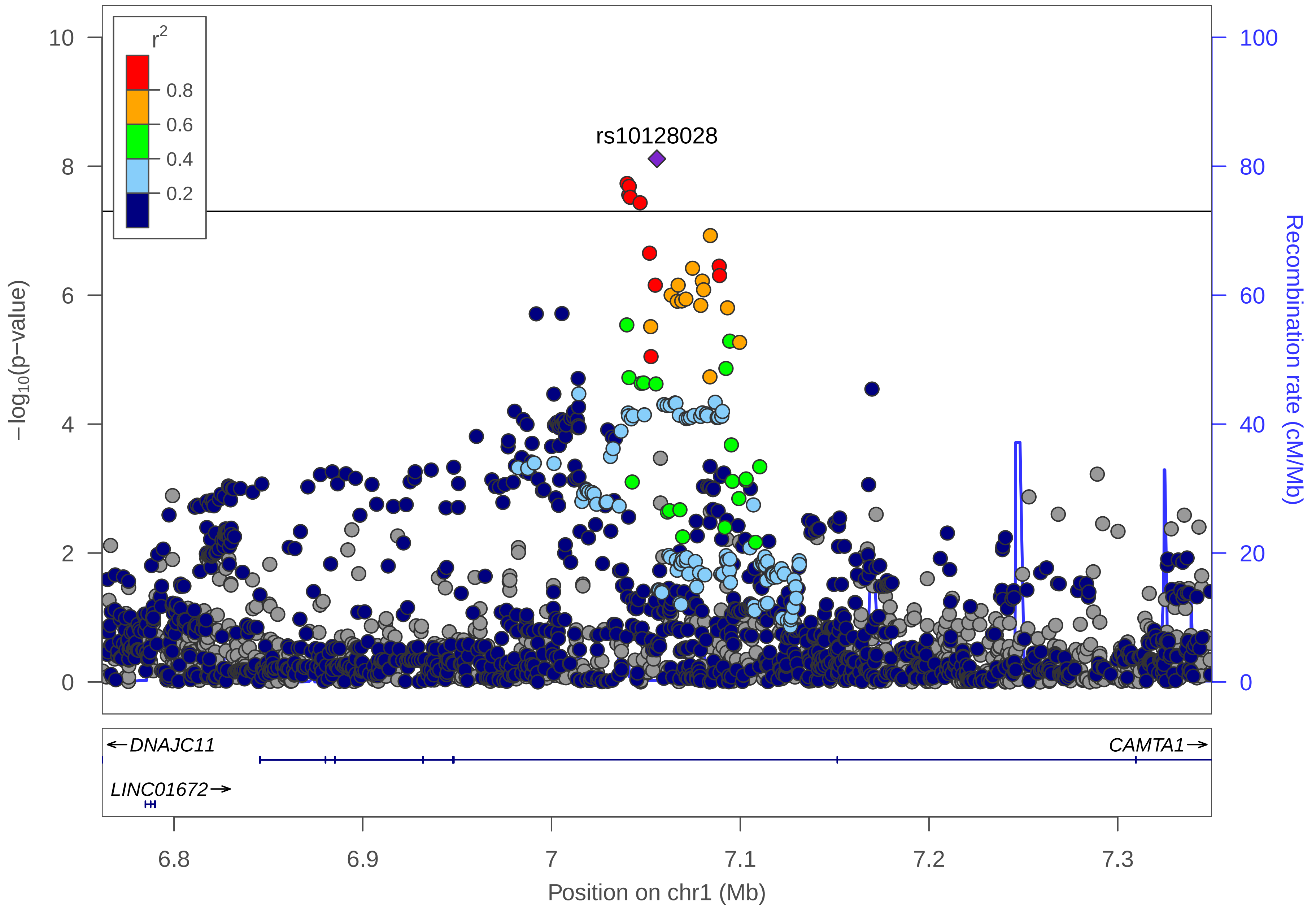
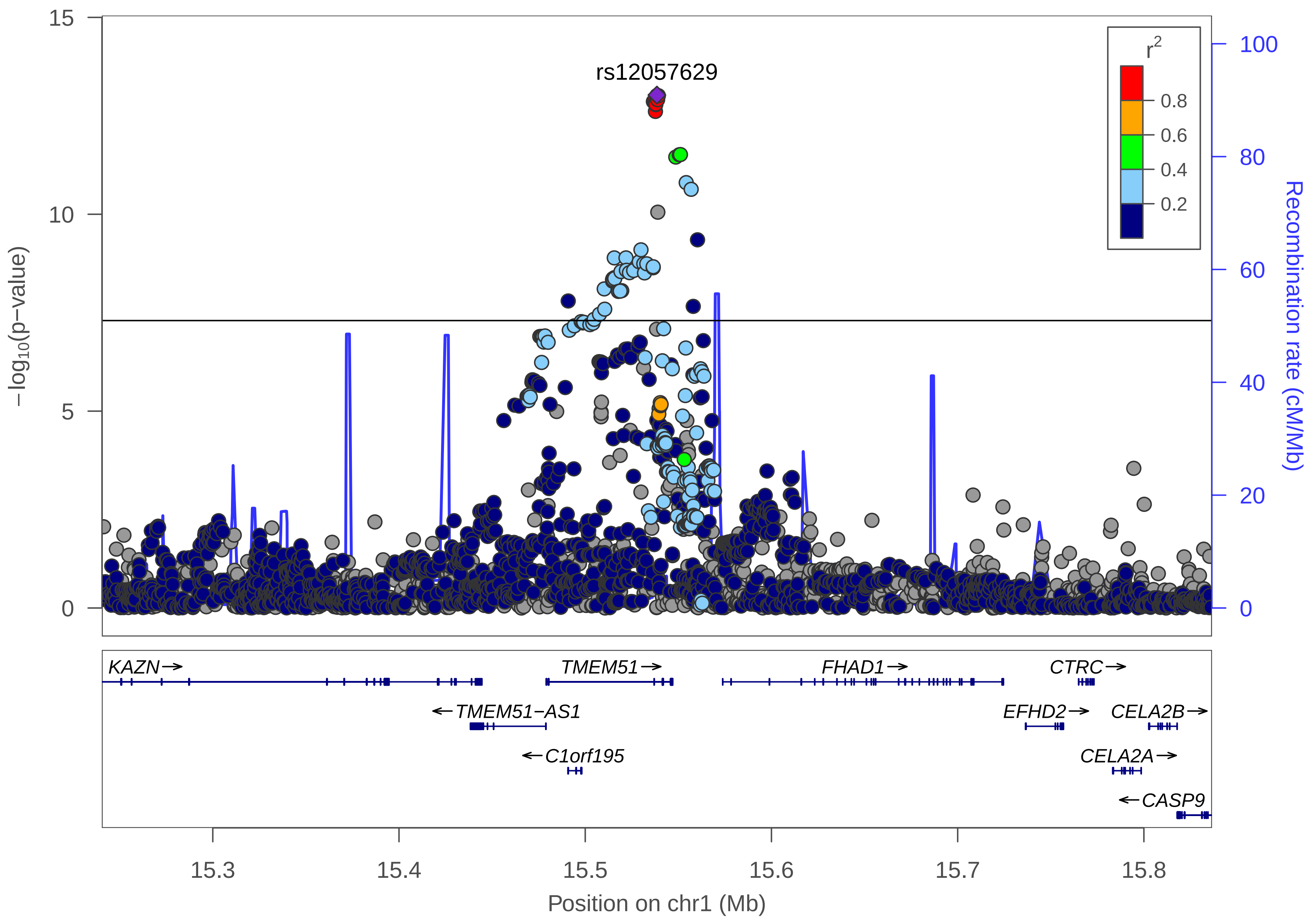
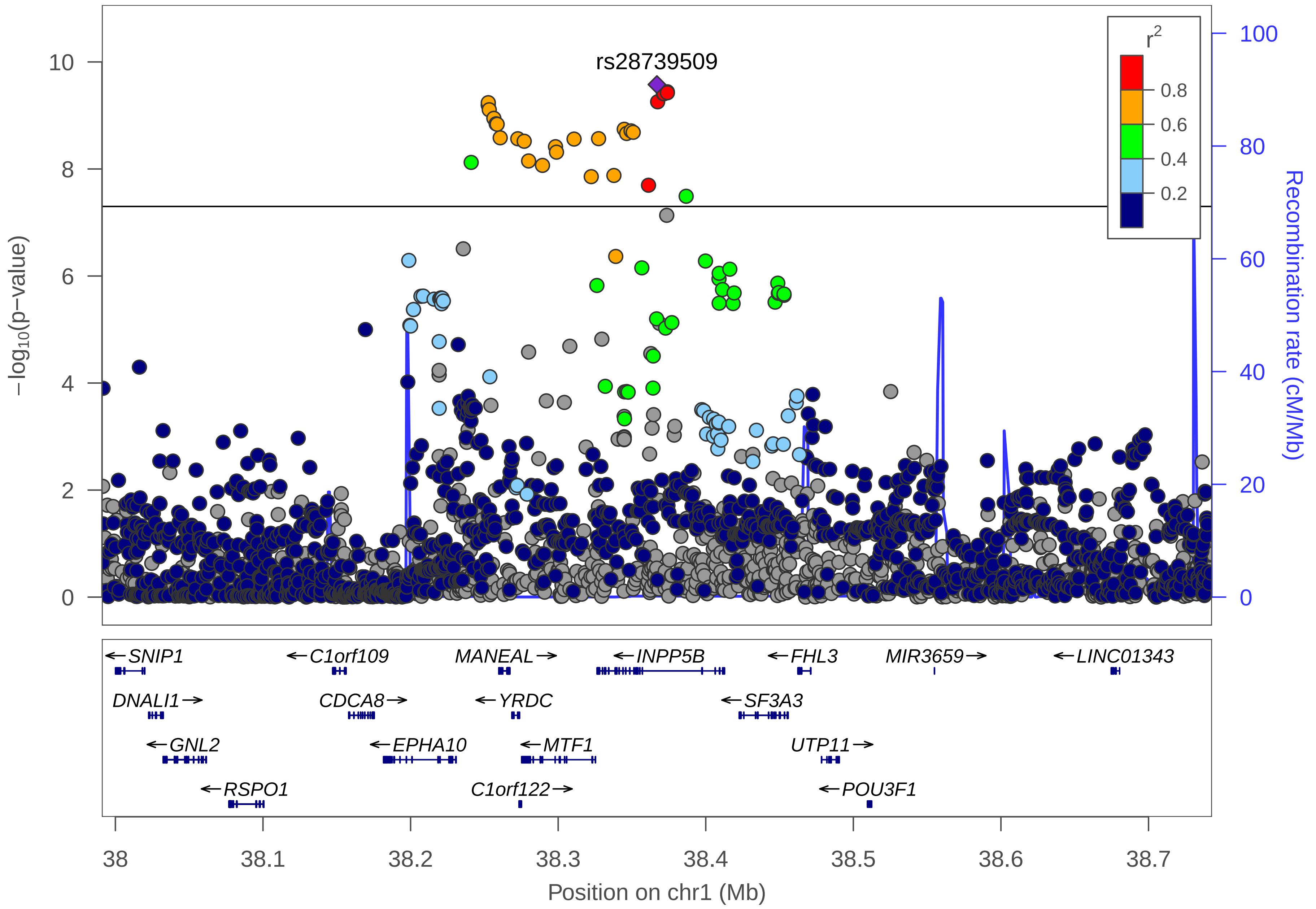
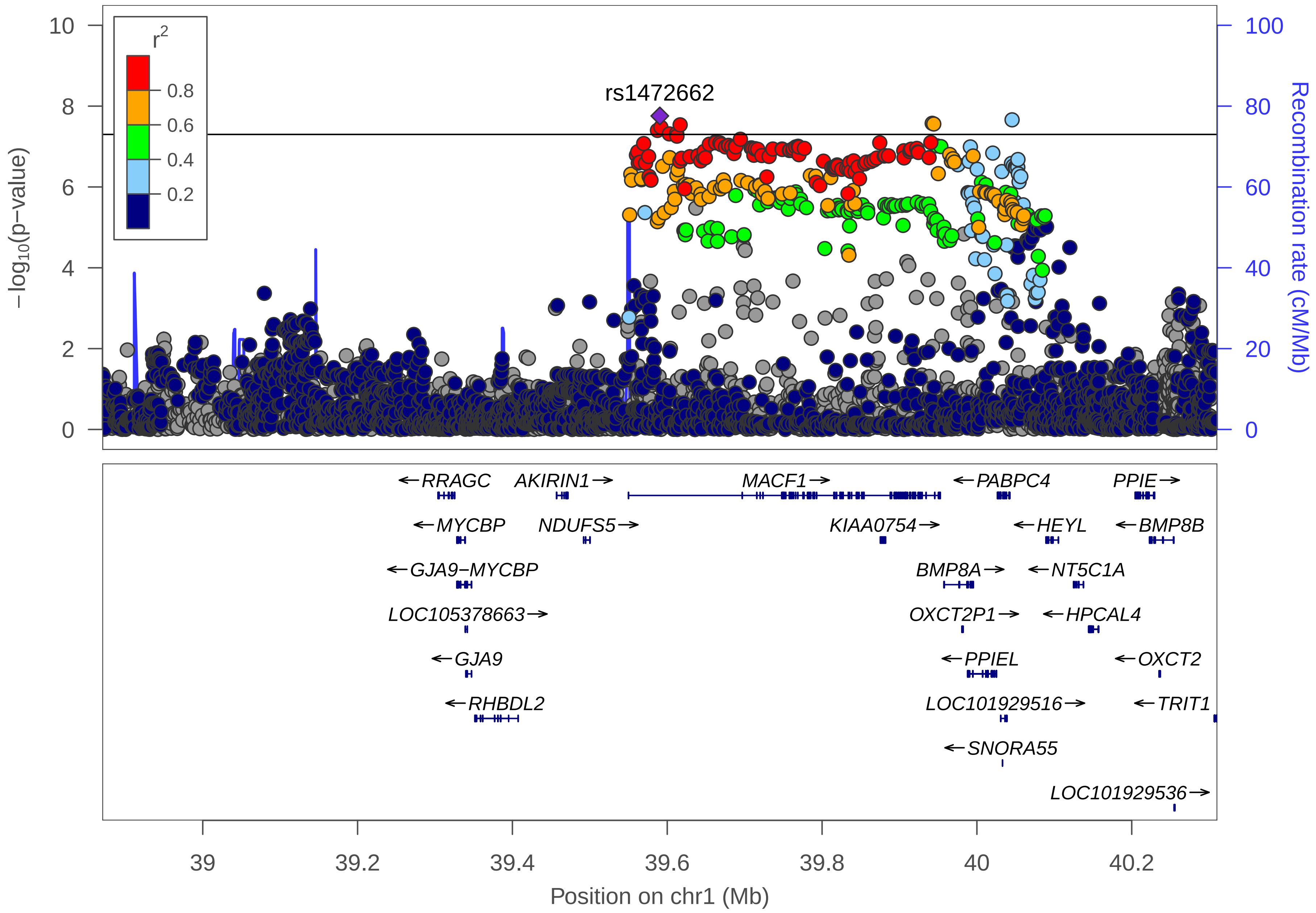
Supplementary Data 1. Regional Locuszoom-plots of the 123 independent migraine risk loci identified from the meta-analysis (N = 873,341; 102,084 cases and 771,257 controls). X-axis shows the chromosomal location, and Y-axis shows the strength of the association as uncorrected two-sided negative log10 *P*-value from the inverse-variance weighted fixed-effects meta-analysis. The squared correlation to the lead variant is shown by colors based on the UK Biobank data for variants that have an effective sample size ±20% of the lead variant´s effective sample size. Black horizontal line corresponds to $P = 5 \times 10^{-8}$ and blue line shows the recombination rate.

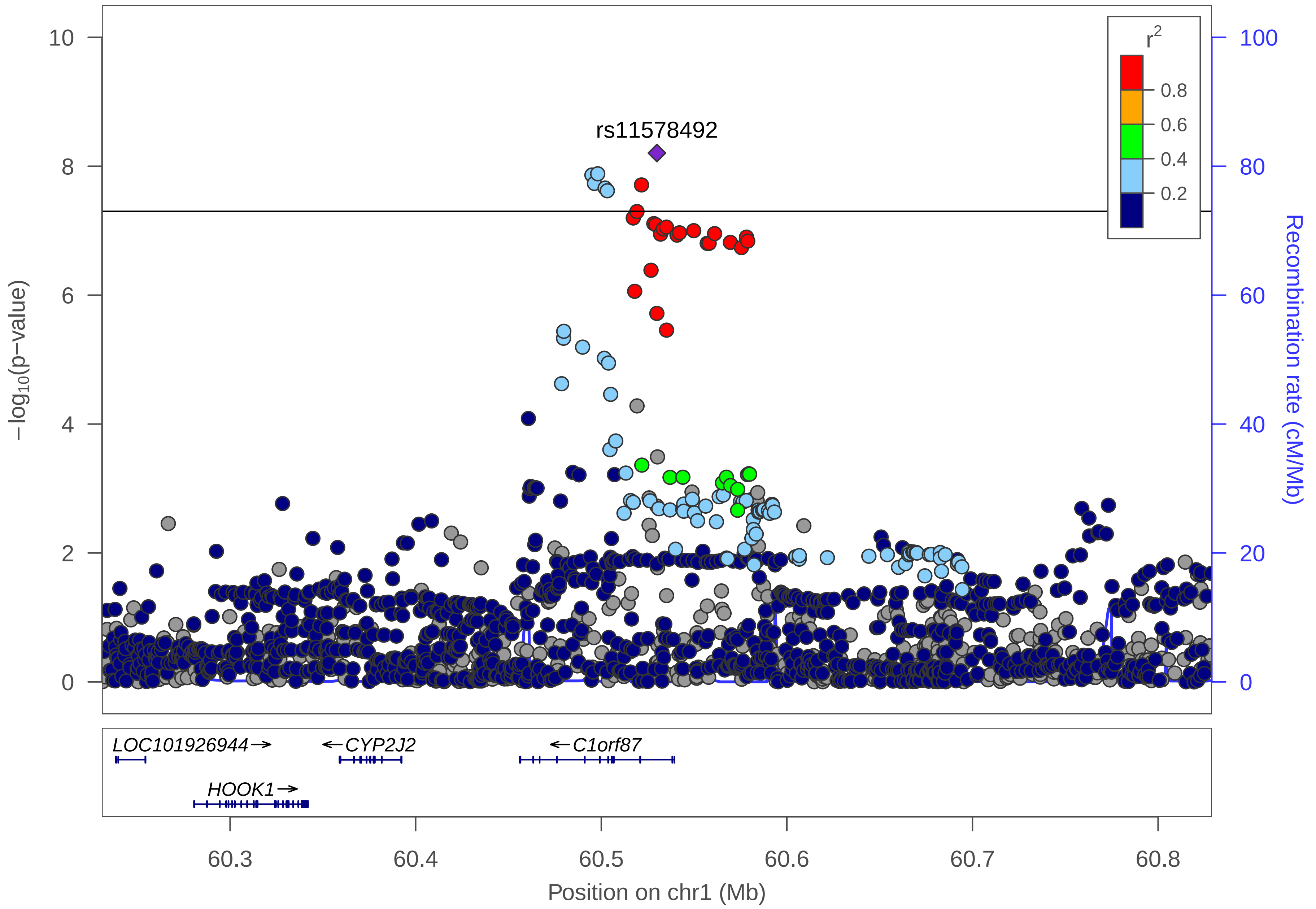

r2
0.8
0.6
0.4
0.2
rs10218452
80
60
40
20
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←MMEL1
ACTRT2→
ARHGEF16→
TPRG1L→
←TTC34
←LINC00982
←MEGF6
PRDM16→
←MIR551A
MIR4251→
←WRAP73
TP73→
2.6
2.8
3
3.2
3.4
Position on chr1 (Mb)

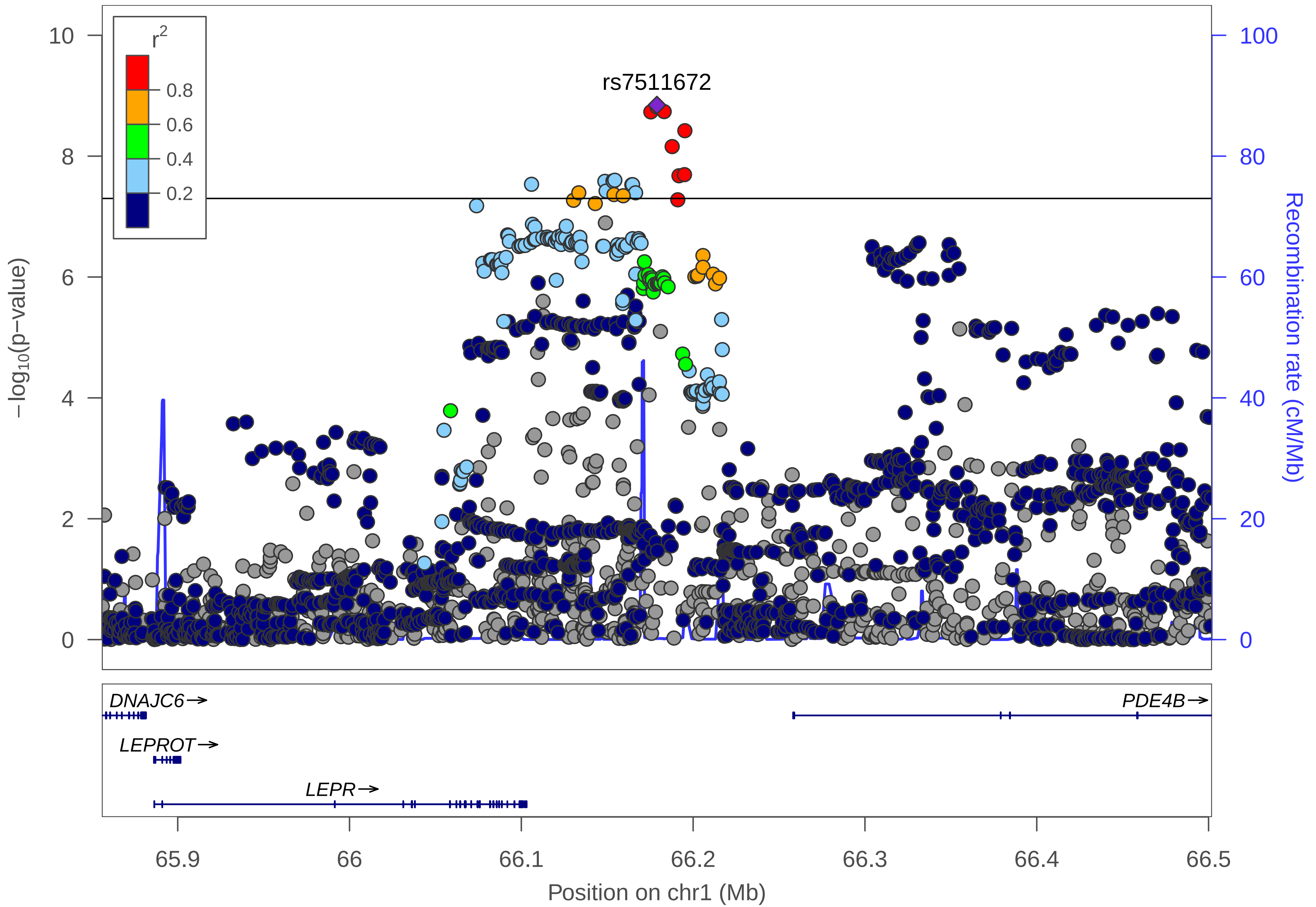

r^2
0.8
0.6
0.4
0.2
rs10128028
10
8
6
4
2
0
$-\log_{10}$(p-value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
← DNAJC11
CAMTA1 →
LINC01672 →
6.8
6.9
7
7.1
7.2
7.3
Position on chr1 (Mb)


rs12057629
r2
0.8
0.6
0.4
0.2
15
10
5
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
KAZN→
TMEM51→
FHAD1→
CTRC→
←TMEM51−AS1
EFHD2→
CELA2B→
←C1orf195
CELA2A→
←CASP9
15.3
15.4
15.5
15.6
15.7
15.8
Position on chr1 (Mb)

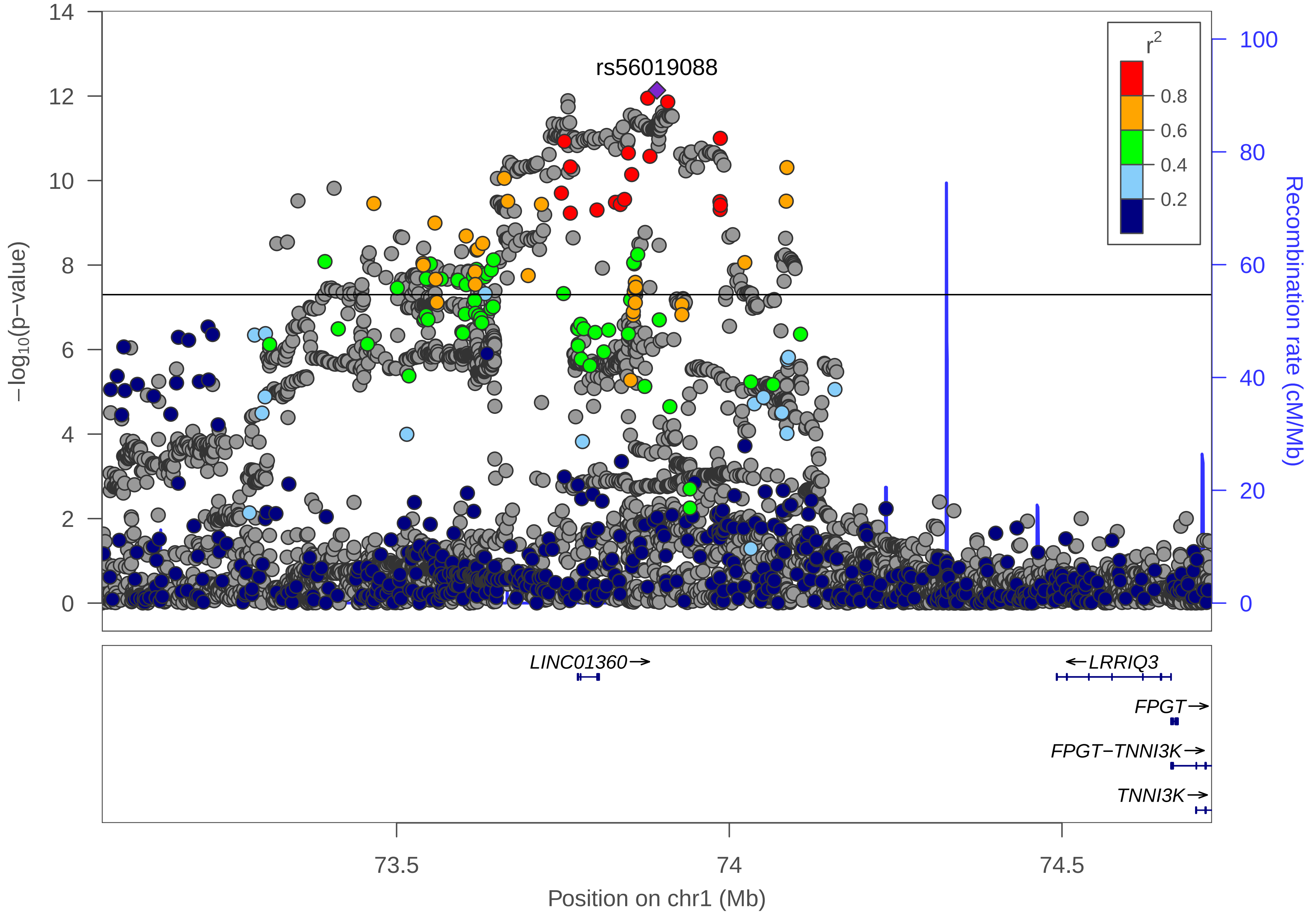

rs28739509
r²
0.8
0.6
0.4
0.2
−log₁₀(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
←SNIP1
DNALI1→
←GNL2
←RSPO1
←C1orf109
CDCA8→
←EPHA10
MANEAL→
←YRDC
←MTF1
C1orf122→
←INPP5B
←SF3A3
←FHL3
UTP11→
←POU3F1
MIR3659→
←LINC01343
38
38.1
38.2
38.3
38.4
38.5
38.6
38.7
Position on chr1 (Mb)

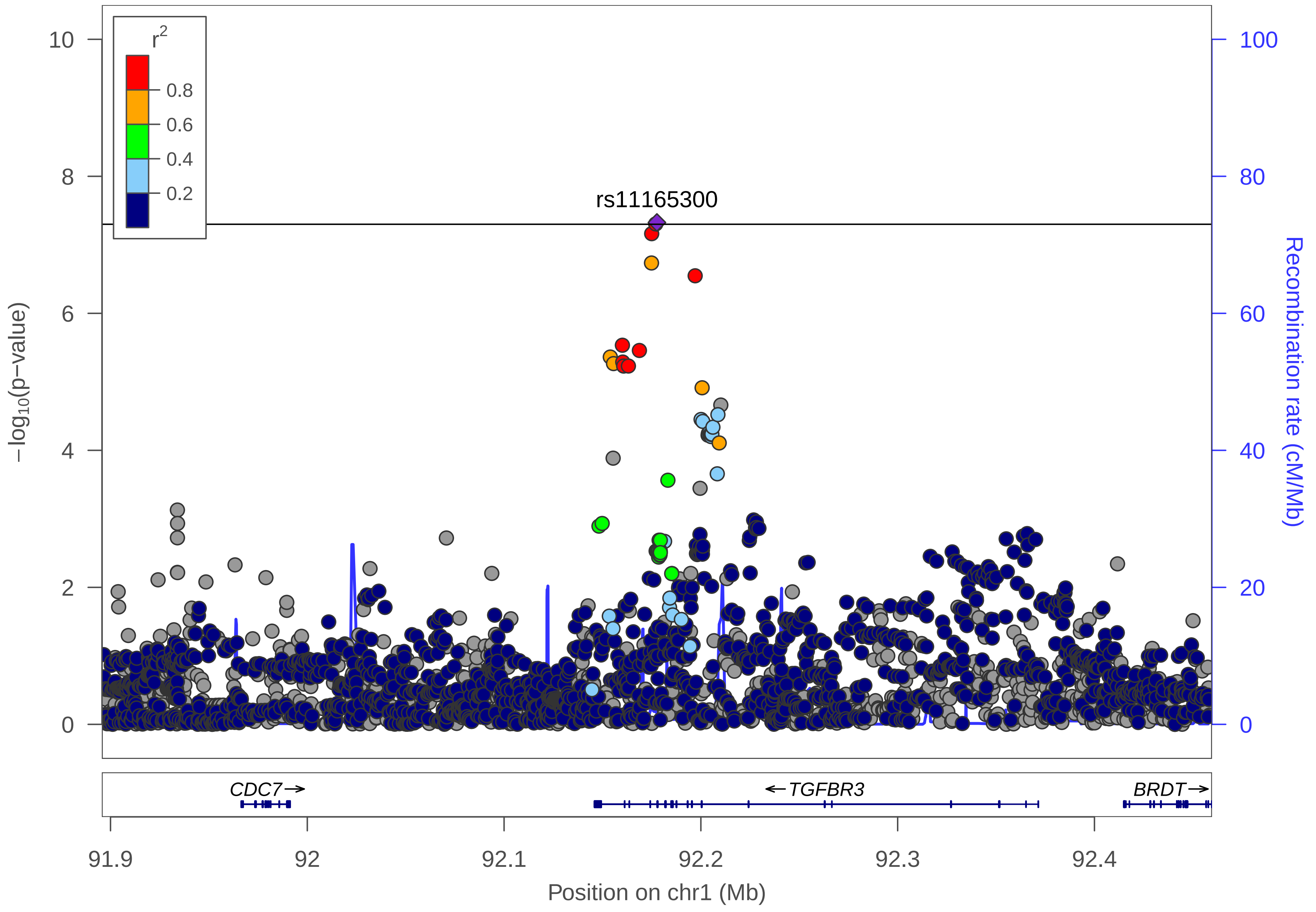

rs1472662
r^2
0.8
0.6
0.4
0.2
−log10(p−value)
Recombination rate (cM/Mb)
10
8
6
4
2
0
100
80
60
40
20
0
RRAGC
AKIRIN1
MACF1
PABPC4
PPIE
MYCBP
NDUFS5
KIAA0754
HEYL
BMP8B
GJA9−MYCBP
BMP8A
NT5C1A
LOC105378663
OXCT2P1
HPCAL4
GJA9
PPIEL
OXCT2
RHBDL2
LOC101929516
TRIT1
SNORA55
LOC101929536
39
39.2
39.4
39.6
39.8
40
40.2
Position on chr1 (Mb)

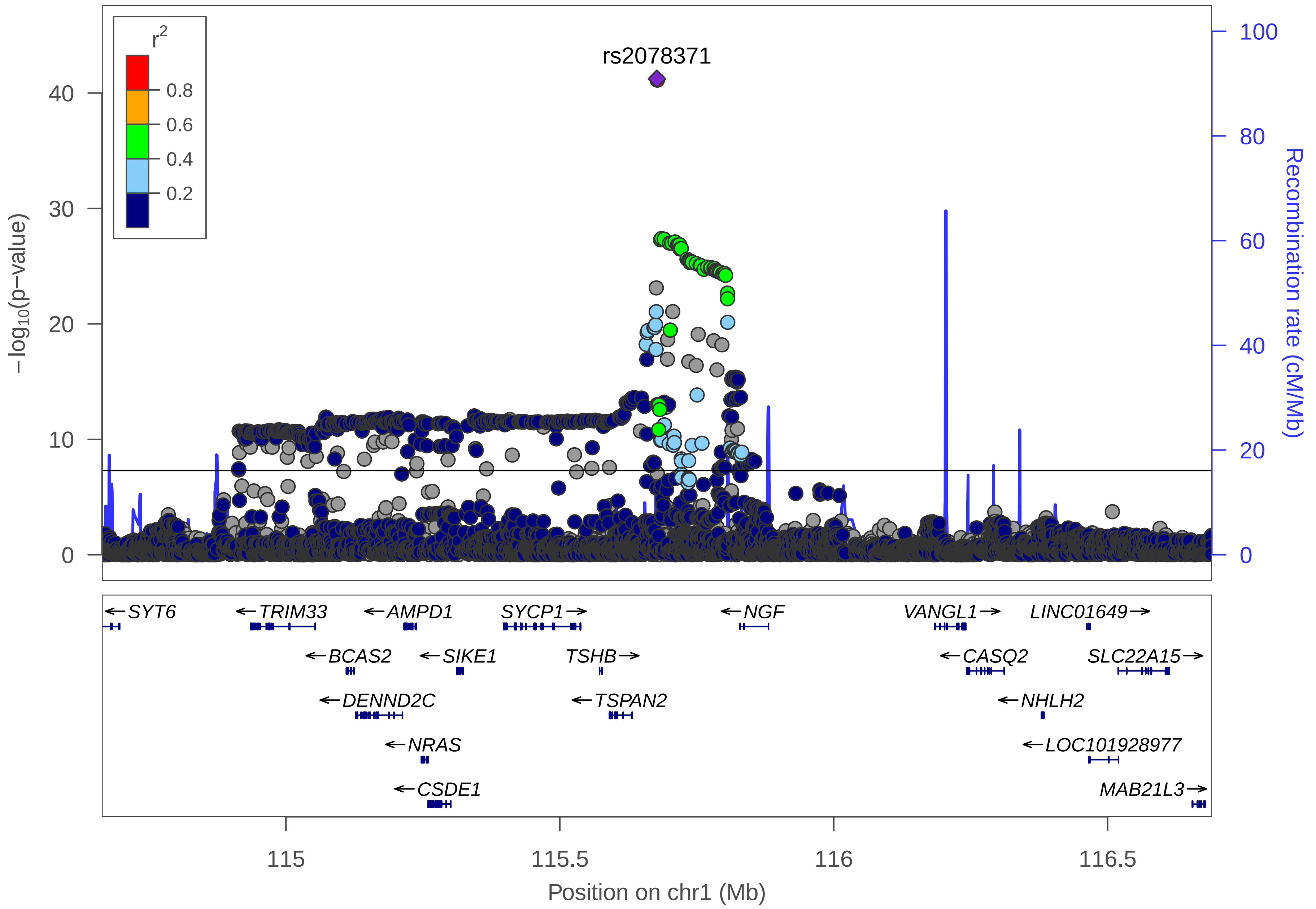

rs11578492
r^2
0.8
0.6
0.4
0.2
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
LOC101926944→
←CYP2J2
←C1orf87
HOOK1→
60.3
60.4
60.5
60.6
60.7
60.8
Position on chr1 (Mb)

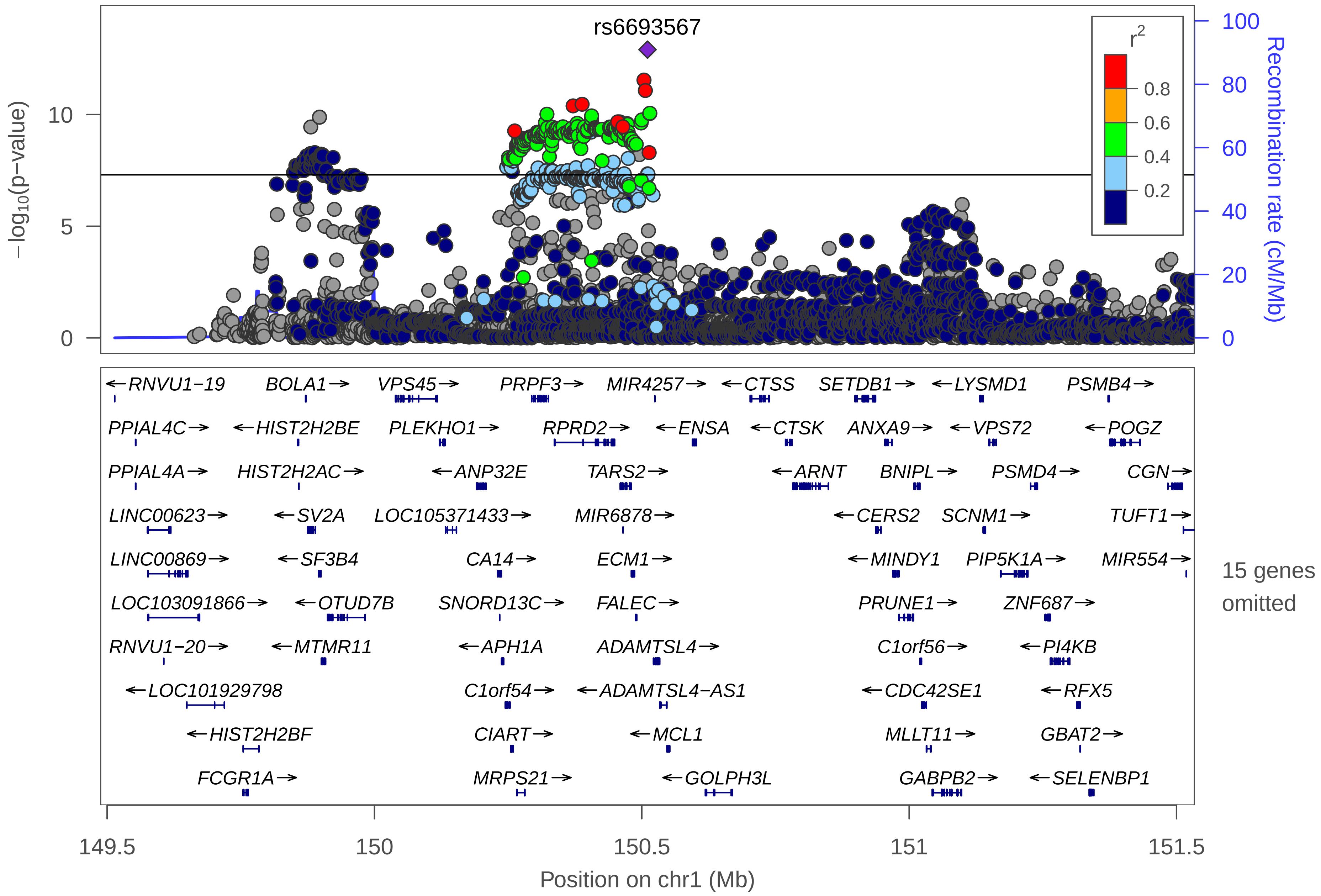


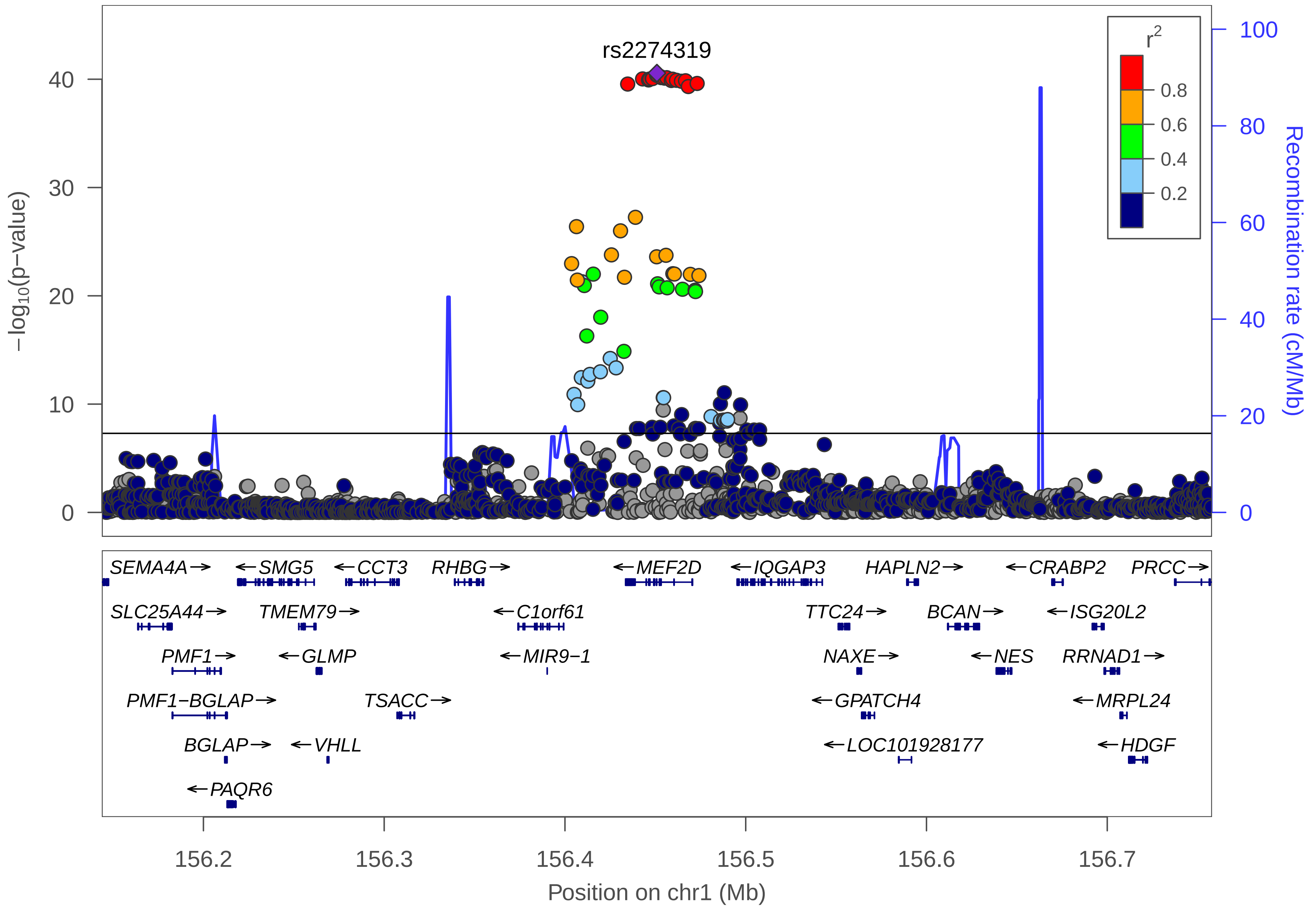
r2
0.8
0.6
0.4
0.2
rs7511672
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
DNAJC6→
LEPROT→
LEPR→
PDE4B→
65.9
66
66.1
66.2
66.3
66.4
66.5
Position on chr1 (Mb)

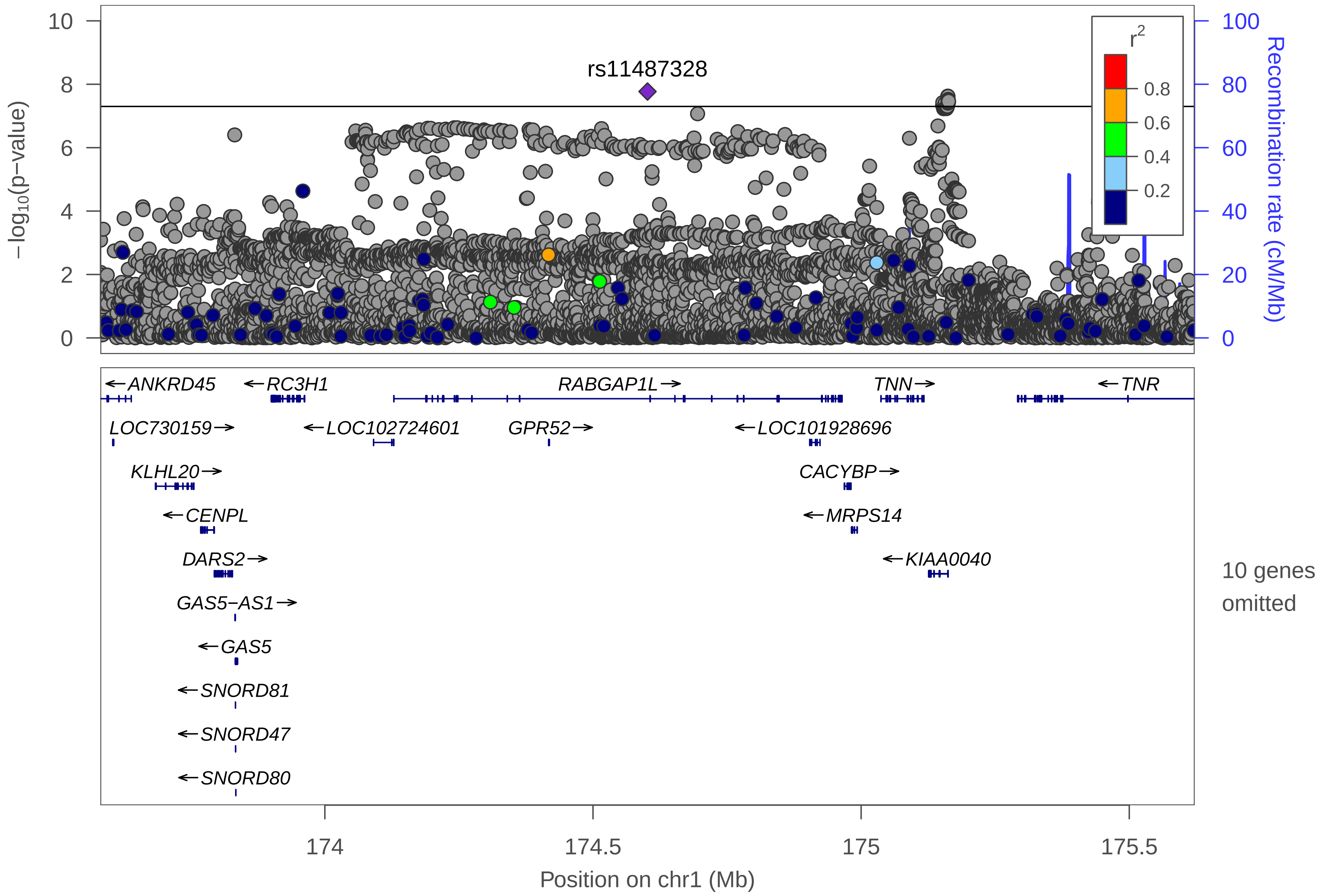

rs56019088
r^2
0.8
0.6
0.4
0.2
−log10(p−value)
0
2
4
6
8
10
12
14
Recombination rate (cM/Mb)
0
20
40
60
80
100
LINC01360→
←LRRIQ3
FPGT→
FPGT−TNNI3K→
TNNI3K→
73.5
74
74.5
Position on chr1 (Mb)

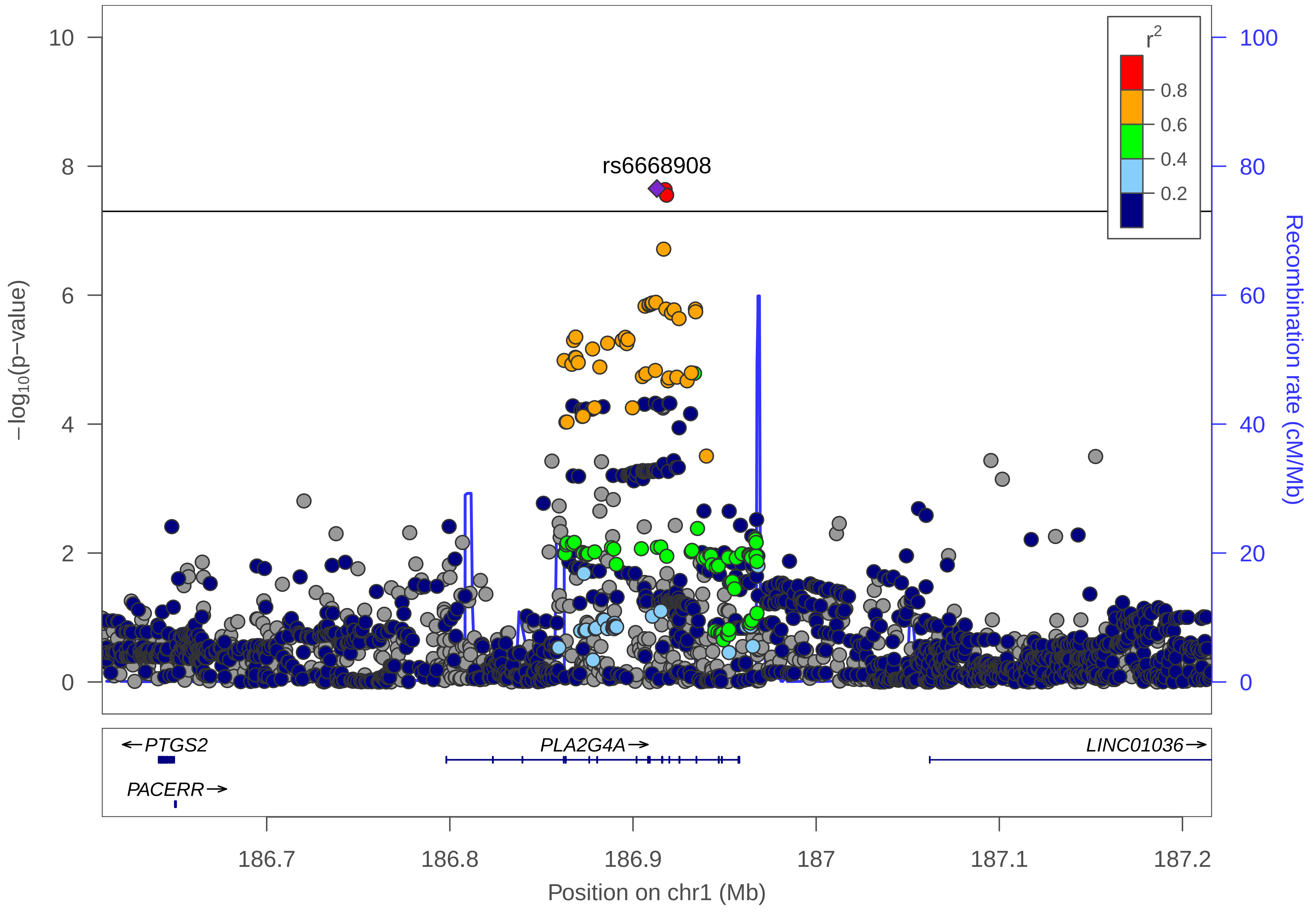

r2
0.8
0.6
0.4
0.2
rs11165300
−log10(p−value)
10
8
6
4
2
0
100
80
60
40
20
0
Recombination rate (cM/Mb)
CDC7→
←TGFBR3
BRDT→
91.9
92
92.1
92.2
92.3
92.4
Position on chr1 (Mb)

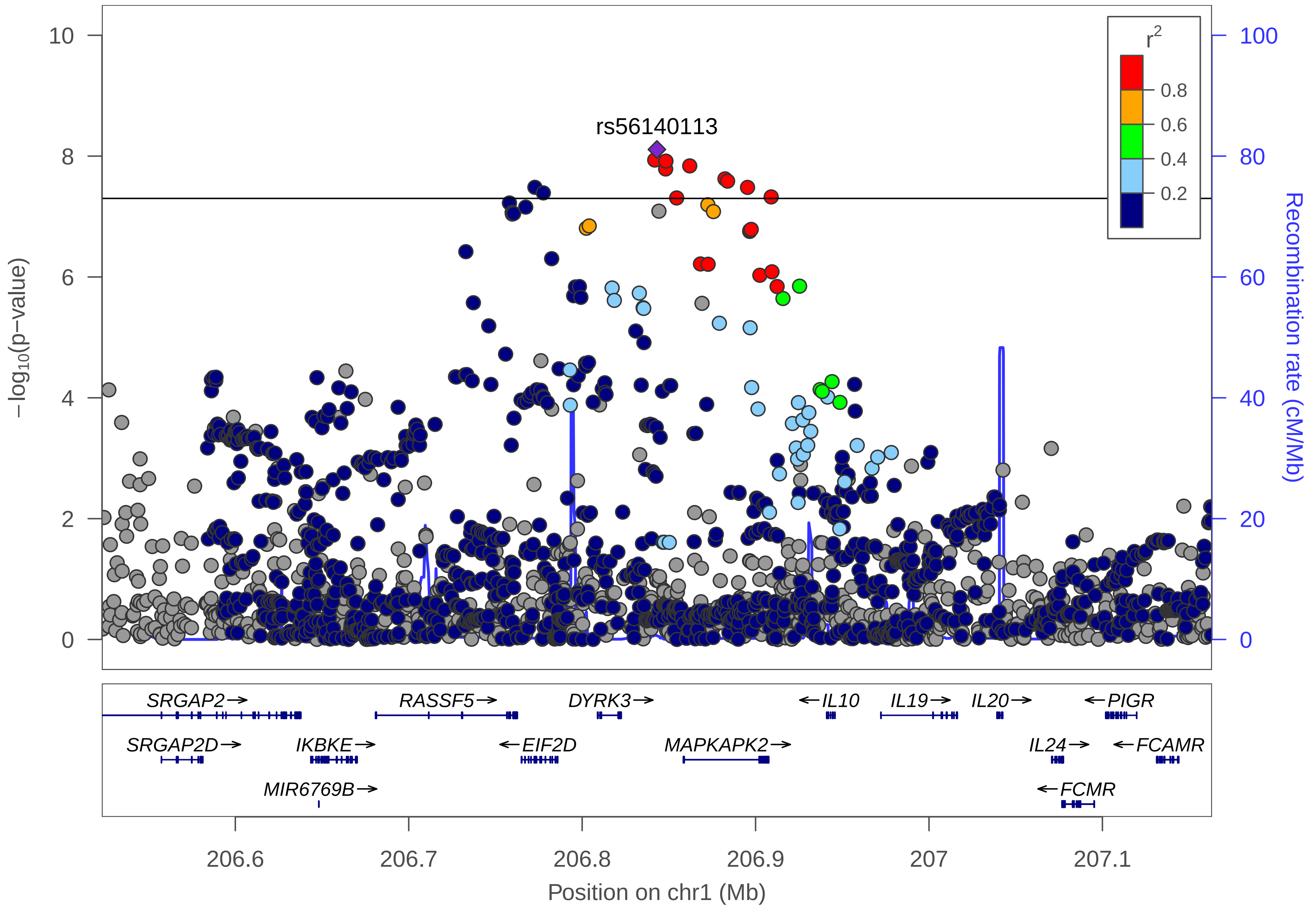

rs2078371
r2
0.8
0.6
0.4
0.2
−log10(p−value)
0
10
20
30
40
Recombination rate (cM/Mb)
0
20
40
60
80
100
←SYT6
←TRIM33
←AMPD1
SYCP1→
←NGF
VANGL1→
LINC01649→
←BCAS2
←SIKE1
TSHB→
←CASQ2
SLC22A15→
←DENND2C
←TSPAN2
←NHLH2
←NRAS
←LOC101928977
←CSDE1
MAB21L3→
115
115.5
116
116.5
Position on chr1 (Mb)


rs6693567
−log10(p−value)
10
5
0
r2
0.8
0.6
0.4
0.2
100
80
60
40
20
0
Recombination rate (cM/Mb)
←RNVU1−19
BOLA1→
VPS45→
PRPF3→
MIR4257→
←CTSS
SETDB1→
←LYSMD1
PSMB4→
PPIAL4C→
←HIST2H2BE
PLEKHO1→
RPRD2→
←ENSA
←CTSK
ANXA9→
←VPS72
←POGZ
PPIAL4A→
HIST2H2AC→
←ANP32E
TARS2→
←ARNT
BNIPL→
PSMD4→
CGN→
LINC00623→
←SV2A
LOC105371433→
MIR6878→
←CERS2
SCNM1→
TUFT1→
LINC00869→
←SF3B4
CA14→
ECM1→
←MINDY1
PIP5K1A→
MIR554→
LOC103091866→
←OTUD7B
SNORD13C→
FALEC→
PRUNE1→
ZNF687→
RNVU1−20→
←MTMR11
←APH1A
ADAMTSL4→
C1orf56→
←PI4KB
←LOC101929798
C1orf54→
←ADAMTSL4−AS1
←CDC42SE1
←RFX5
←HIST2H2BF
CIART→
←MCL1
MLLT11→
GBAT2→
FCGR1A→
MRPS21→
←GOLPH3L
GABPB2→
←SELENBP1
15 genes omitted
149.5
150
150.5
151
151.5
Position on chr1 (Mb)

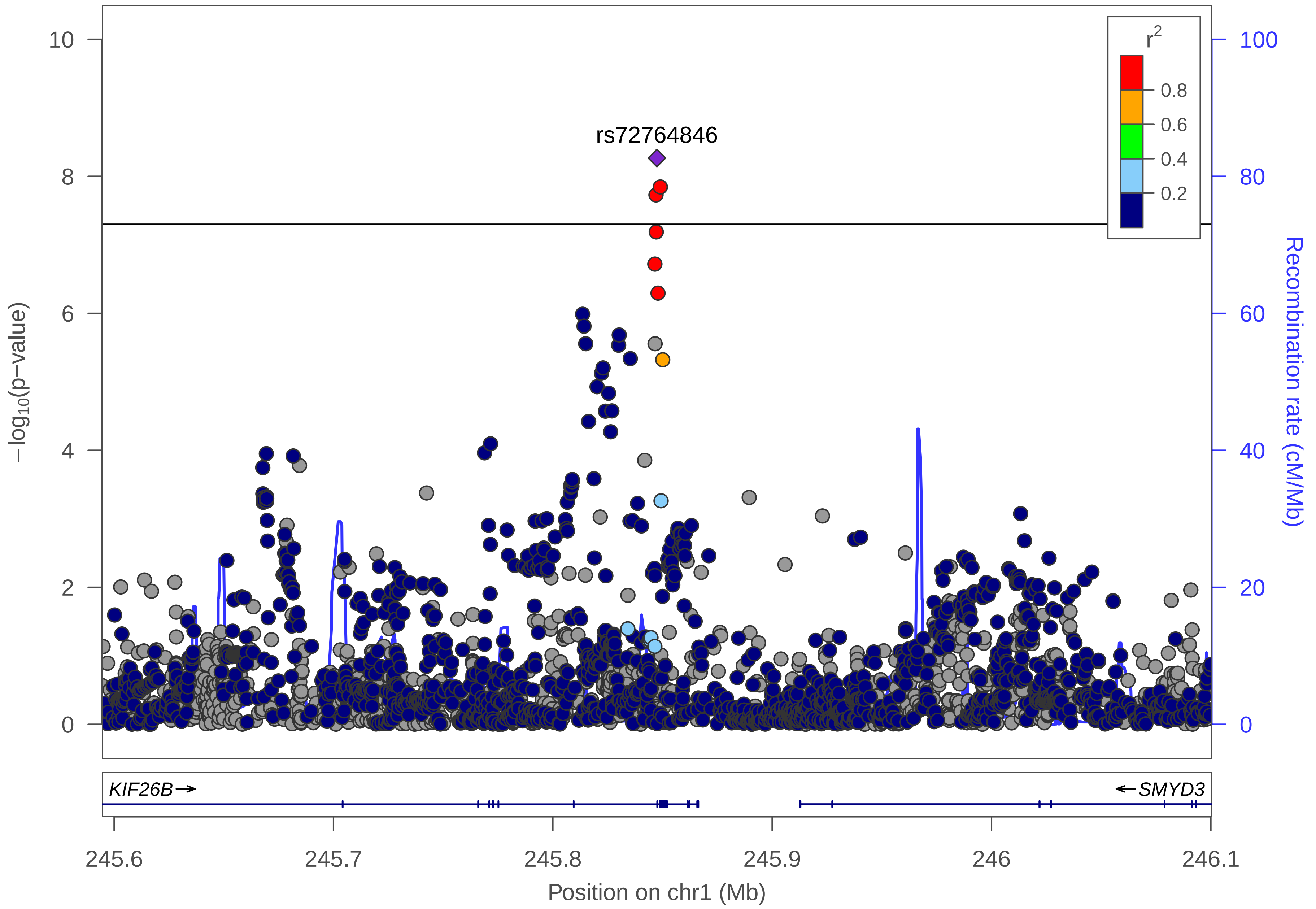

rs2274319
r²
0.8
0.6
0.4
0.2
−log10(p−value)
0
10
20
30
40
Recombination rate (cM/Mb)
0
20
40
60
80
100
SEMA4A→
←SMG5
←CCT3
RHBG→
←MEF2D
←IQGAP3
HAPLN2→
←CRABP2
PRCC→
SLC25A44→
TMEM79→
←C1orf61
TTC24→
BCAN→
←ISG20L2
PMF1→
←GLMP
←MIR9−1
NAXE→
←NES
RRNAD1→
PMF1−BGLAP→
TSACC→
←GPATCH4
←MRPL24
BGLAP→
←VHLL
←LOC101928177
←HDGF
←PAQR6
156.2
156.3
156.4
156.5
156.6
156.7
Position on chr1 (Mb)

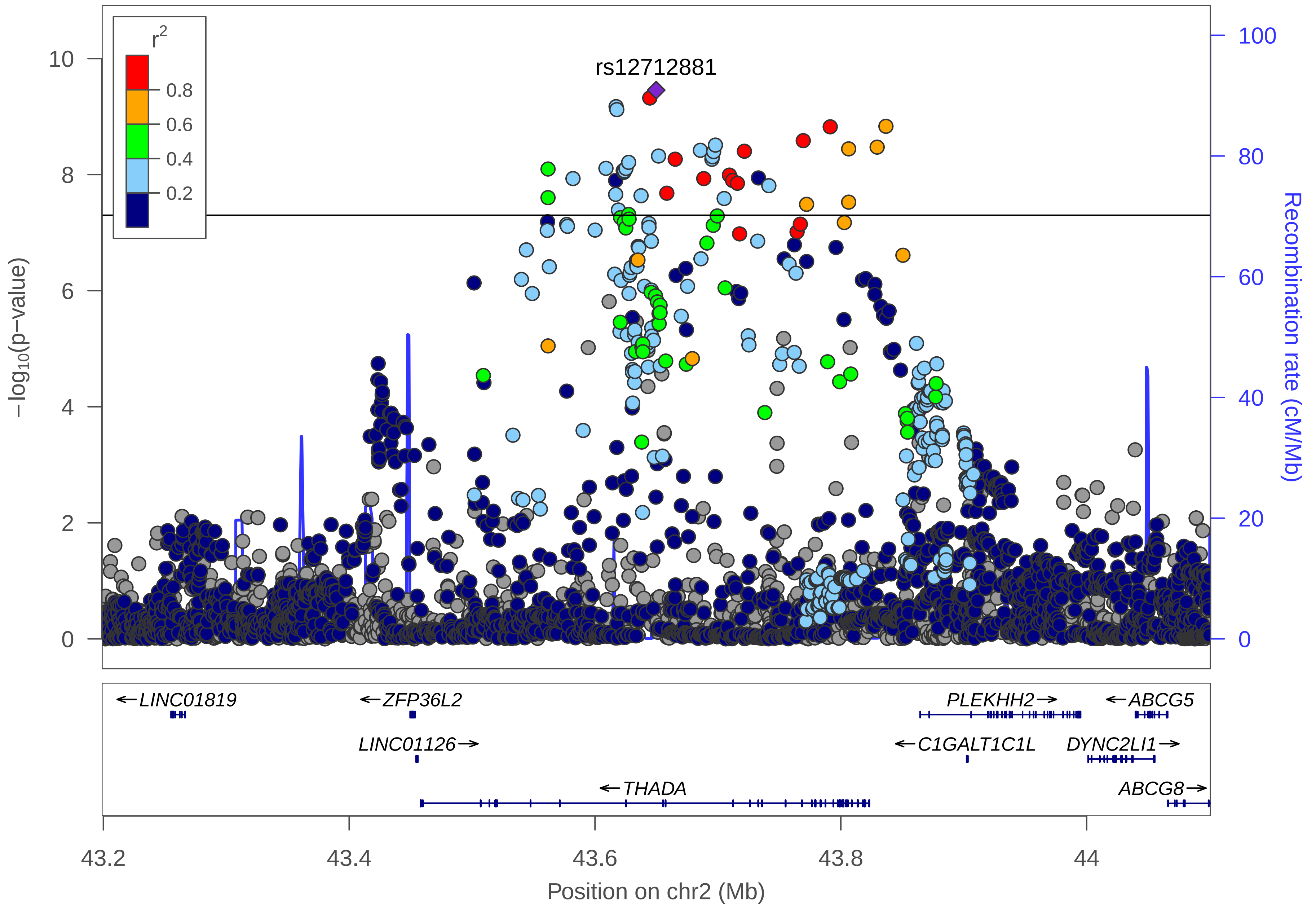

rs11487328
−log10(p−value)
Recombination rate (cM/Mb)
r2
0.8
0.6
0.4
0.2
0
2
4
6
8
10
0
20
40
60
80
100
ANKRD45
RC3H1
RABGAP1L
TNN
TNR
LOC730159
LOC102724601
GPR52
LOC101928696
KLHL20
CACYBP
CENPL
MRPS14
DARS2
KIAA0040
GAS5−AS1
GAS5
SNORD81
SNORD47
SNORD80
10 genes omitted
174
174.5
175
175.5
Position on chr1 (Mb)

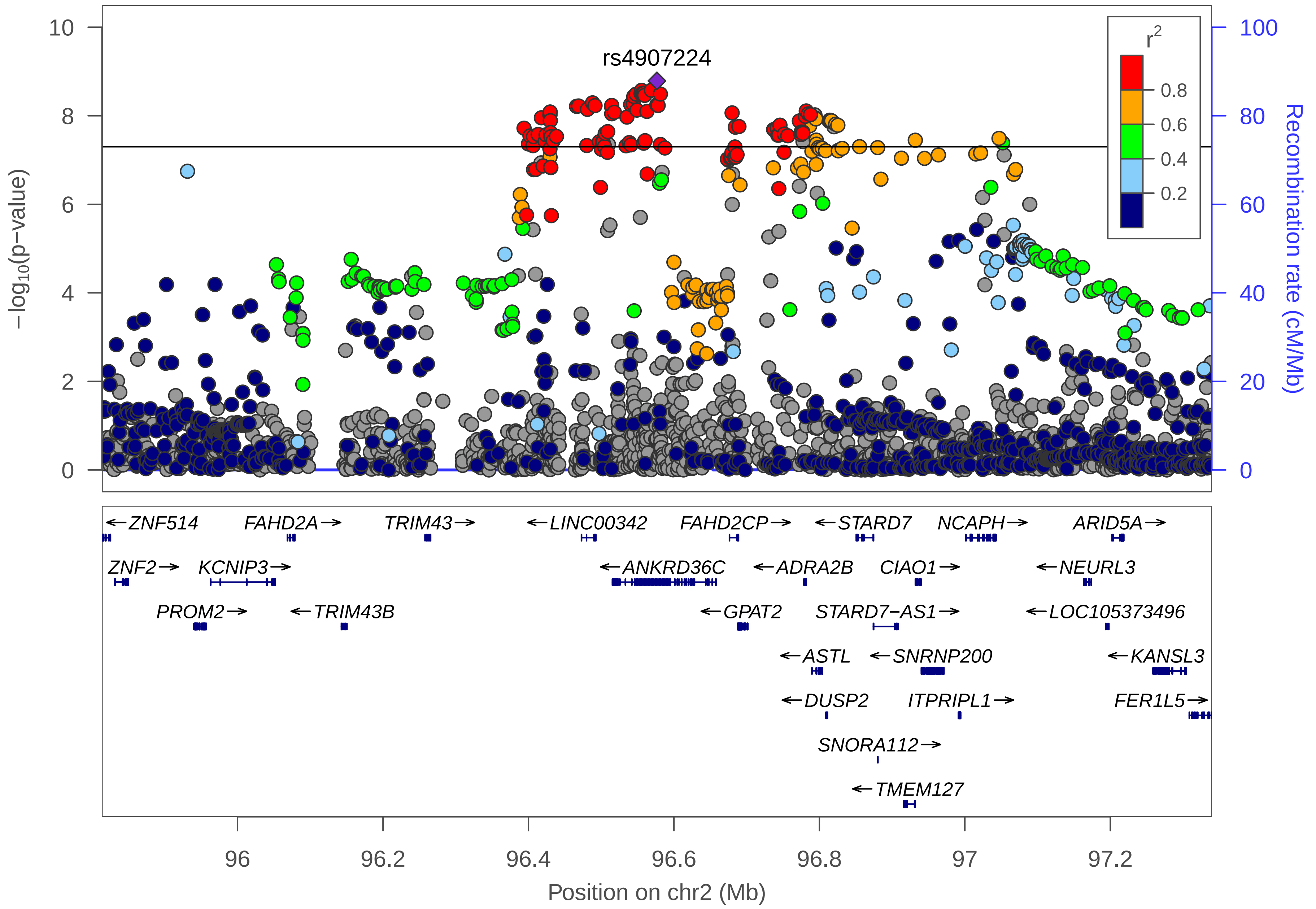

rs6668908
r^2
0.8
0.6
0.4
0.2
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←PTGS2
PLA2G4A→
LINC01036→
PACERR→
186.7
186.8
186.9
187
187.1
187.2
Position on chr1 (Mb)

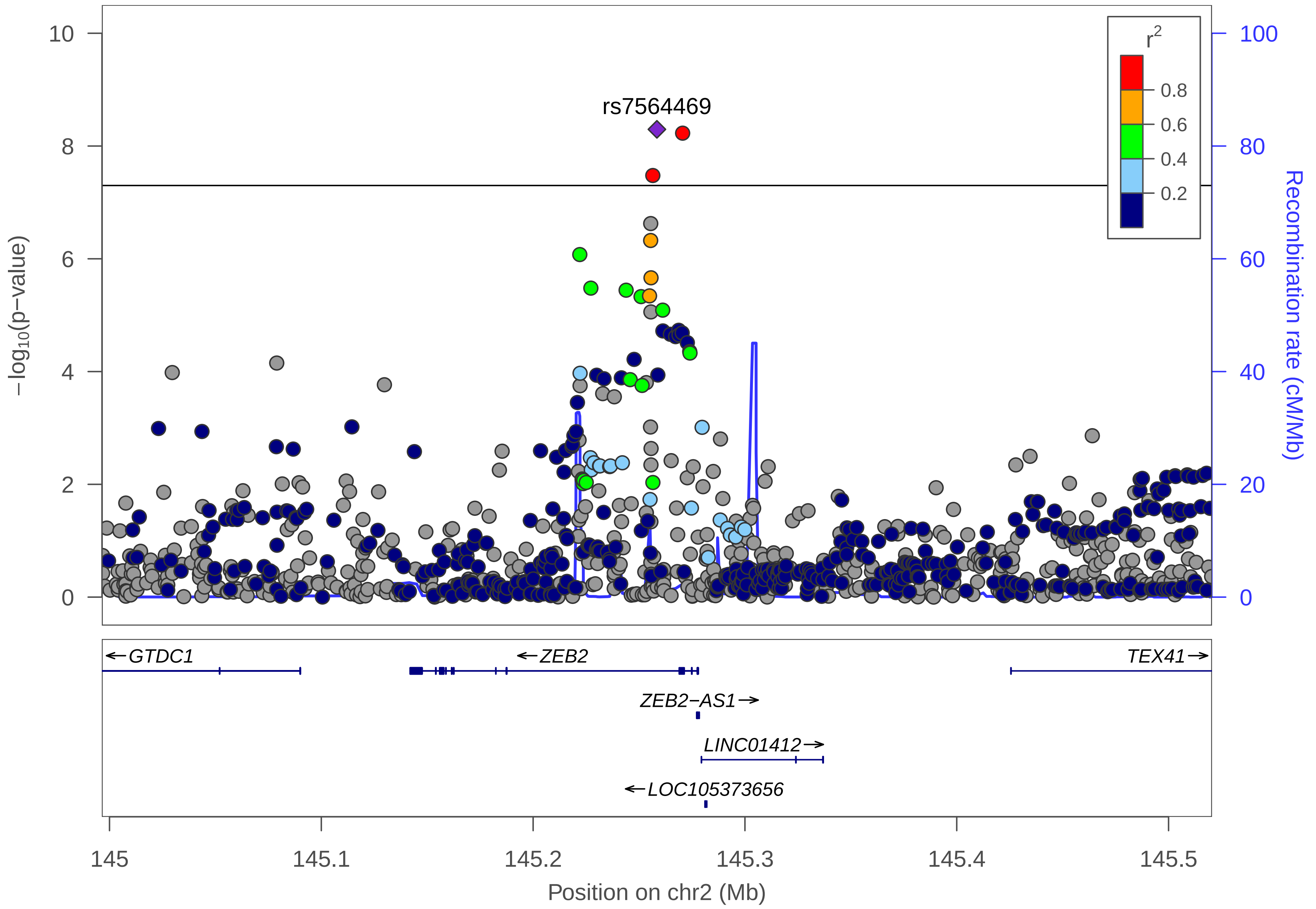


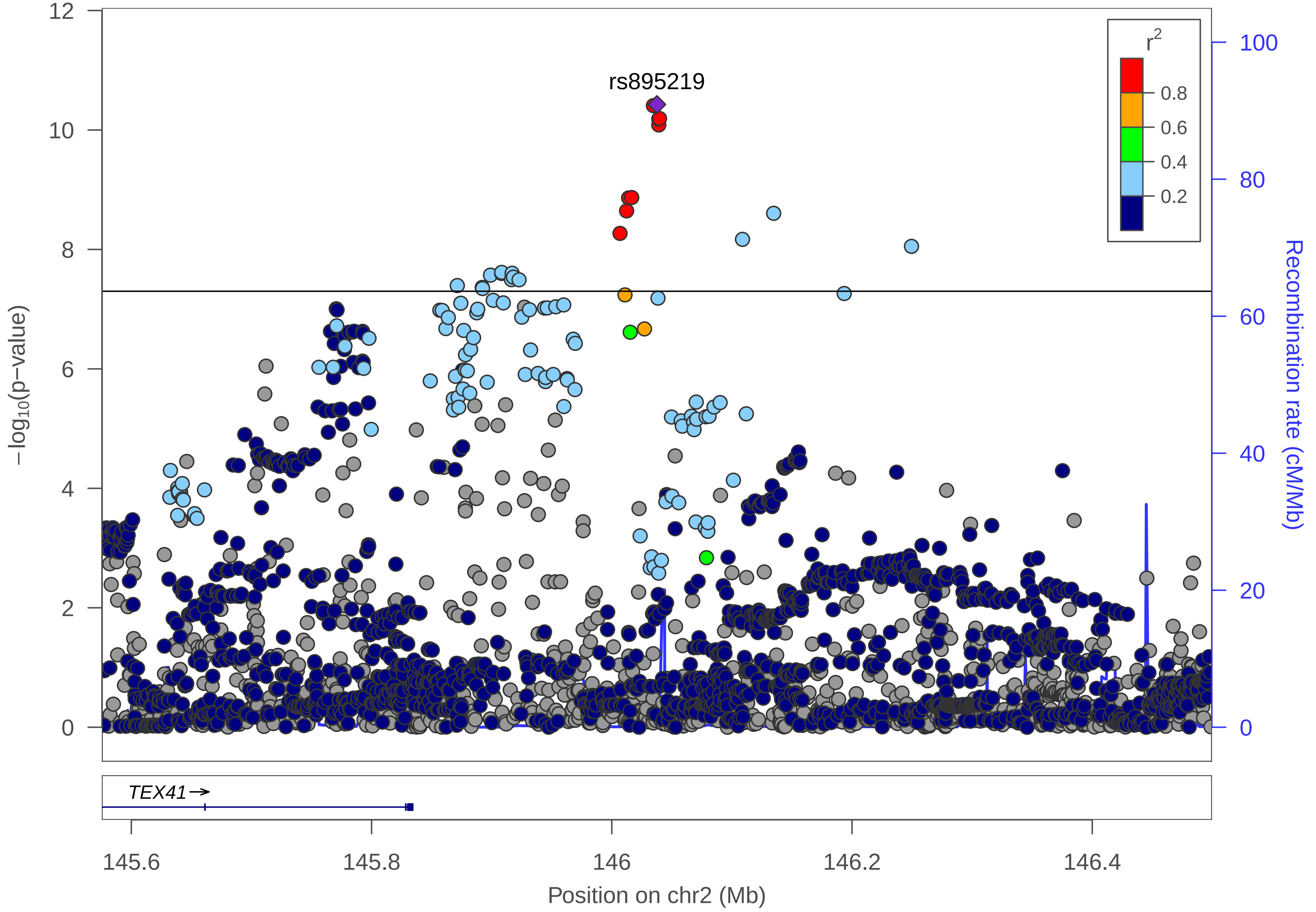
rs56140113
r²
0.8
0.6
0.4
0.2
−log₁₀(p−value)
Recombination rate (cM/Mb)
0
2
4
6
8
10
0
20
40
60
80
100
SRGAP2→
RASSF5→
DYRK3→
←IL10
IL19→
IL20→
←PIGR
SRGAP2D→
IKBKE→
←EIF2D
MAPKAPK2→
IL24→
←FCAMR
MIR6769B→
←FCMR
206.6
206.7
206.8
206.9
207
207.1
Position on chr1 (Mb)

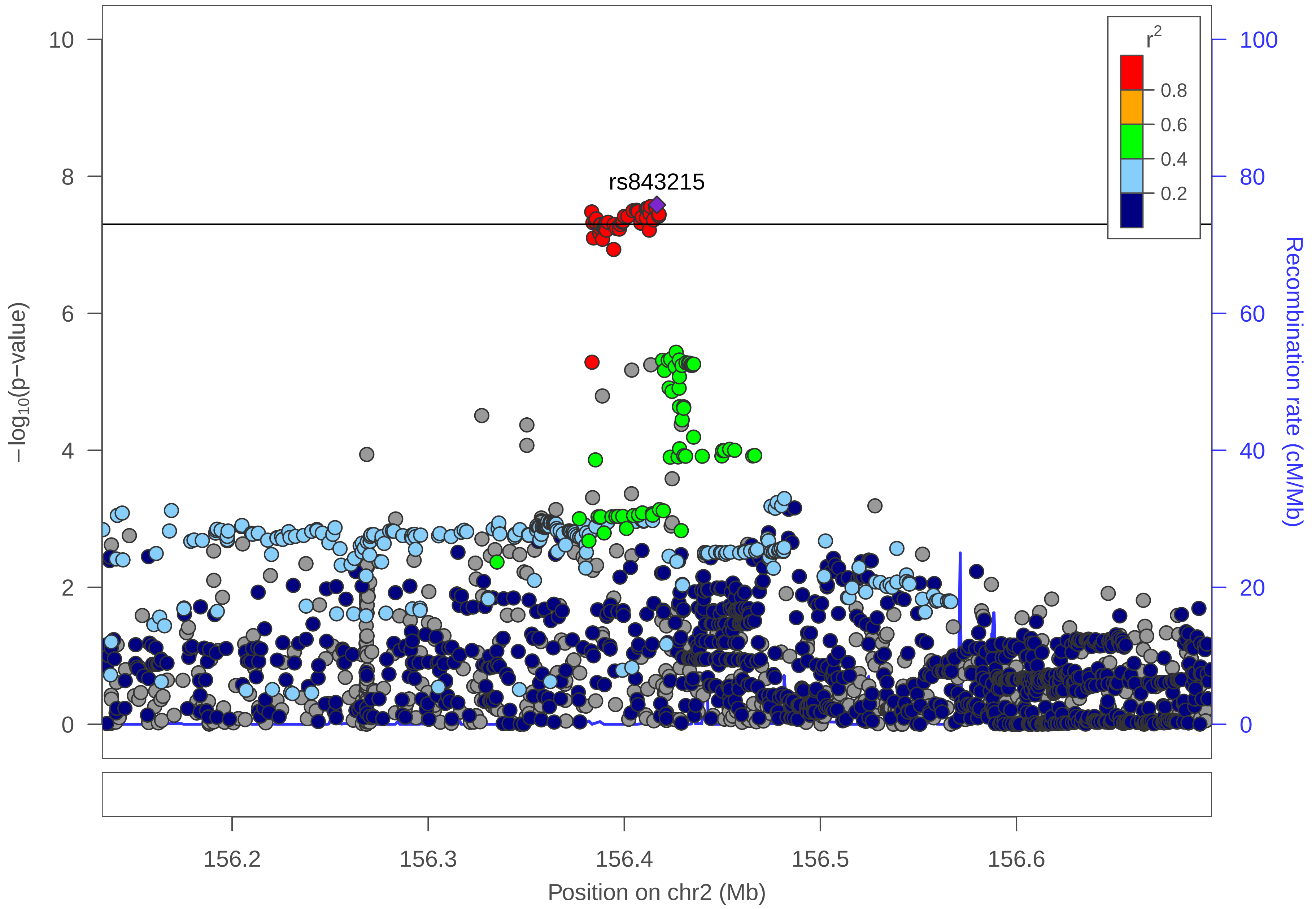

rs72764846
r^2
0.8
0.6
0.4
0.2
−log$_{10}$(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
KIF26B→
←SMYD3
245.6
245.7
245.8
245.9
246
246.1
Position on chr1 (Mb)

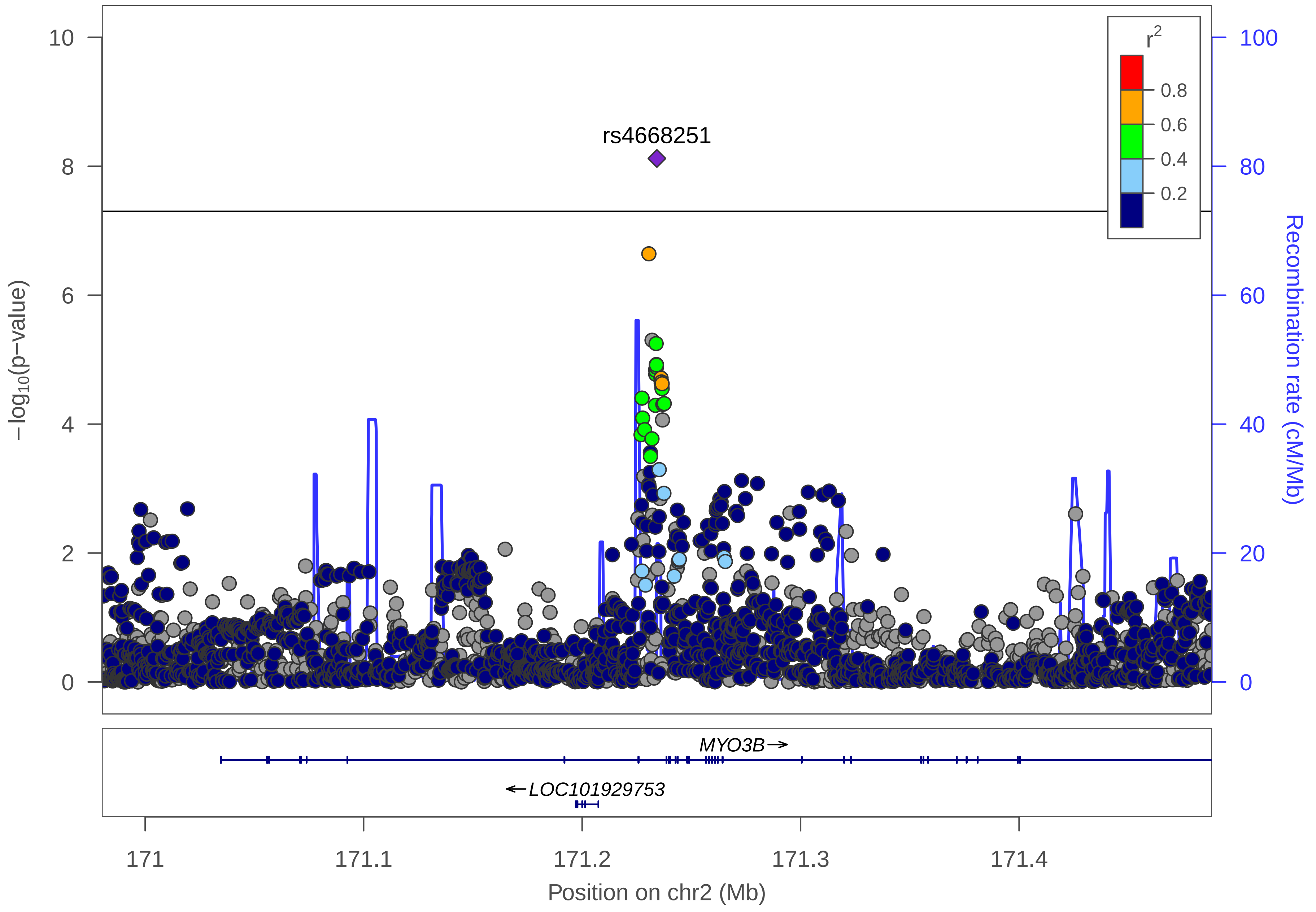

rs12712881
r2
0.8
0.6
0.4
0.2
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
←LINC01819
←ZFP36L2
LINC01126→
←THADA
PLEKHH2→
←C1GALT1C1L
←ABCG5
DYNC2LI1→
ABCG8→
43.2
43.4
43.6
43.8
44
Position on chr2 (Mb)

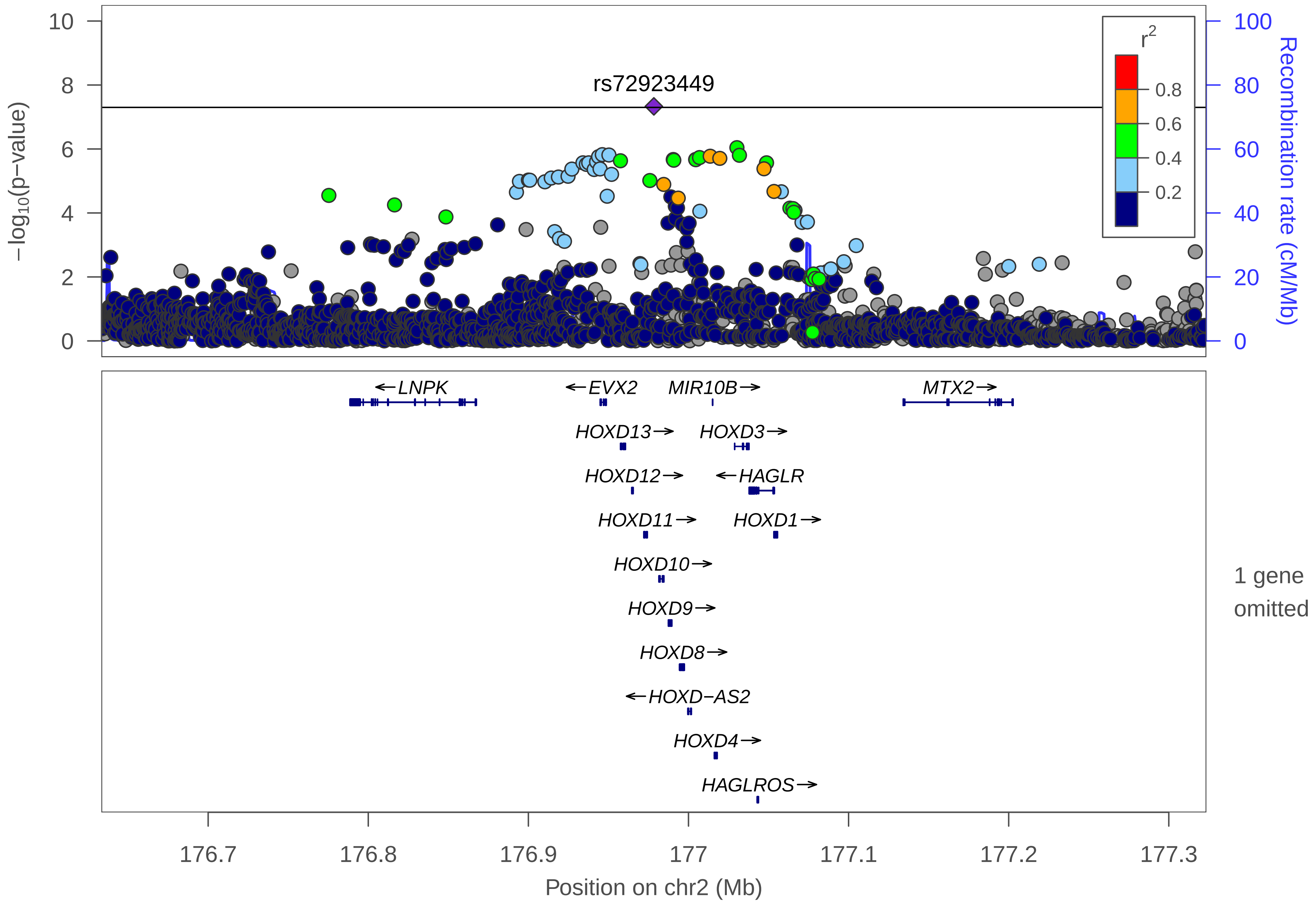

rs4907224
r2
0.8
0.6
0.4
0.2
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←ZNF514
FAHD2A→
TRIM43→
←LINC00342
FAHD2CP→
←STARD7
NCAPH→
ARID5A→
ZNF2→
KCNIP3→
←ANKRD36C
←ADRA2B
CIAO1→
←NEURL3
PROM2→
←TRIM43B
←GPAT2
STARD7−AS1→
←LOC105373496
←ASTL
←SNRNP200
←KANSL3
←DUSP2
ITPRIPL1→
FER1L5→
SNORA112→
←TMEM127
96
96.2
96.4
96.6
96.8
97
97.2
Position on chr2 (Mb)

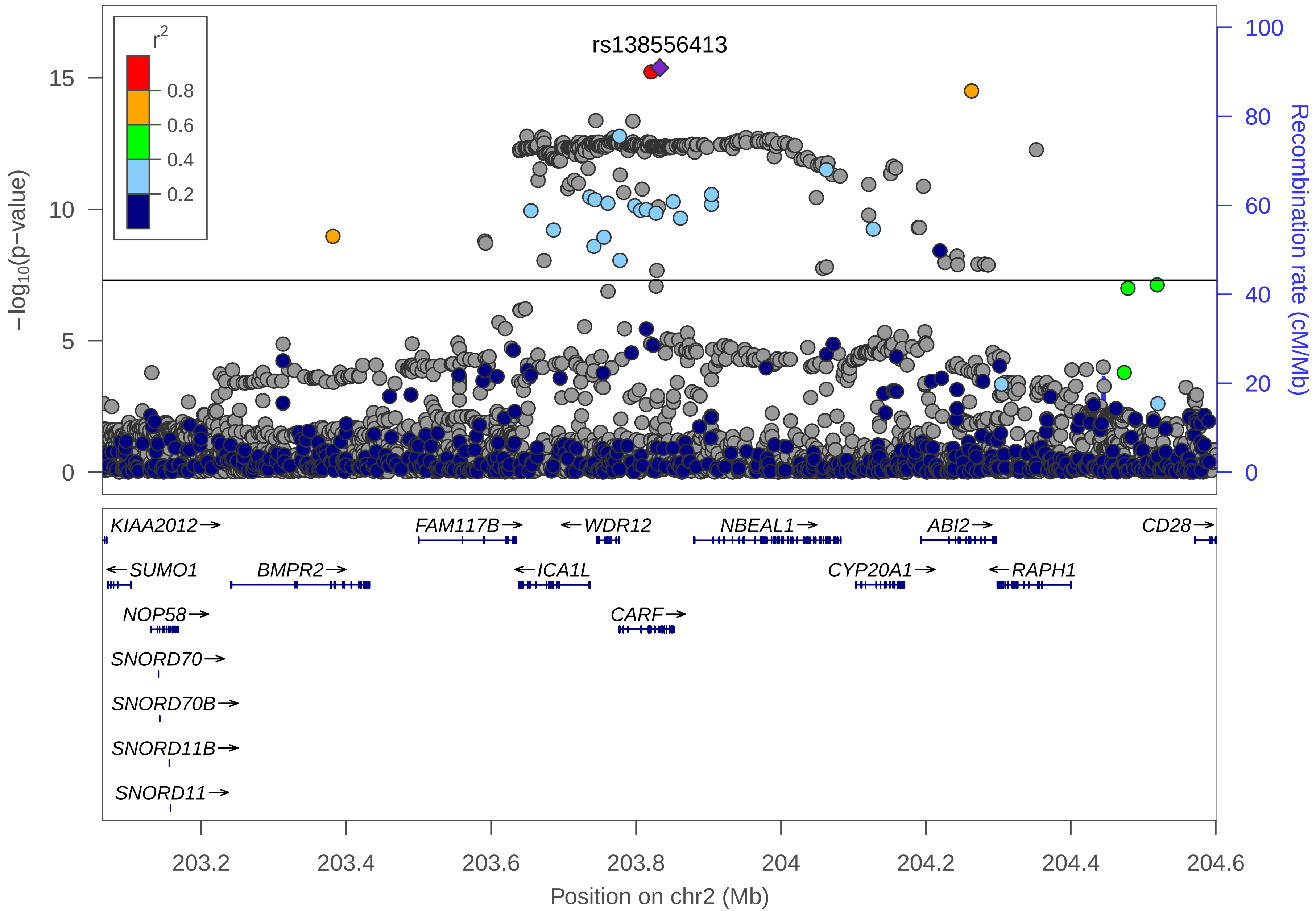

rs7564469
r^2
0.8
0.6
0.4
0.2
−log10(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
←GTDC1
←ZEB2
TEX41→
ZEB2−AS1→
LINC01412→
←LOC105373656
145
145.1
145.2
145.3
145.4
145.5
Position on chr2 (Mb)

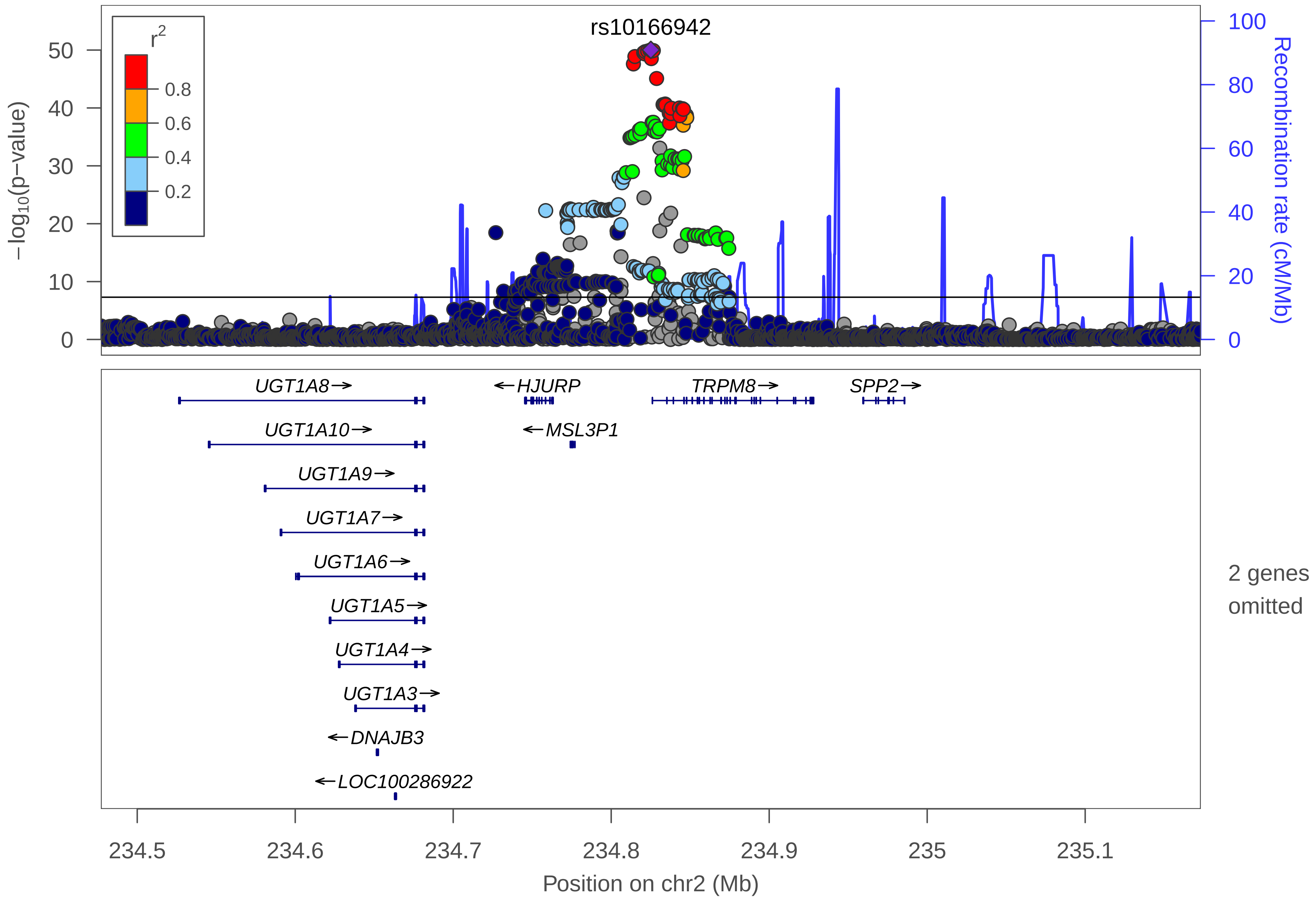

rs895219
r^2
0.8
0.6
0.4
0.2
−log$_{10}$(p−value)
0
2
4
6
8
10
12
Recombination rate (cM/Mb)
0
20
40
60
80
100
TEX41→
145.6
145.8
146
146.2
146.4
Position on chr2 (Mb)

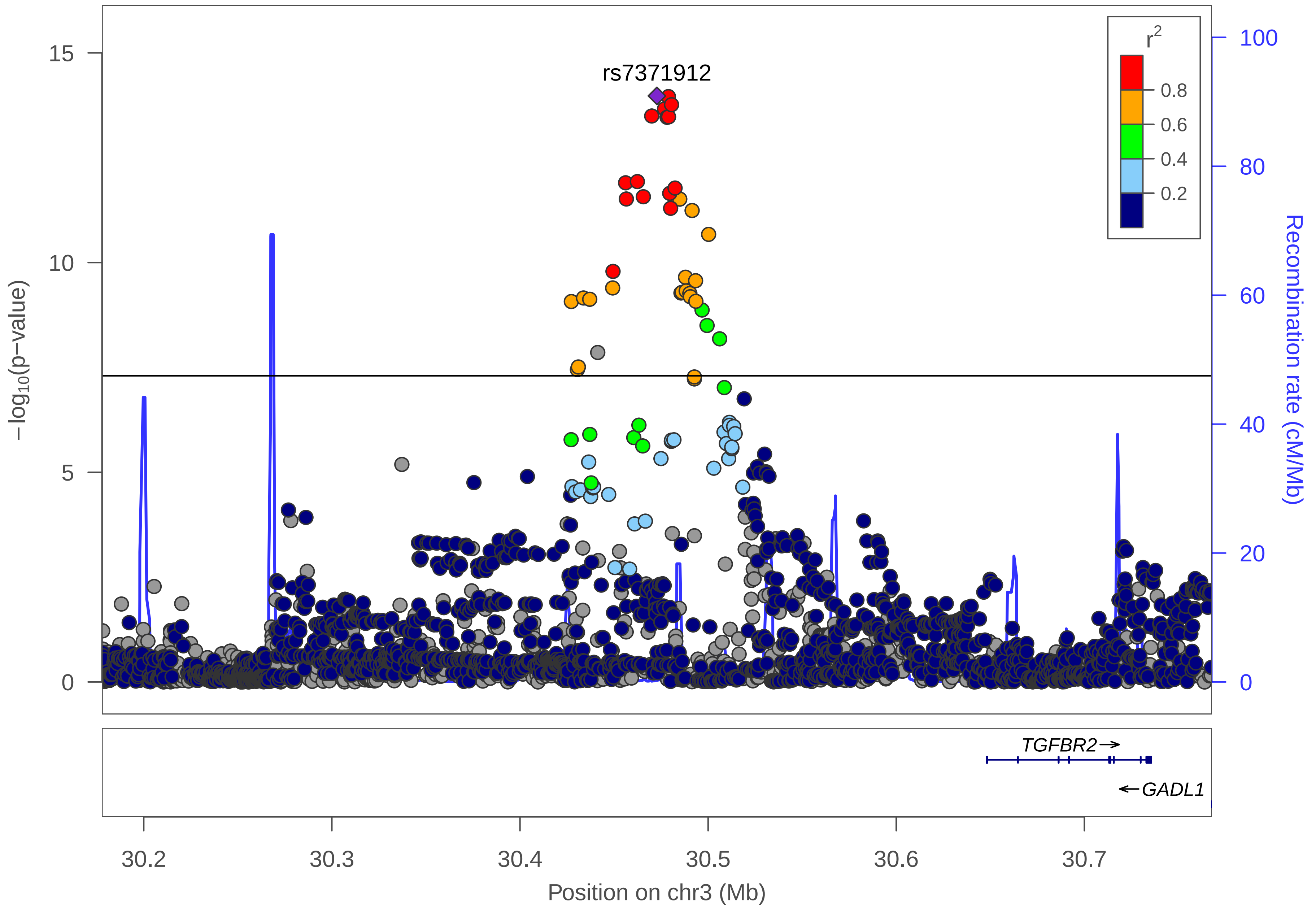

rs843215
r^2
0.8
0.6
0.4
0.2
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
156.2
156.3
156.4
156.5
156.6
Position on chr2 (Mb)

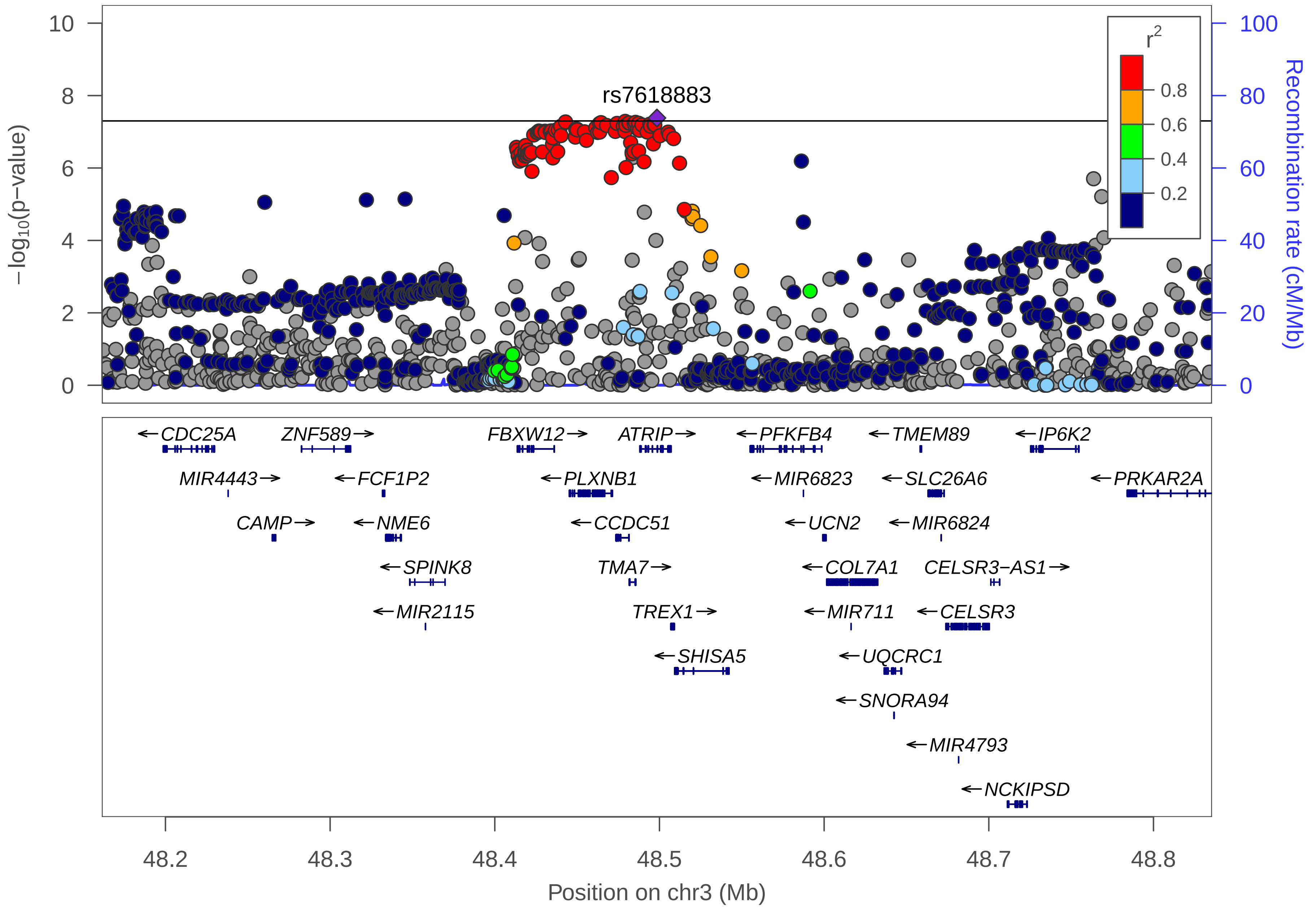

rs4668251
r2
0.8
0.6
0.4
0.2
−log10(p−value)
Recombination rate (cM/Mb)
10
8
6
4
2
0
100
80
60
40
20
0
MYO3B→
←LOC101929753
171
171.1
171.2
171.3
171.4
Position on chr2 (Mb)

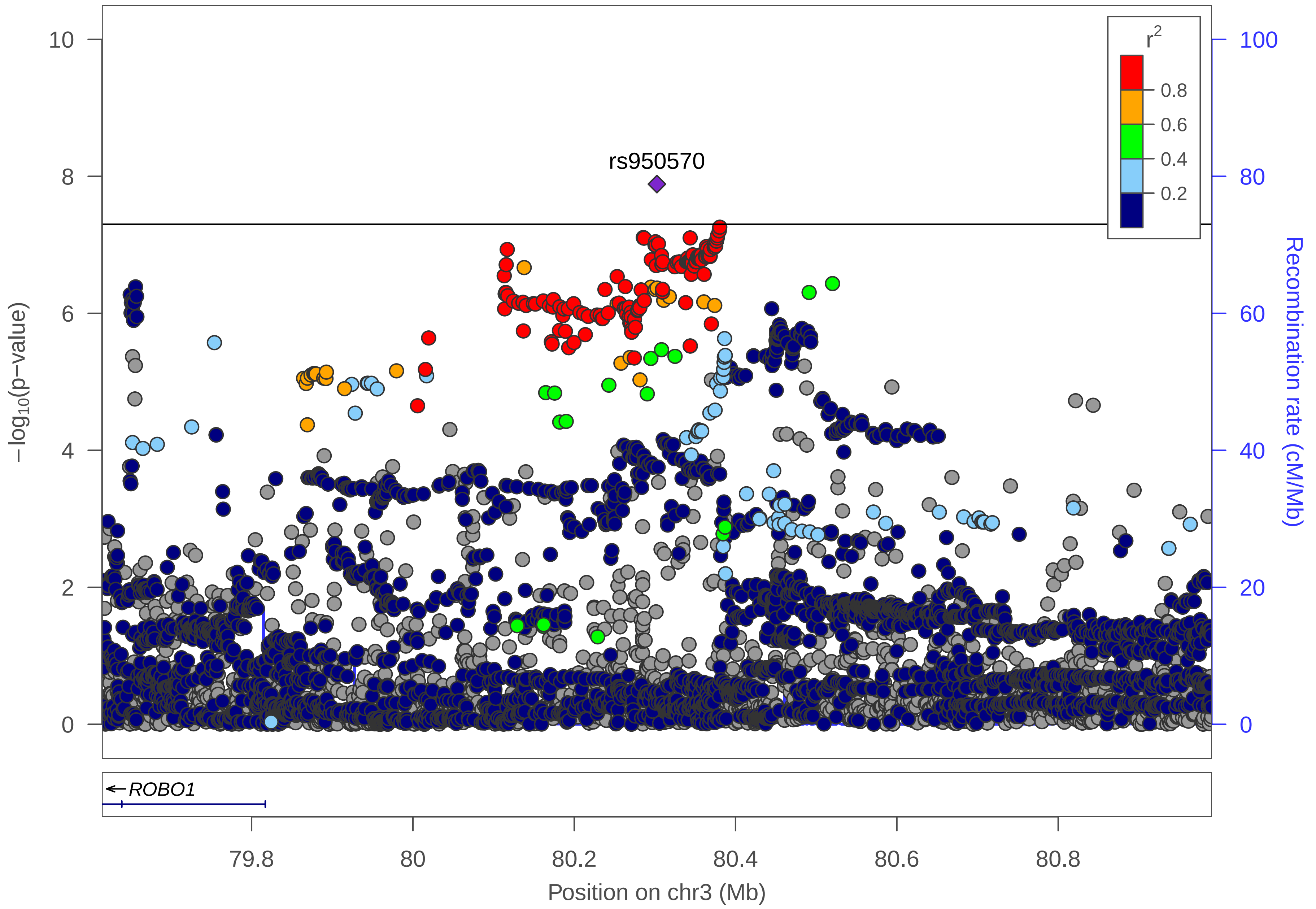

rs72923449
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
r2
0.8
0.6
0.4
0.2
←LNPK
←EVX2
MIR10B→
MTX2→
HOXD13→
HOXD3→
HOXD12→
←HAGLR
HOXD11→
HOXD1→
HOXD10→
HOXD9→
HOXD8→
←HOXD−AS2
HOXD4→
HAGLROS→
1 gene omitted
176.7
176.8
176.9
177
177.1
177.2
177.3
Position on chr2 (Mb)

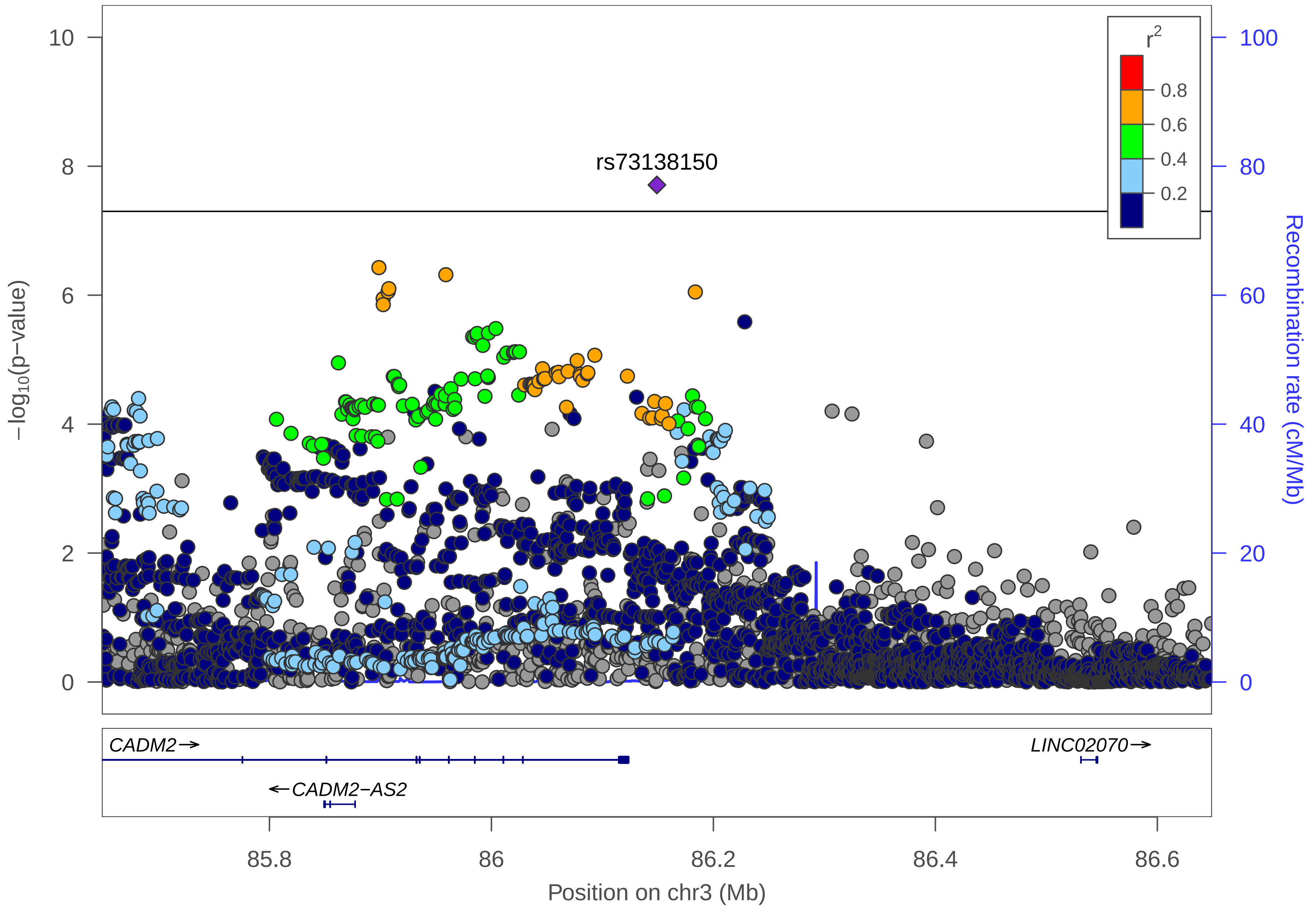

r2
0.8
0.6
0.4
0.2
rs138556413
15
10
5
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
KIAA2012→
FAM117B→
←WDR12
NBEAL1→
ABI2→
CD28→
←SUMO1
BMPR2→
←ICA1L
CYP20A1→
←RAPH1
NOP58→
CARF→
SNORD70→
SNORD70B→
SNORD11B→
SNORD11→
203.2
203.4
203.6
203.8
204
204.2
204.4
204.6
Position on chr2 (Mb)

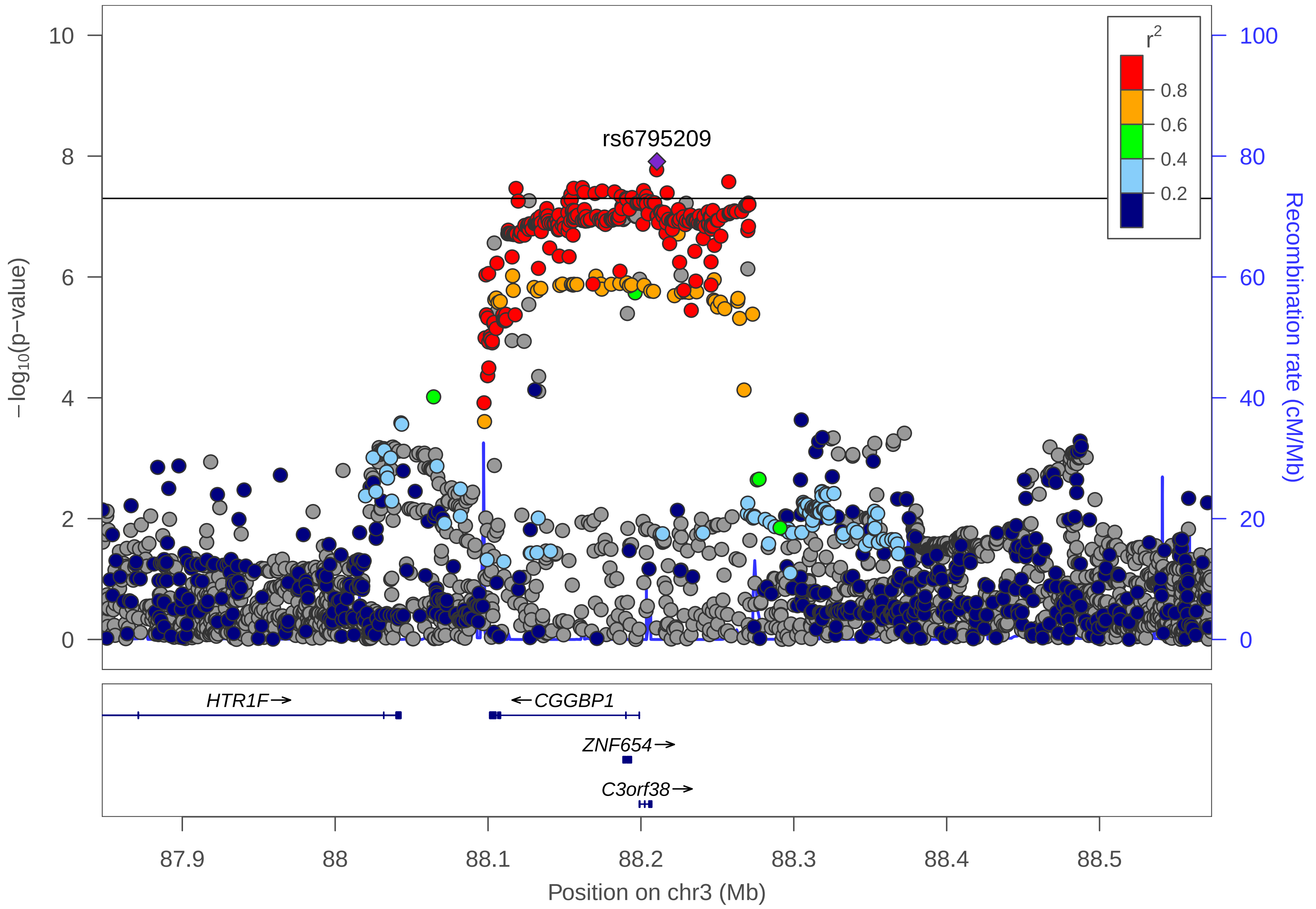

rs10166942
r^2
0.8
0.6
0.4
0.2
−log10(p−value)
50
40
30
20
10
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
UGT1A8→
←HJURP
TRPM8→
SPP2→
UGT1A10→
←MSL3P1
UGT1A9→
UGT1A7→
UGT1A6→
UGT1A5→
UGT1A4→
UGT1A3→
←DNAJB3
←LOC100286922
2 genes omitted
234.5
234.6
234.7
234.8
234.9
235
235.1
Position on chr2 (Mb)

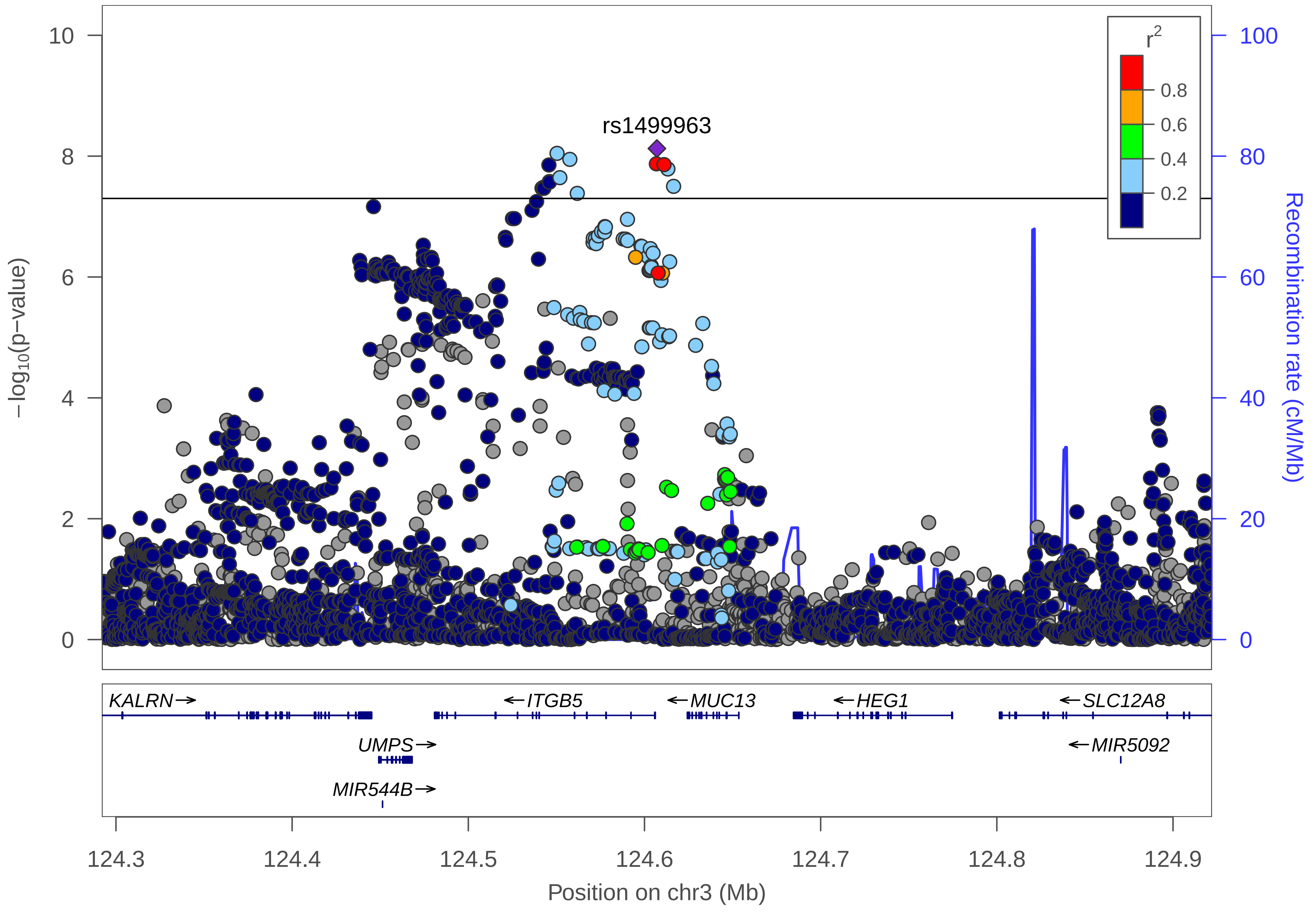

rs7371912
r^2
0.8
0.6
0.4
0.2
15
10
5
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
TGFBR2→
←GADL1
30.2
30.3
30.4
30.5
30.6
30.7
Position on chr3 (Mb)

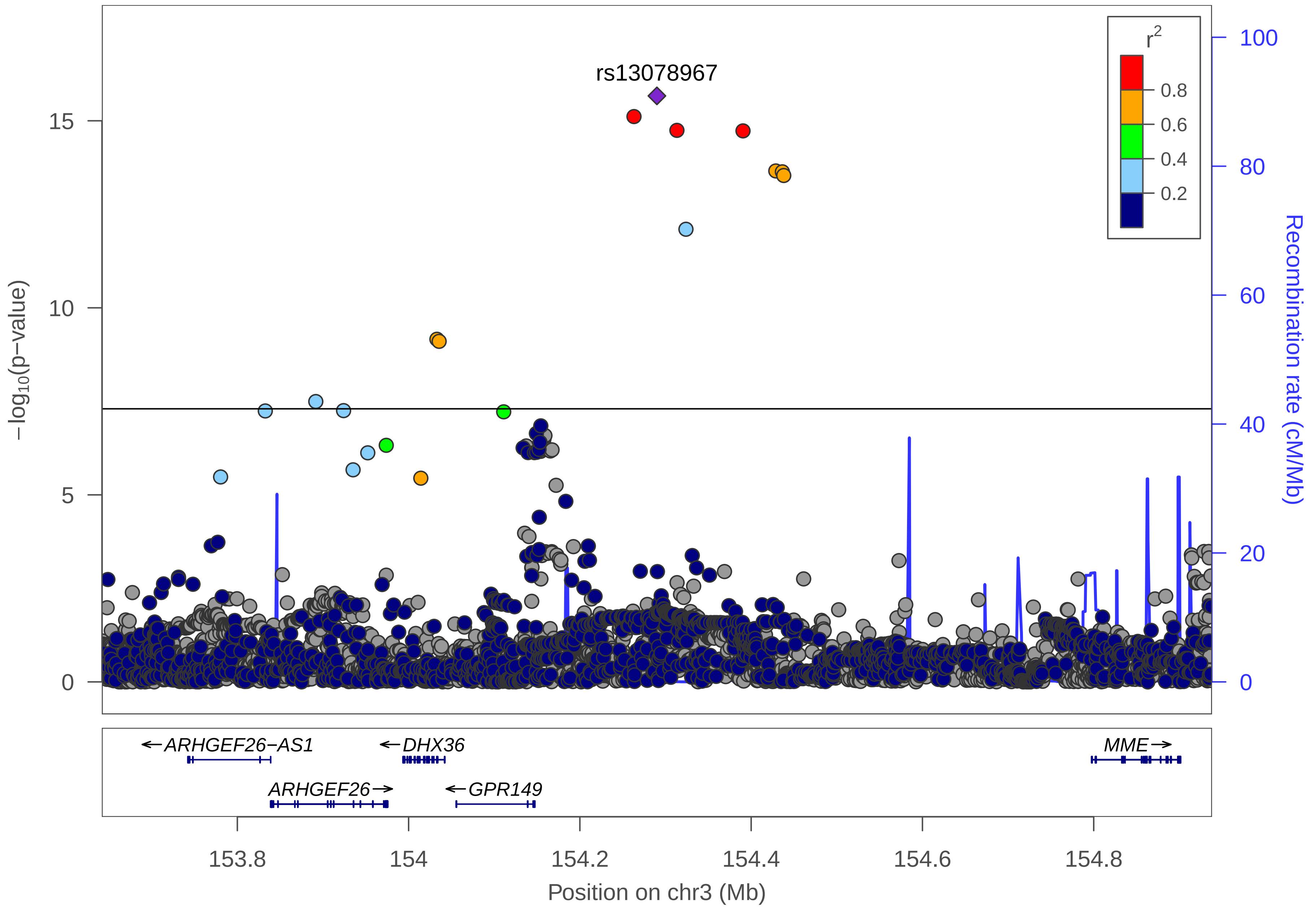

rs7618883
−log10(p−value)
Recombination rate (cM/Mb)
r2
0.8
0.6
0.4
0.2
10
8
6
4
2
0
100
80
60
40
20
0
←CDC25A
ZNF589→
FBXW12→
ATRIP→
←PFKFB4
←TMEM89
←IP6K2
MIR4443→
←FCF1P2
←PLXNB1
←MIR6823
←SLC26A6
←PRKAR2A
CAMP→
←NME6
←CCDC51
←UCN2
←MIR6824
←SPINK8
TMA7→
←COL7A1
CELSR3−AS1→
←MIR2115
TREX1→
←MIR711
←CELSR3
←SHISA5
←UQCRC1
←SNORA94
←MIR4793
←NCKIPSD
48.2
48.3
48.4
48.5
48.6
48.7
48.8
Position on chr3 (Mb)

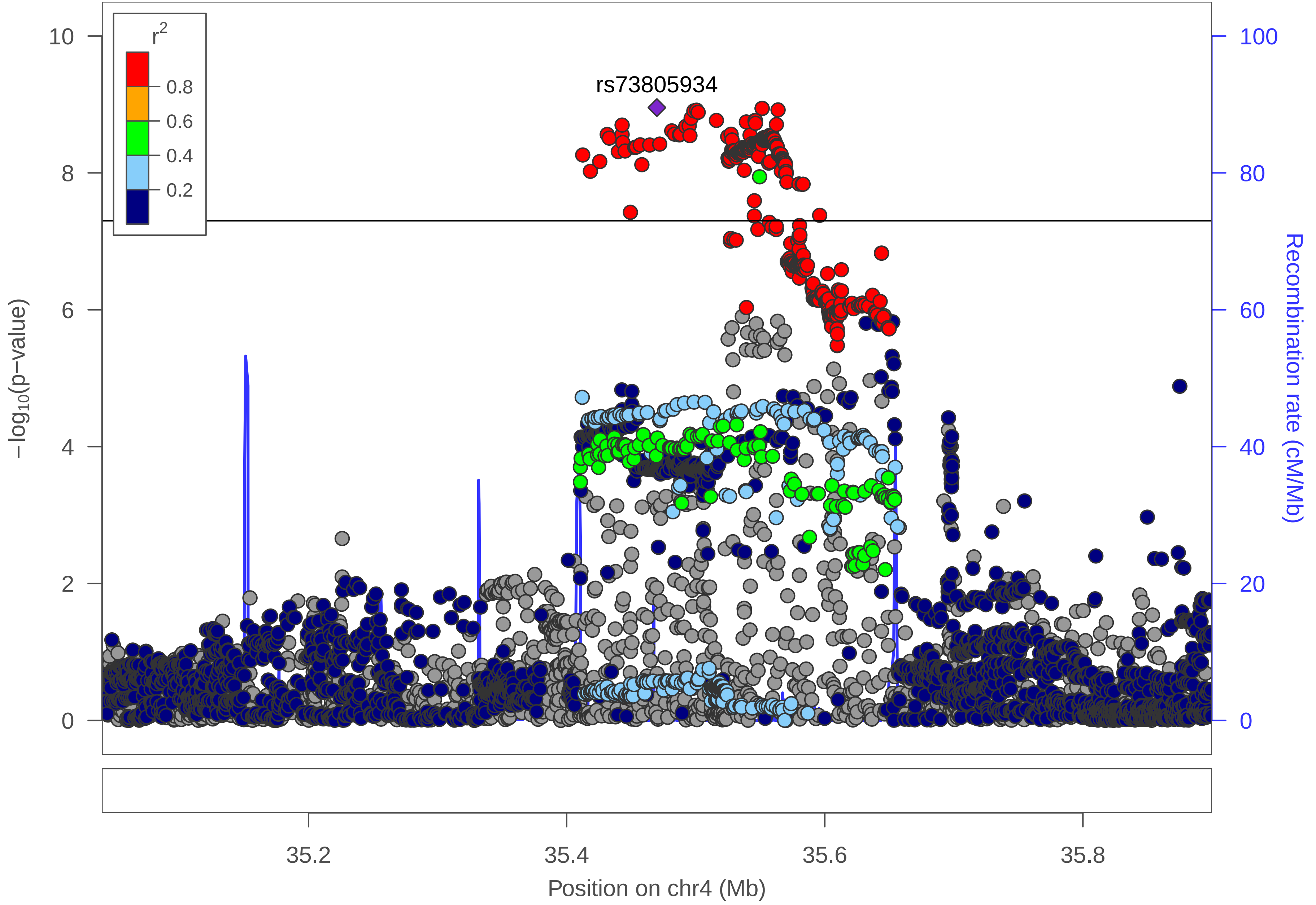

rs950570
r2
0.8
0.6
0.4
0.2
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
ROBO1
79.8
80
80.2
80.4
80.6
80.8
Position on chr3 (Mb)

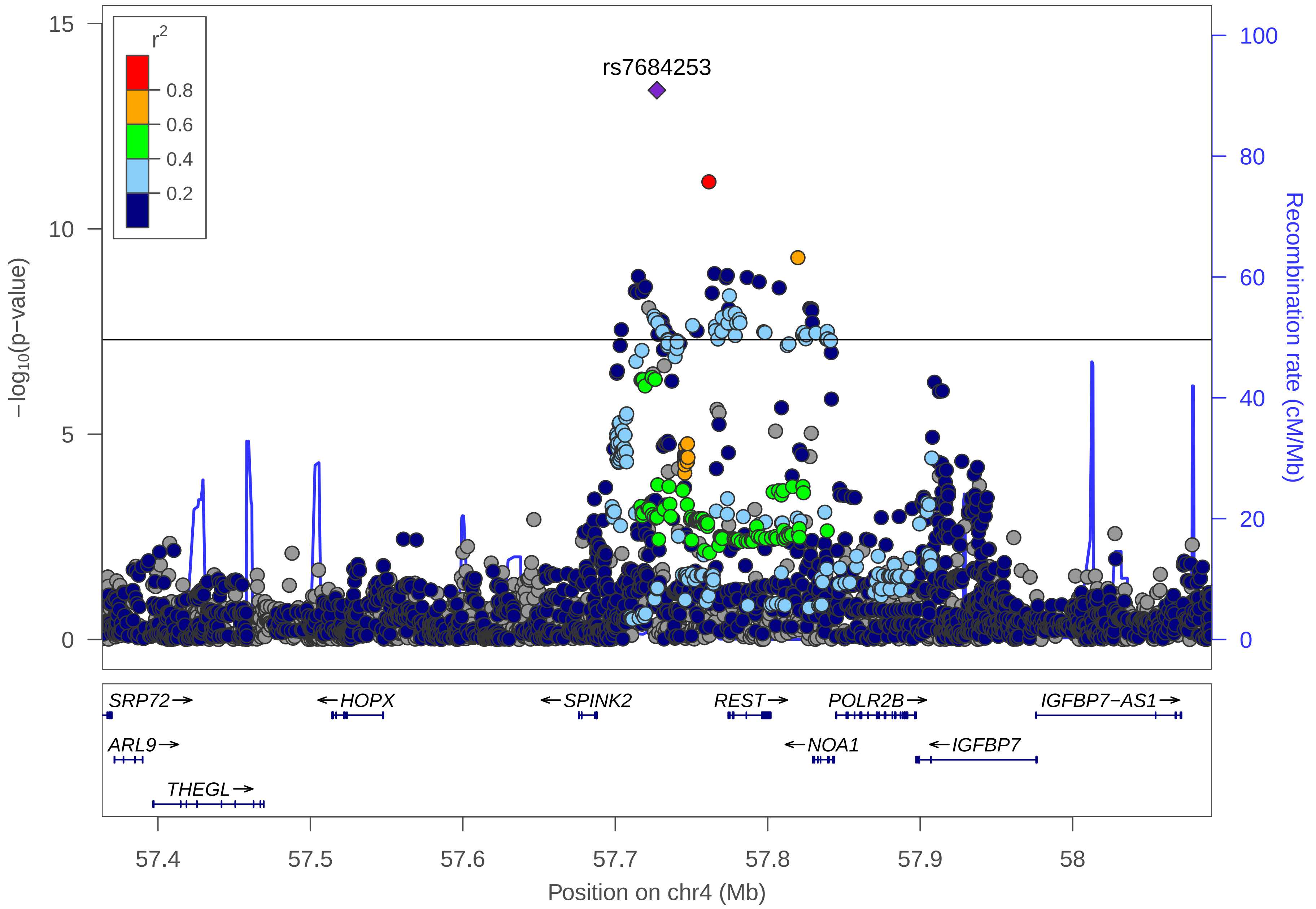

rs73138150
r^2
0.8
0.6
0.4
0.2
−log10(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
CADM2→
←CADM2−AS2
LINC02070→
85.8
86
86.2
86.4
86.6
Position on chr3 (Mb)

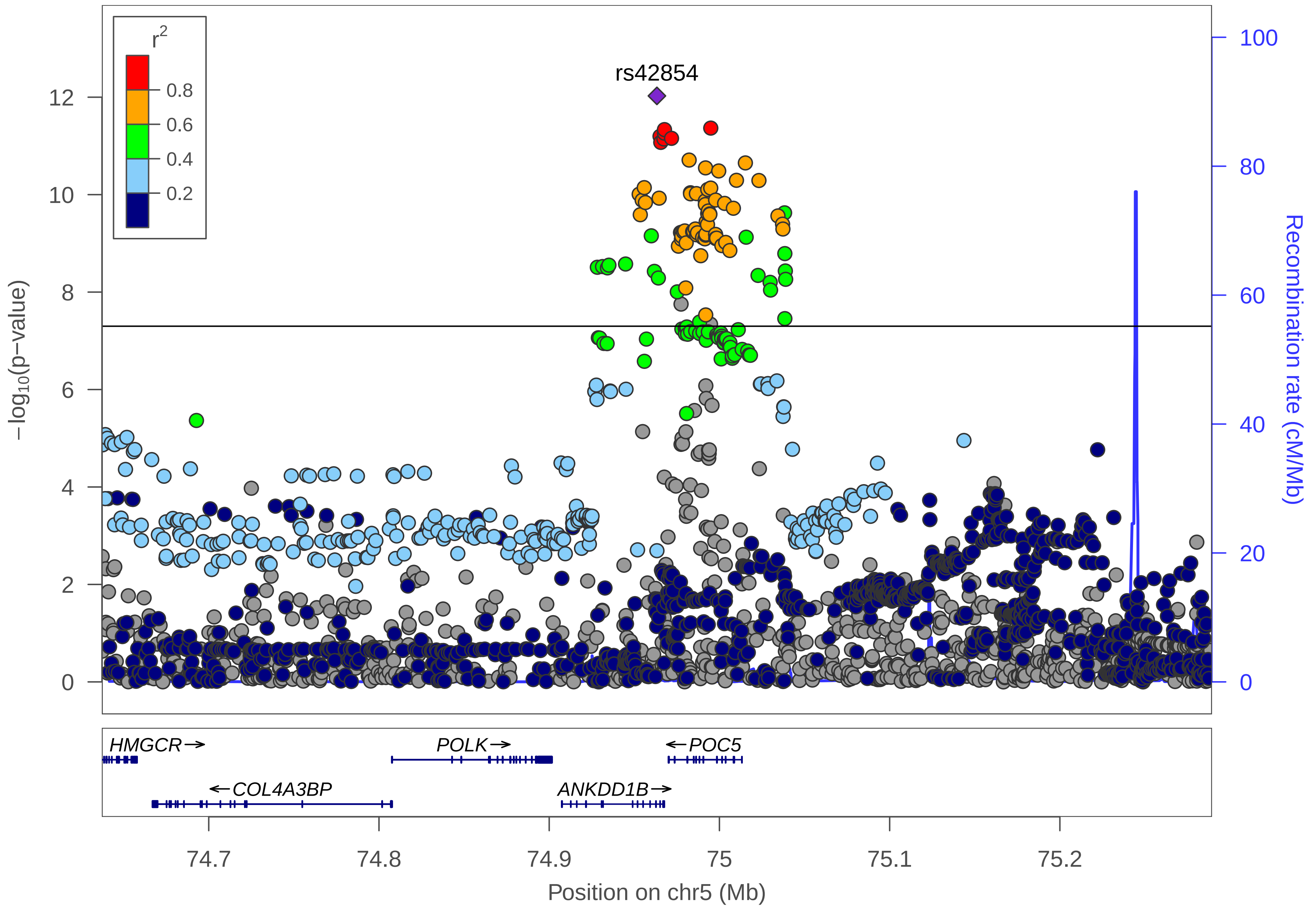

rs6795209
−log10(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
r2
0.8
0.6
0.4
0.2
HTR1F→
←CGGBP1
ZNF654→
C3orf38→
87.9
88
88.1
88.2
88.3
88.4
88.5
Position on chr3 (Mb)

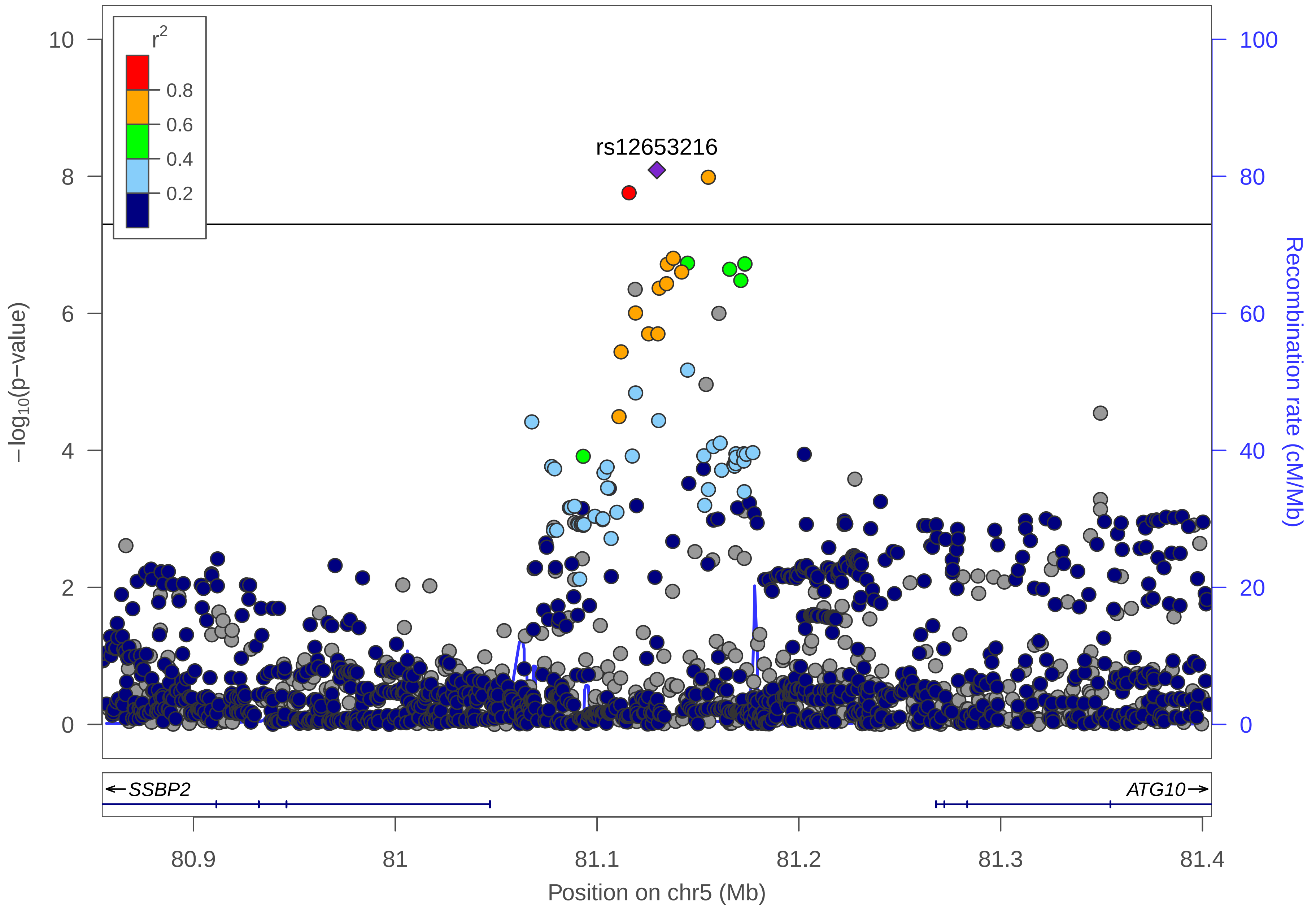

rs1499963
r²
0.8
0.6
0.4
0.2
10
8
6
4
2
0
100
80
60
40
20
0
−log10(p−value)
Recombination rate (cM/Mb)
KALRN→
←ITGB5
←MUC13
←HEG1
←SLC12A8
UMPS→
←MIR5092
MIR544B→
124.3
124.4
124.5
124.6
124.7
124.8
124.9
Position on chr3 (Mb)

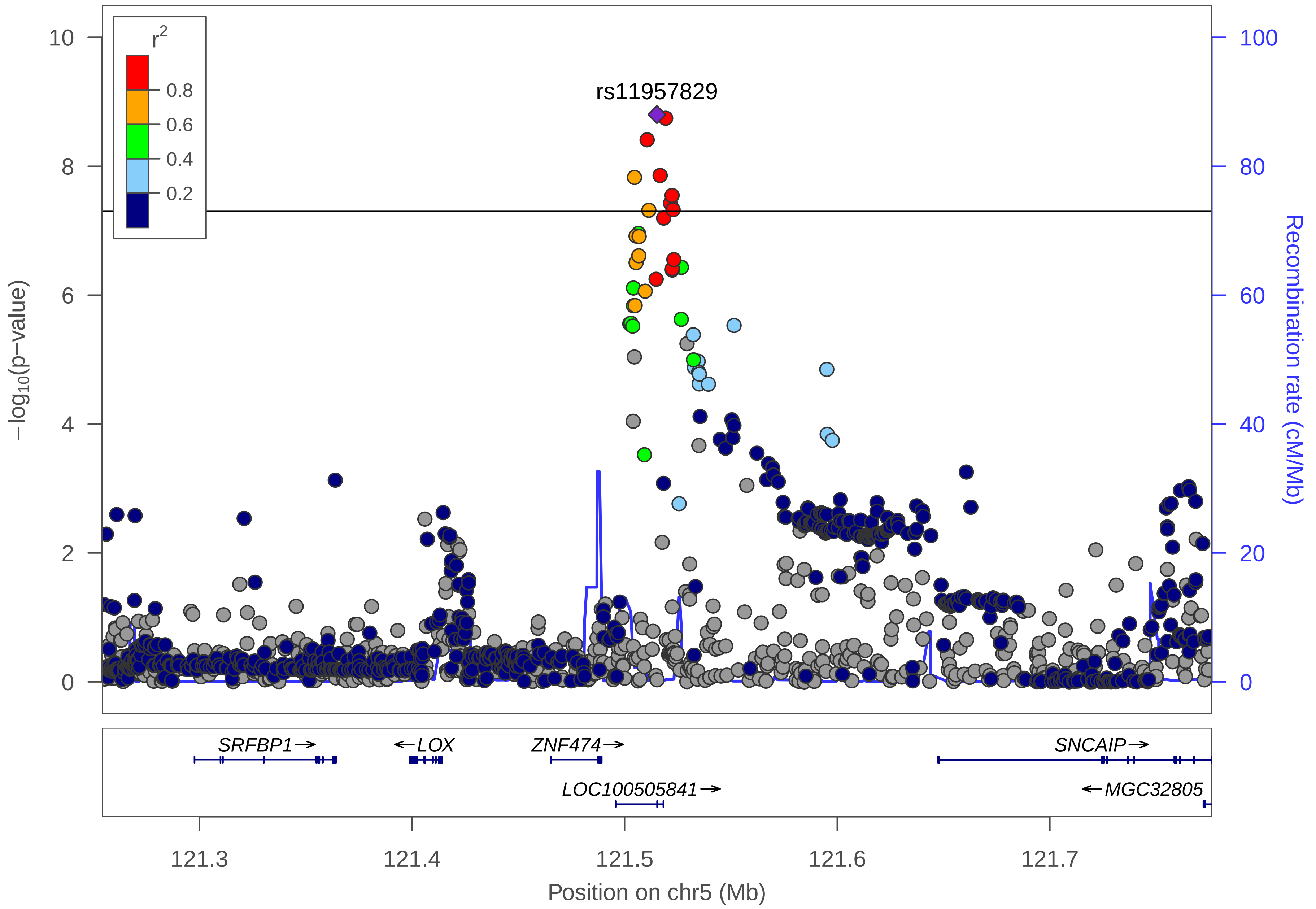

rs13078967
r2
0.8
0.6
0.4
0.2
−log10(p−value)
15
10
5
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
←ARHGEF26−AS1
←DHX36
MME→
ARHGEF26→
←GPR149
153.8
154
154.2
154.4
154.6
154.8
Position on chr3 (Mb)

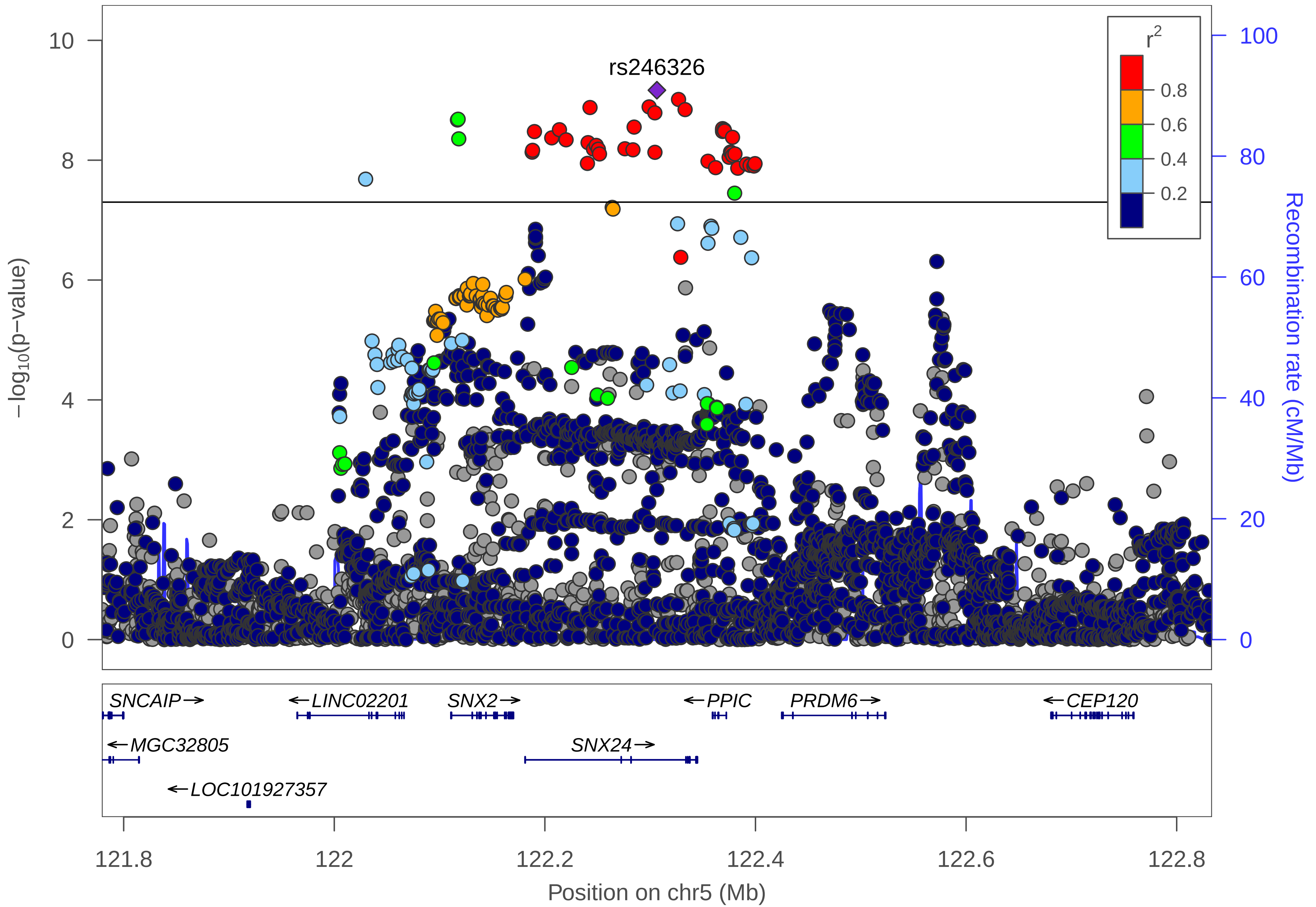

r2
0.8
0.6
0.4
0.2
rs73805934
−log10(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
35.2
35.4
35.6
35.8
Position on chr4 (Mb)

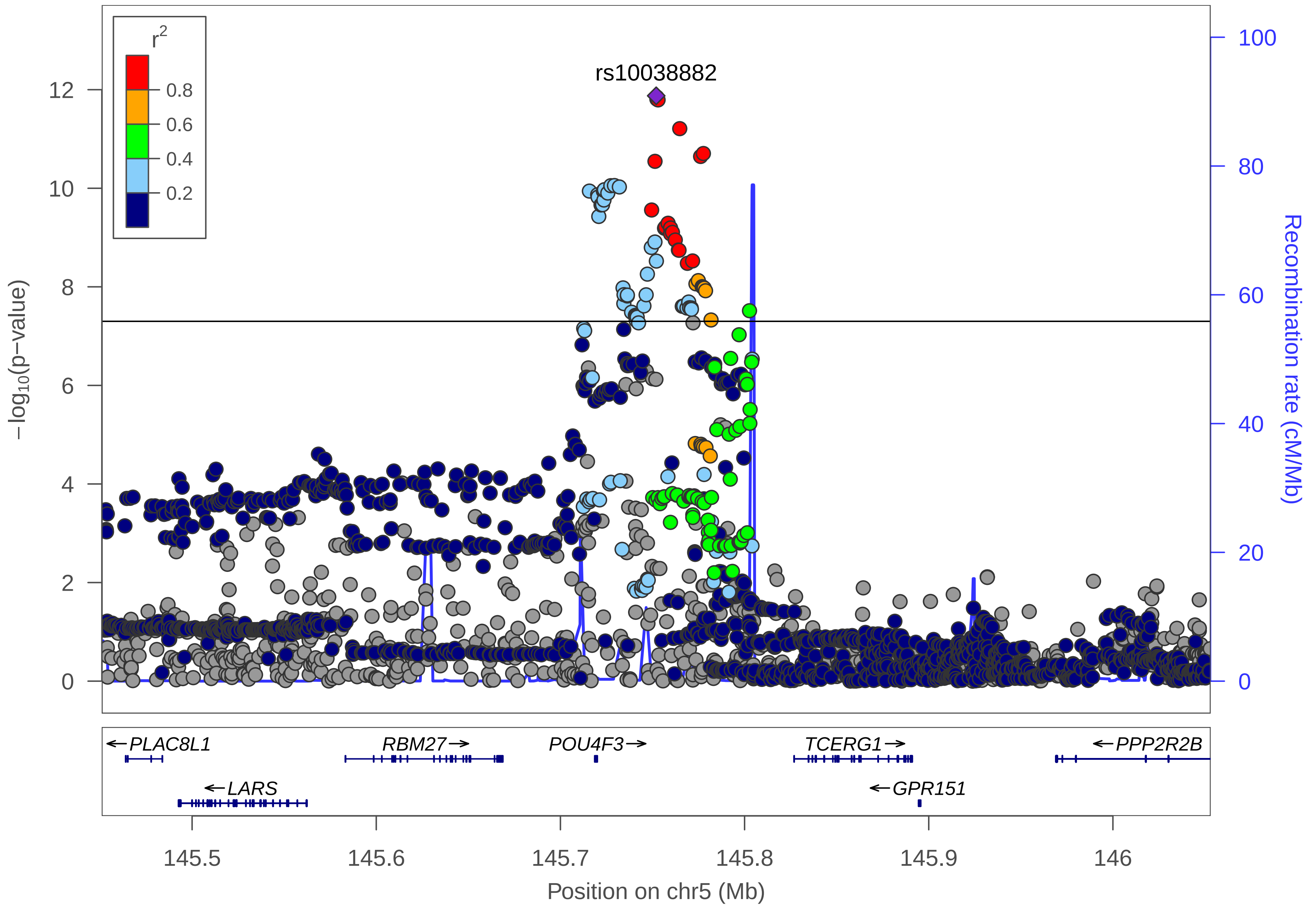

r2
0.8
0.6
0.4
0.2
rs7684253
15
10
5
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
SRP72→
←HOPX
←SPINK2
REST→
POLR2B→
IGFBP7−AS1→
ARL9→
←NOA1
←IGFBP7
THEGL→
57.4
57.5
57.6
57.7
57.8
57.9
58
Position on chr4 (Mb)

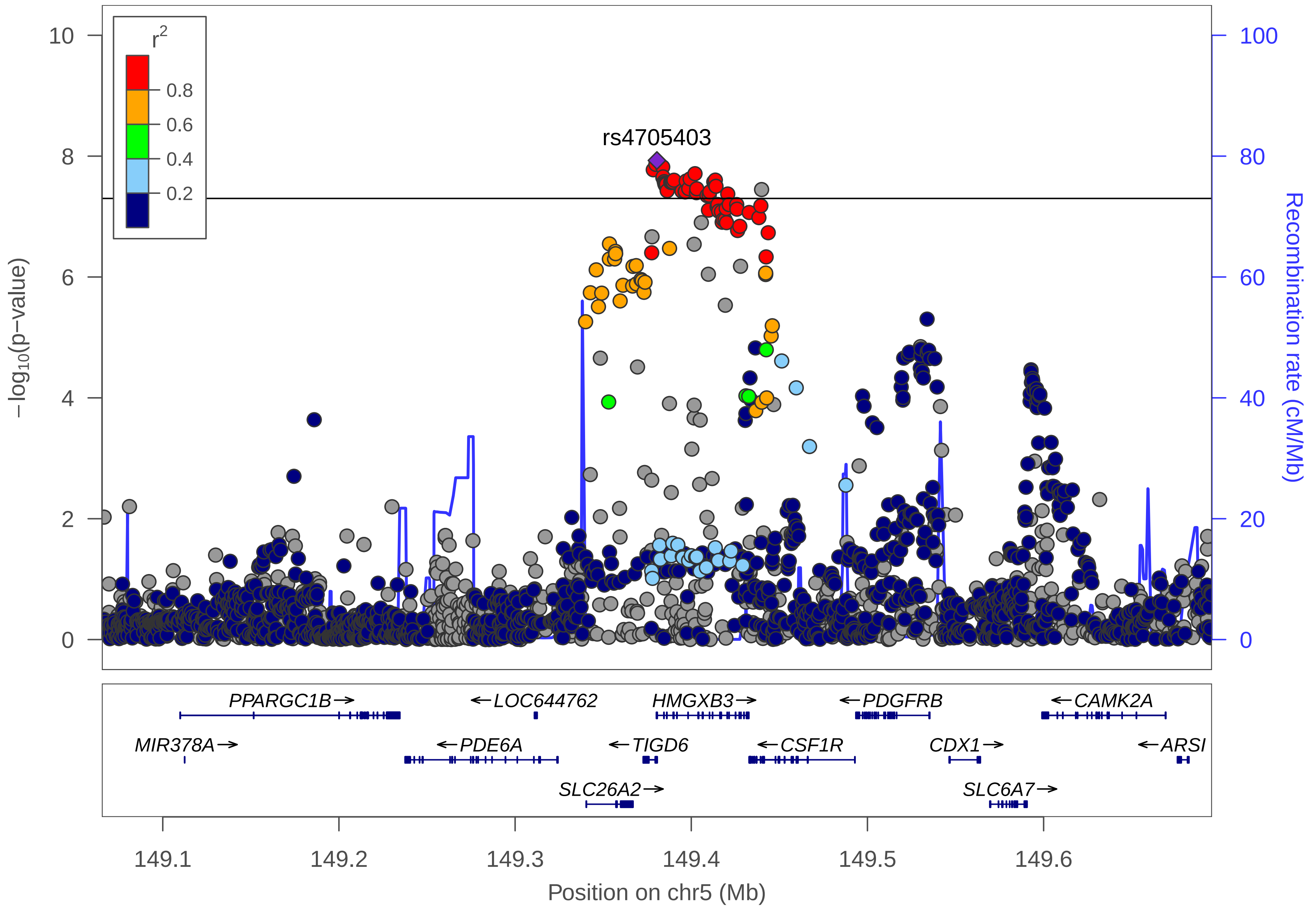

r²
0.8
0.6
0.4
0.2
rs42854
12
10
8
6
4
2
0
−log₁₀(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
HMGCR→
POLK→
←POC5
←COL4A3BP
ANKDD1B→
74.7
74.8
74.9
75
75.1
75.2
Position on chr5 (Mb)

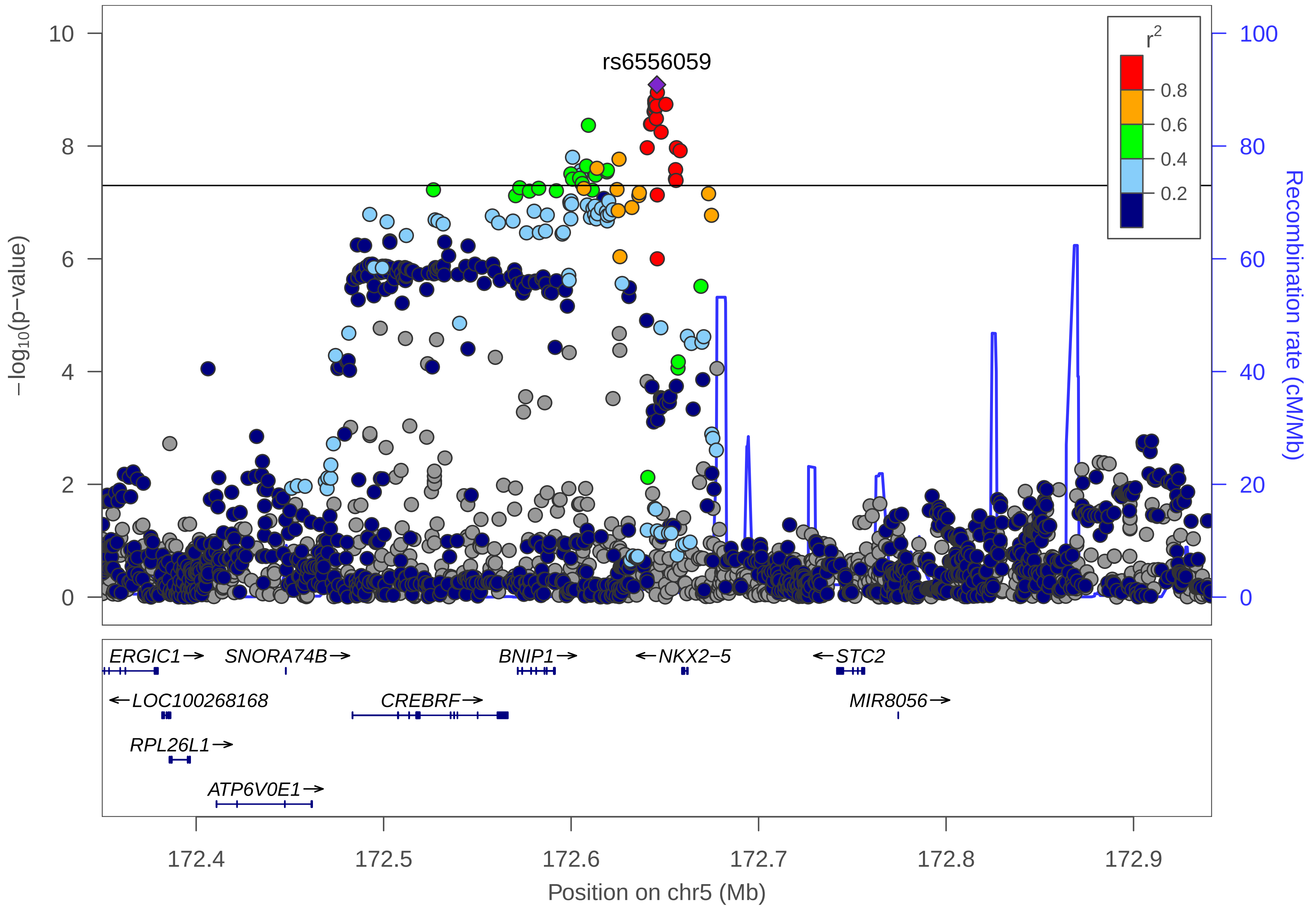

r2
0.8
0.6
0.4
0.2
rs12653216
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
SSBP2
ATG10
80.9
81
81.1
81.2
81.3
81.4
Position on chr5 (Mb)

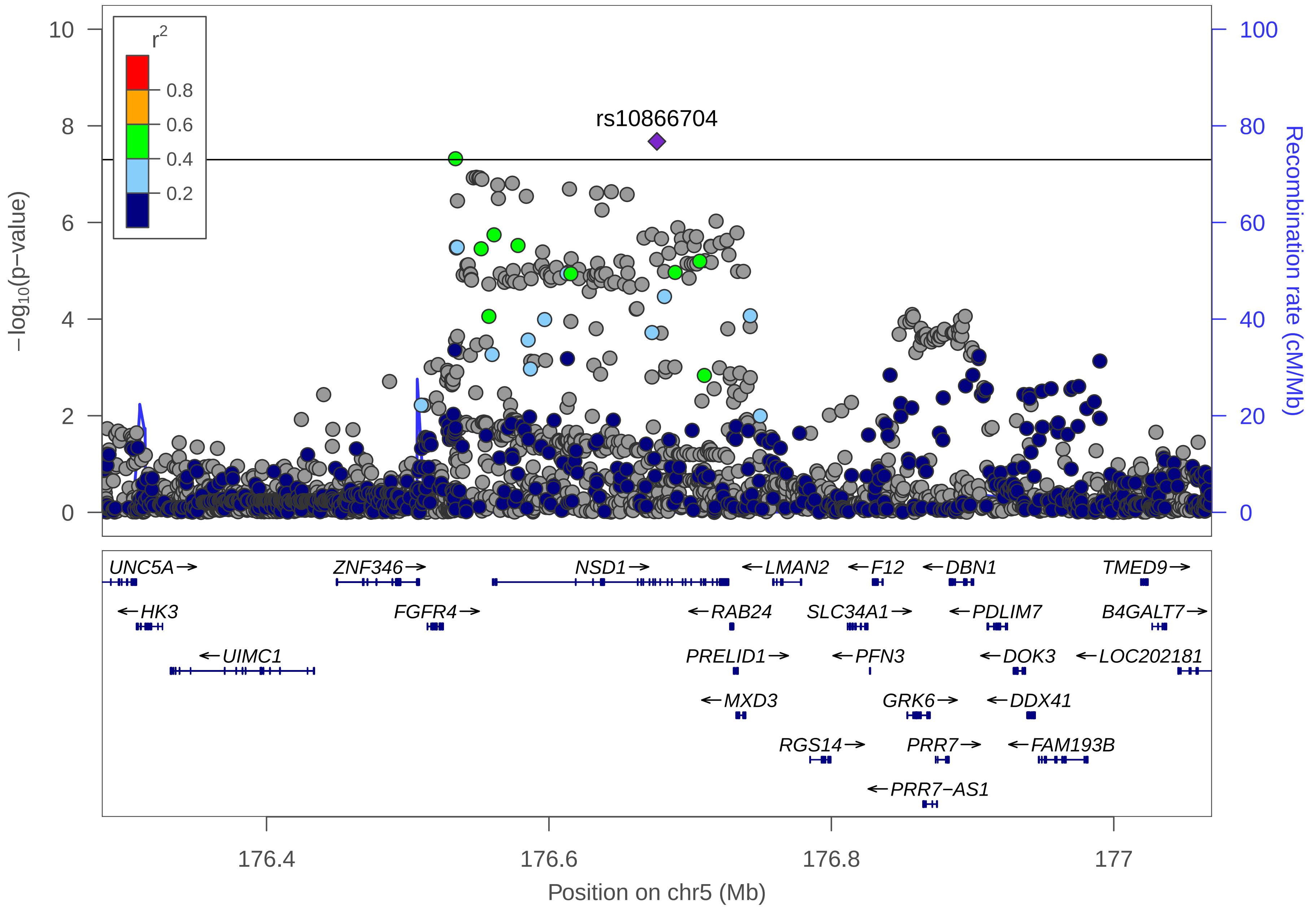

rs11957829
r2
0.8
0.6
0.4
0.2
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
SRFBP1→
←LOX
ZNF474→
LOC100505841→
SNCAIP→
←MGC32805
121.3
121.4
121.5
121.6
121.7
Position on chr5 (Mb)

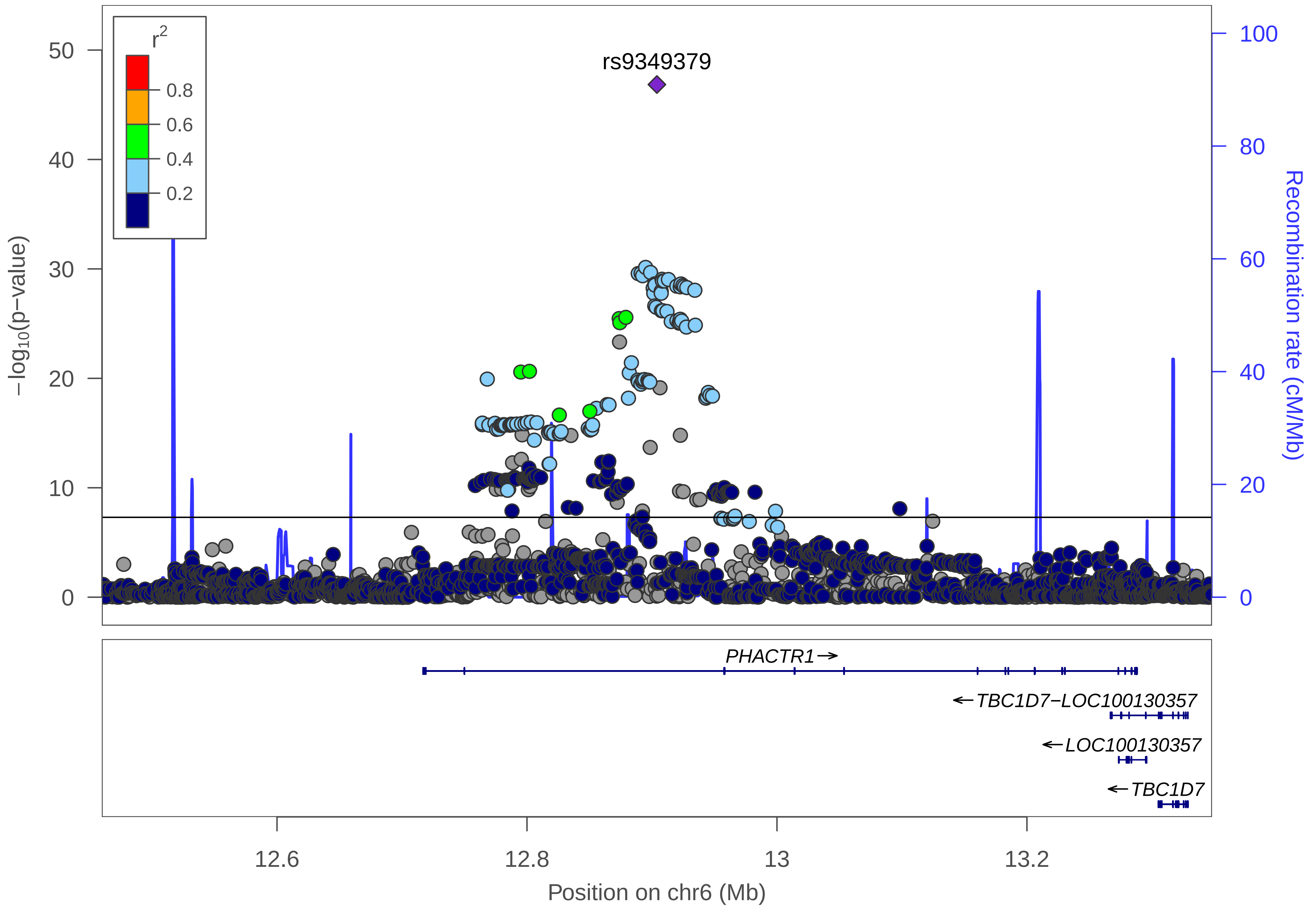

rs246326
r²
0.8
0.6
0.4
0.2
−log₁₀(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
SNCAIP→
←LINC02201
SNX2→
←PPIC
PRDM6→
←CEP120
←MGC32805
SNX24→
←LOC101927357
121.8
122
122.2
122.4
122.6
122.8
Position on chr5 (Mb)

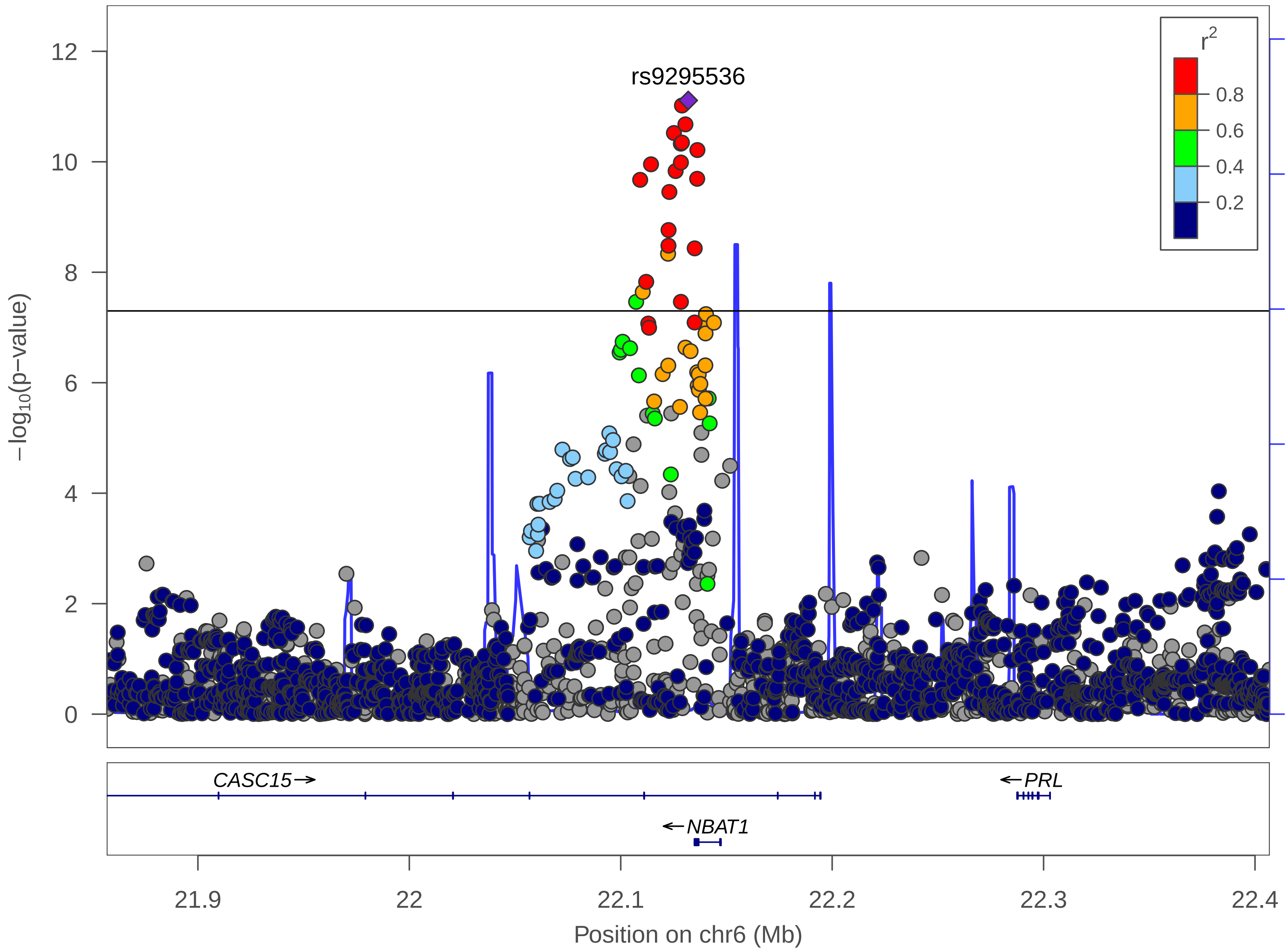

r2
0.8
0.6
0.4
0.2
rs10038882
−log10(p−value)
0
2
4
6
8
10
12
Recombination rate (cM/Mb)
0
20
40
60
80
100
←PLAC8L1
←LARS
RBM27→
POU4F3→
TCERG1→
←GPR151
←PPP2R2B
145.5
145.6
145.7
145.8
145.9
146
Position on chr5 (Mb)

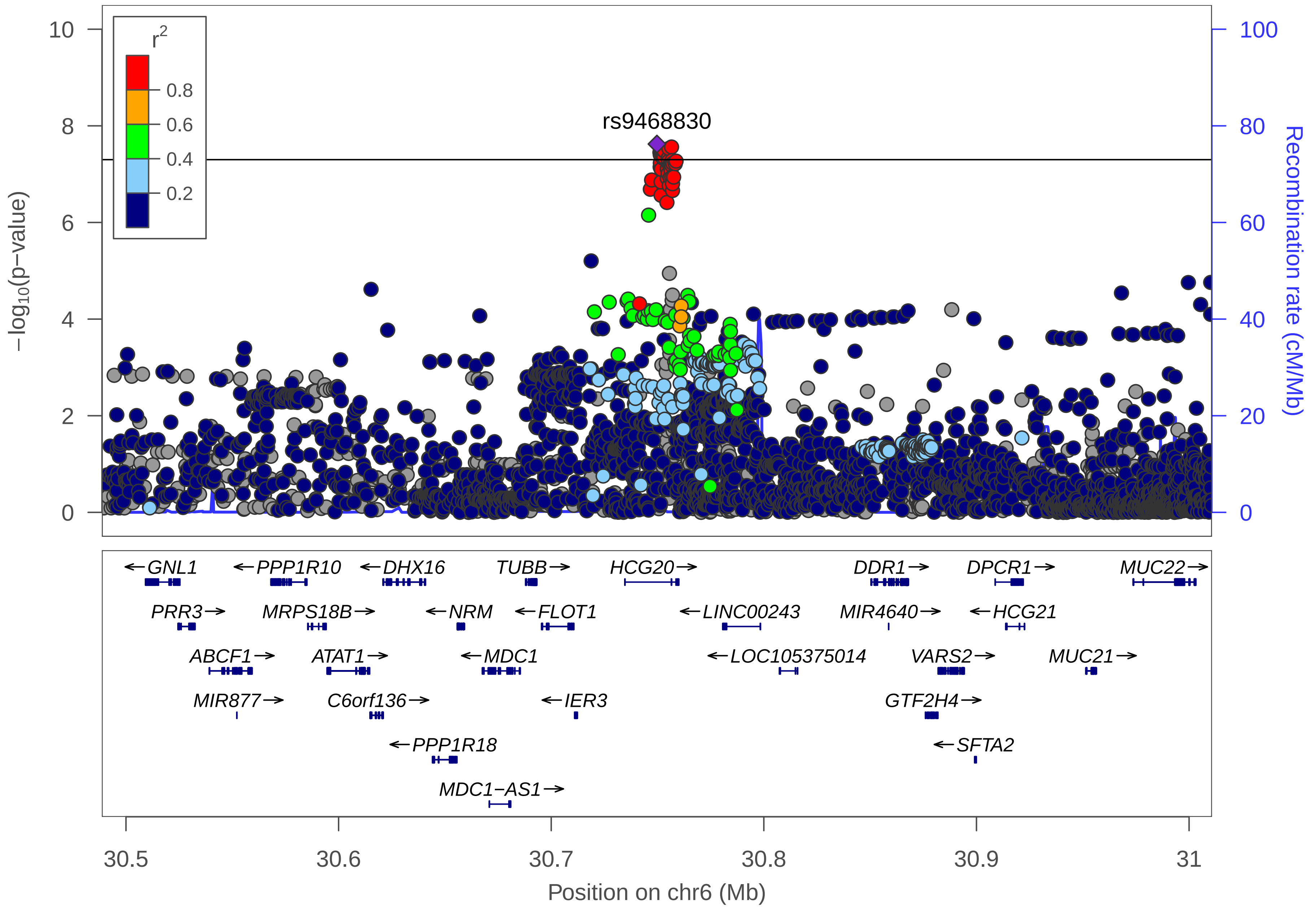

r2
0.8
0.6
0.4
0.2
rs4705403
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
PPARGC1B→
←LOC644762
HMGXB3→
←PDGFRB
←CAMK2A
MIR378A→
←PDE6A
←TIGD6
←CSF1R
CDX1→
←ARSI
SLC26A2→
SLC6A7→
149.1
149.2
149.3
149.4
149.5
149.6
Position on chr5 (Mb)


rs6556059
r²
0.8
0.6
0.4
0.2
−log₁₀(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
ERGIC1→
SNORA74B→
BNIP1→
←NKX2−5
←STC2
←LOC100268168
CREBRF→
MIR8056→
RPL26L1→
ATP6V0E1→
172.4
172.5
172.6
172.7
172.8
172.9
Position on chr5 (Mb)

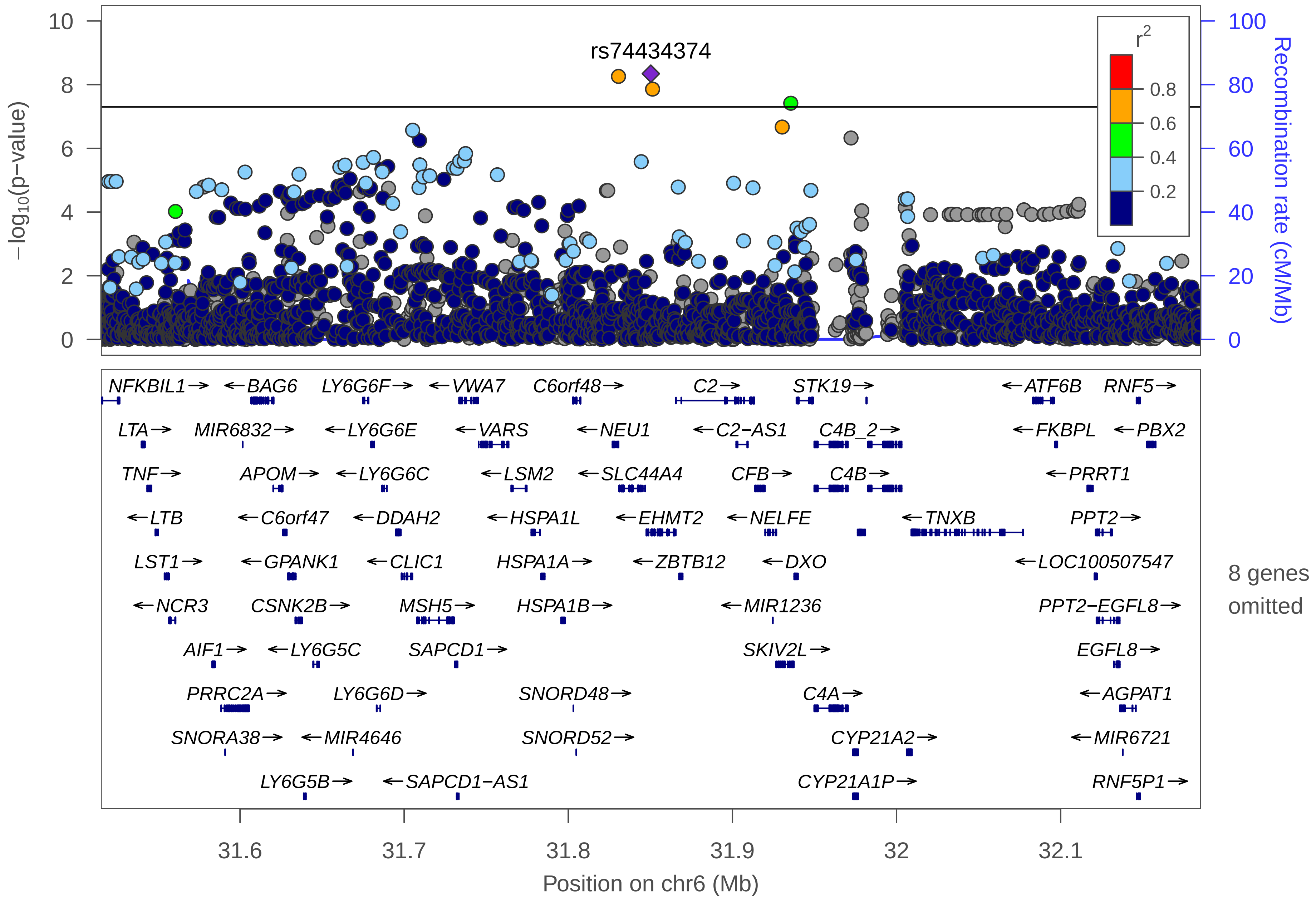

r2
0.8
0.6
0.4
0.2
rs10866704
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
UNC5A→
ZNF346→
NSD1→
←LMAN2
←F12
←DBN1
TMED9→
←HK3
FGFR4→
←RAB24
SLC34A1→
←PDLIM7
B4GALT7→
←UIMC1
PRELID1→
←PFN3
←DOK3
←LOC202181
←MXD3
GRK6→
←DDX41
RGS14→
PRR7→
←FAM193B
←PRR7−AS1
176.4
176.6
176.8
177
Position on chr5 (Mb)

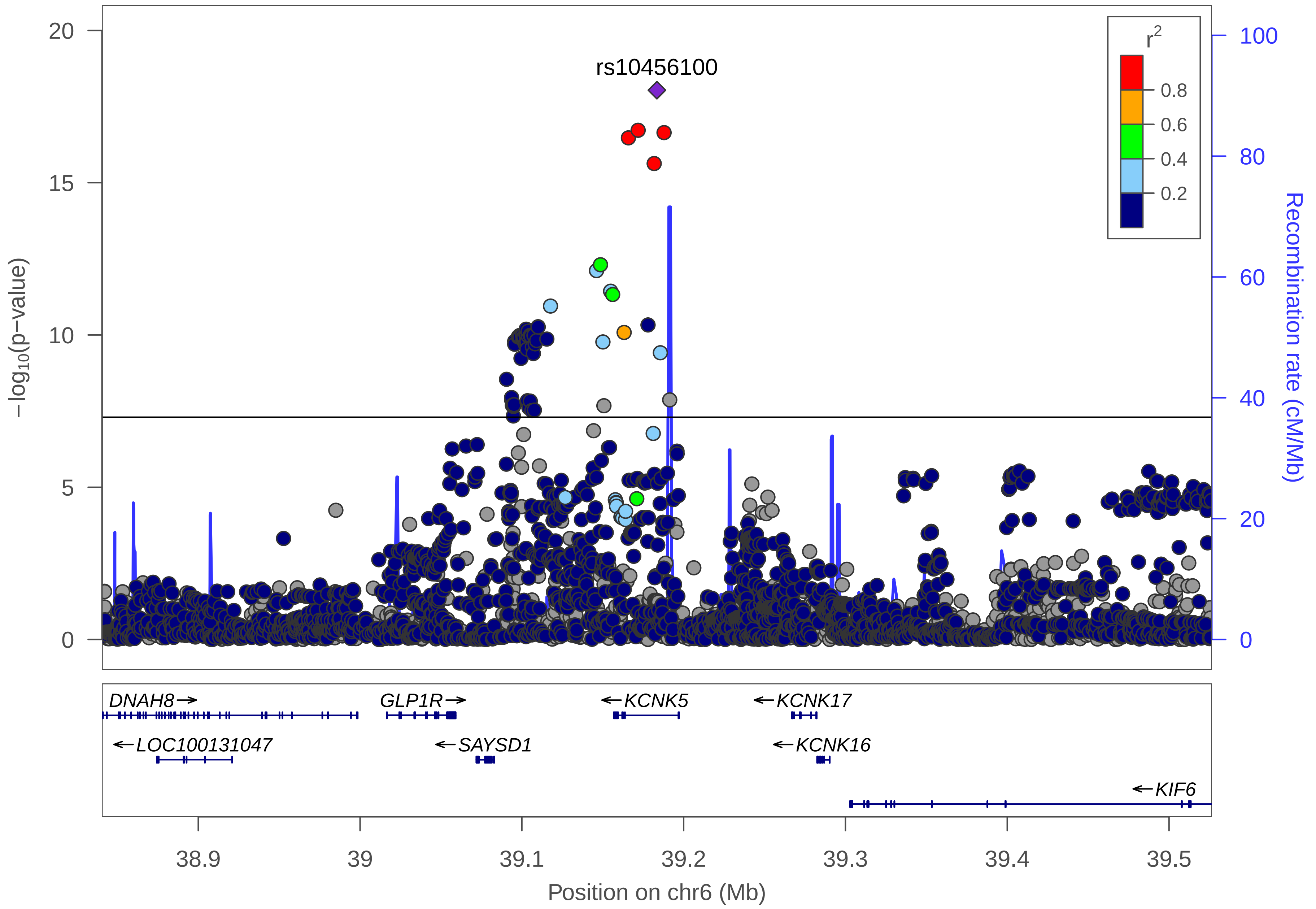

r²
0.8
0.6
0.4
0.2
rs9349379
−log₁₀(p−value)
0
10
20
30
40
50
Recombination rate (cM/Mb)
0
20
40
60
80
100
PHACTR1→
←TBC1D7−LOC100130357
←LOC100130357
←TBC1D7
12.6
12.8
13
13.2
Position on chr6 (Mb)

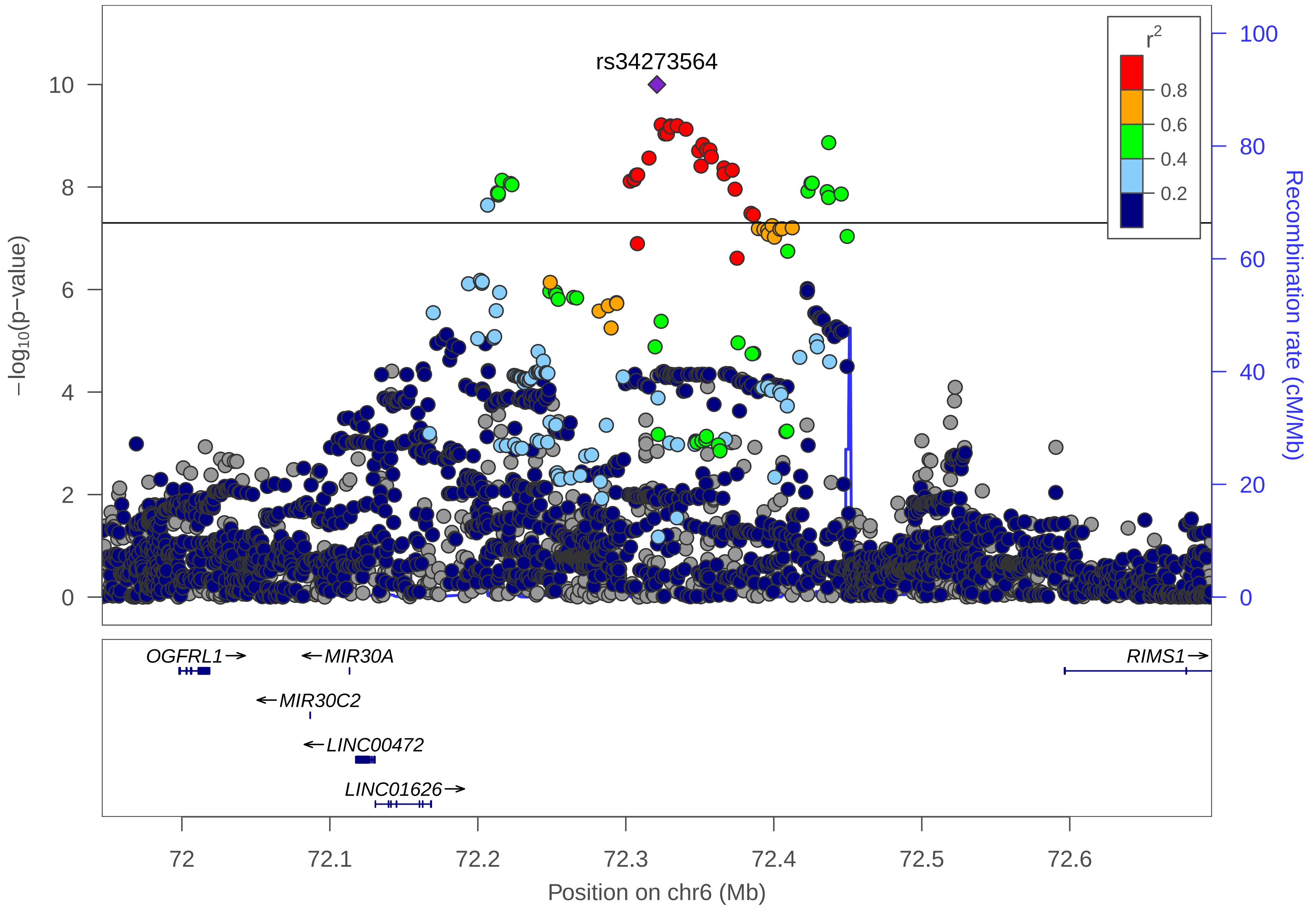

rs9295536
r^2
0.8
0.6
0.4
0.2
−log10(p−value)
12
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
CASC15→
←PRL
←NBAT1
21.9
22
22.1
22.2
22.3
22.4
Position on chr6 (Mb)

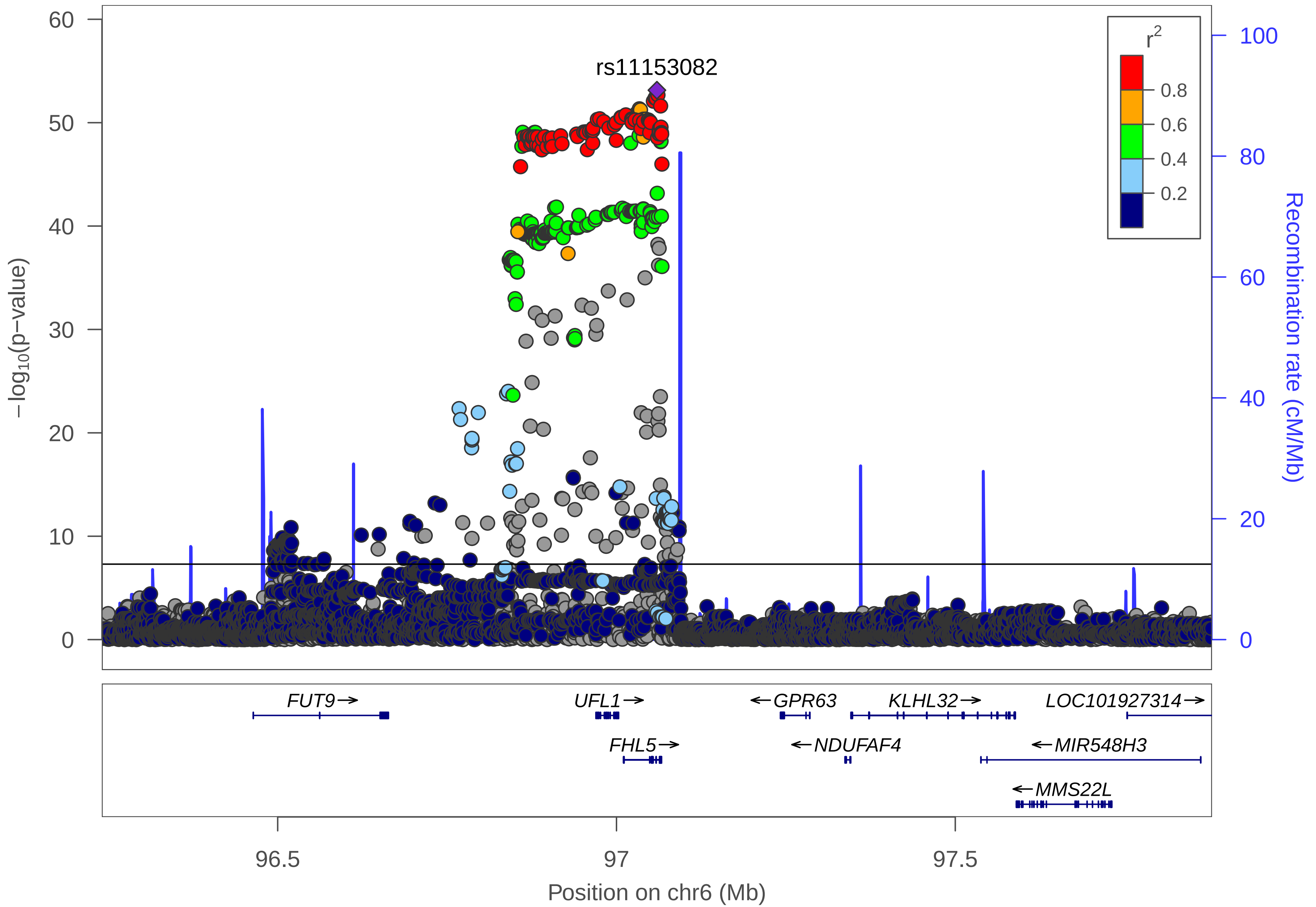


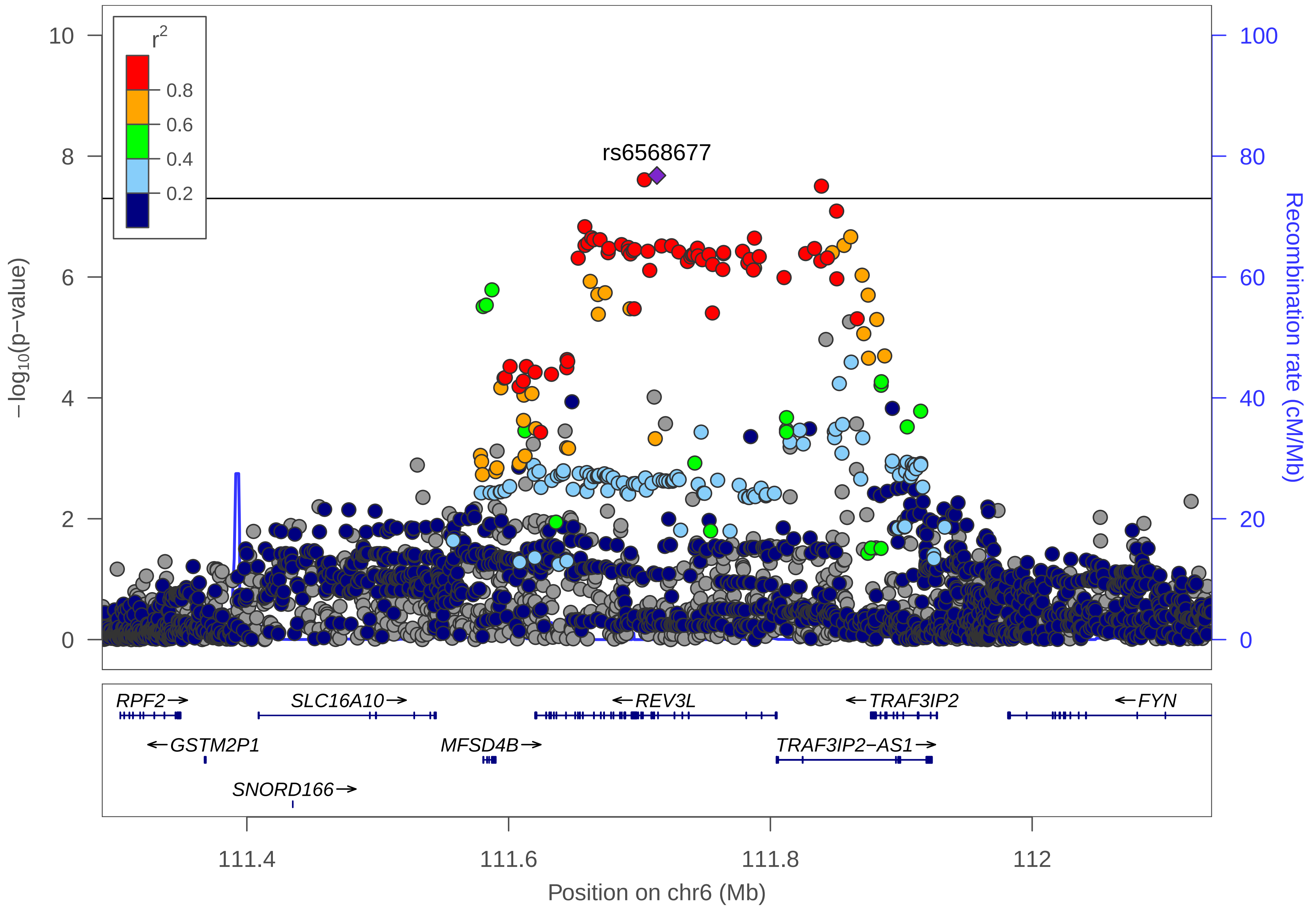
r²
0.8
0.6
0.4
0.2
rs9468830
−log₁₀(p−value)
Recombination rate (cM/Mb)
0
2
4
6
8
10
0
20
40
60
80
100
←GNL1
←PPP1R10
←DHX16
TUBB→
HCG20→
DDR1→
DPCR1→
MUC22→
PRR3→
MRPS18B→
←NRM
←FLOT1
←LINC00243
MIR4640→
←HCG21
ABCF1→
ATAT1→
←MDC1
←LOC105375014
VARS2→
MUC21→
MIR877→
C6orf136→
←IER3
GTF2H4→
←PPP1R18
←SFTA2
MDC1−AS1→
30.5
30.6
30.7
30.8
30.9
31
Position on chr6 (Mb)

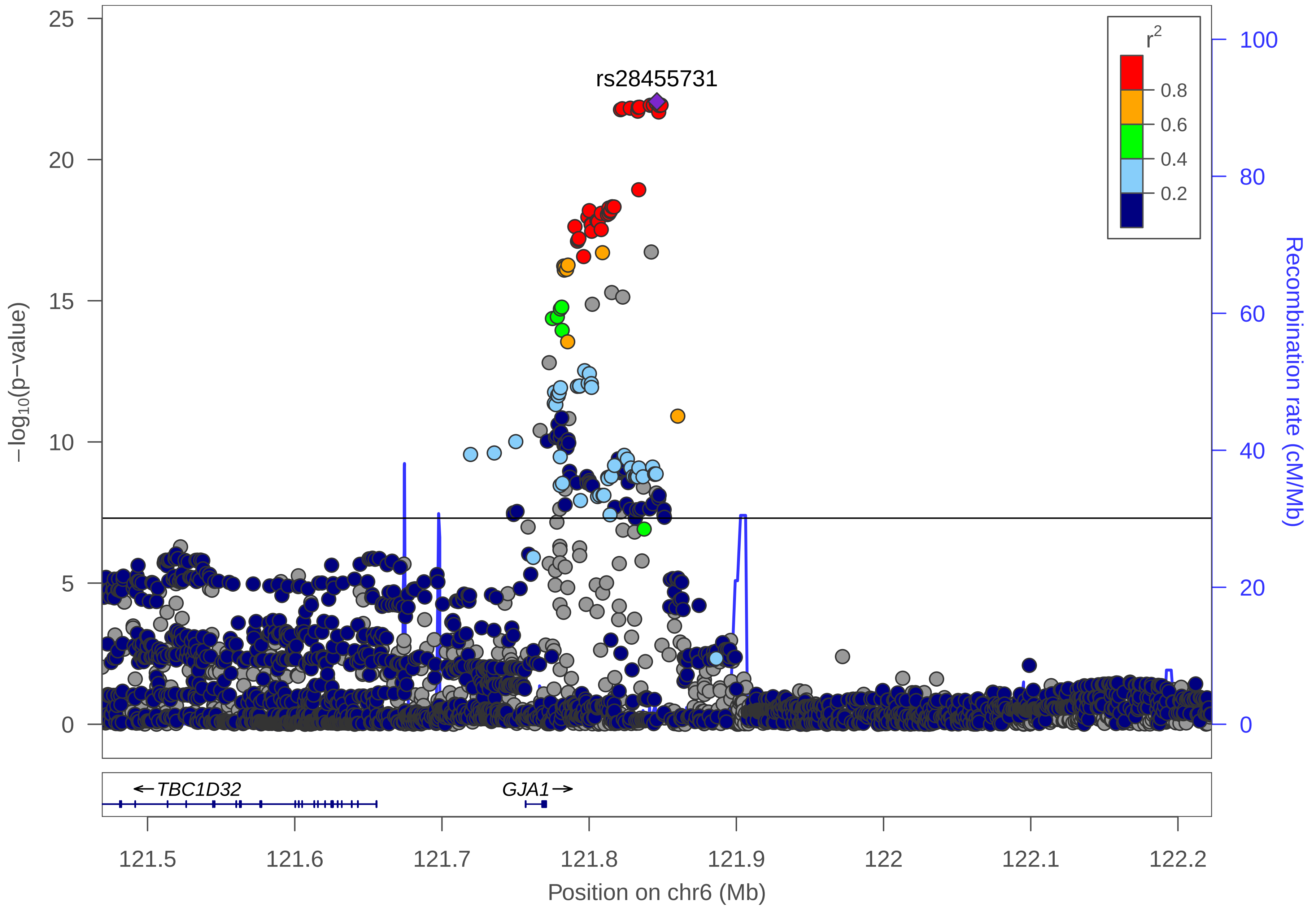

rs74434374
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
r2
0.8
0.6
0.4
0.2
NFKBIL1→
←BAG6
LY6G6F→
←VWA7
C6orf48→
C2→
STK19→
←ATF6B
RNF5→
LTA→
MIR6832→
←LY6G6E
←VARS
←NEU1
←C2−AS1
C4B_2→
←FKBPL
←PBX2
TNF→
APOM→
←LY6G6C
←LSM2
←SLC44A4
CFB→
C4B→
←PRRT1
←LTB
←C6orf47
←DDAH2
←HSPA1L
←EHMT2
←NELFE
←TNXB
PPT2→
LST1→
←GPANK1
←CLIC1
HSPA1A→
←ZBTB12
←DXO
←LOC100507547
←NCR3
CSNK2B→
MSH5→
HSPA1B→
←MIR1236
PPT2−EGFL8→
AIF1→
←LY6G5C
SAPCD1→
SKIV2L→
EGFL8→
PRRC2A→
LY6G6D→
SNORD48→
C4A→
←AGPAT1
SNORA38→
←MIR4646
SNORD52→
CYP21A2→
←MIR6721
LY6G5B→
←SAPCD1−AS1
CYP21A1P→
RNF5P1→
8 genes omitted
31.6
31.7
31.8
31.9
32
32.1
Position on chr6 (Mb)

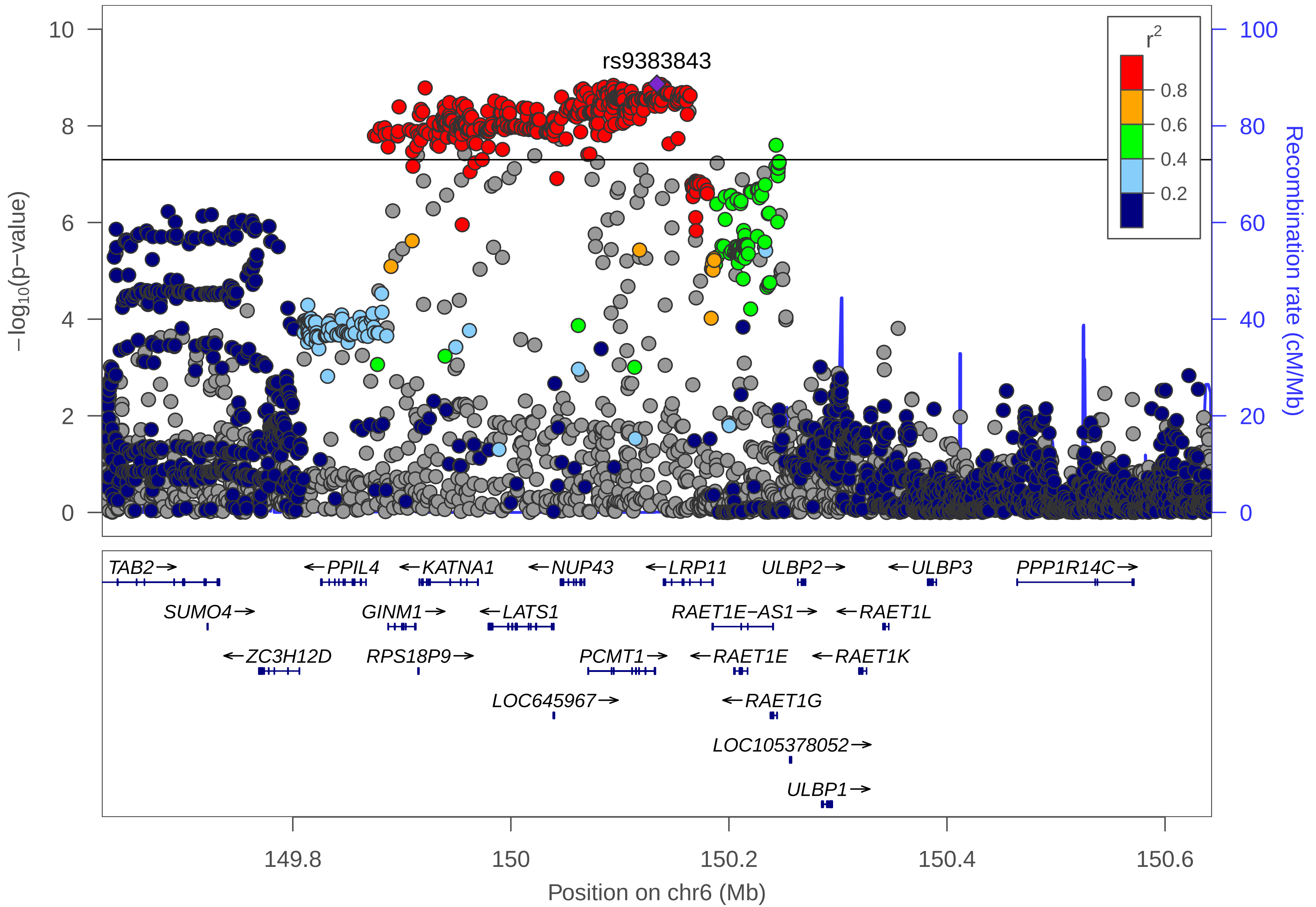

rs10456100
r²
0.8
0.6
0.4
0.2
−log10(p−value)
Recombination rate (cM/Mb)
0
5
10
15
20
0
20
40
60
80
100
DNAH8→
GLP1R→
←KCNK5
←KCNK17
←LOC100131047
←SAYSD1
←KCNK16
←KIF6
38.9
39
39.1
39.2
39.3
39.4
39.5
Position on chr6 (Mb)

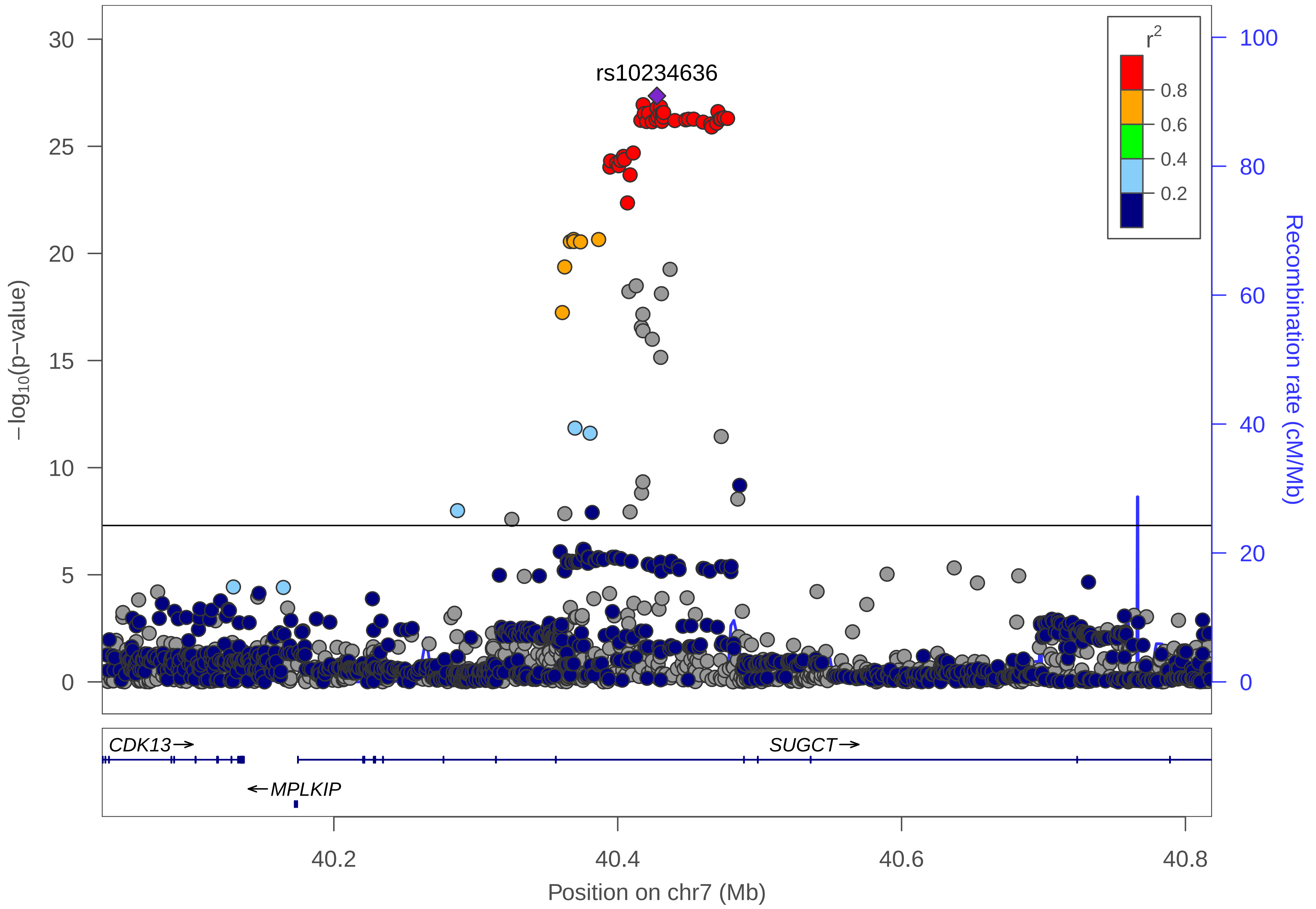

rs34273564
r^2
0.8
0.6
0.4
0.2
10
8
6
4
2
0
−log$_{10}$(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
OGFRL1→
←MIR30A
←MIR30C2
←LINC00472
LINC01626→
RIMS1→
72
72.1
72.2
72.3
72.4
72.5
72.6
Position on chr6 (Mb)

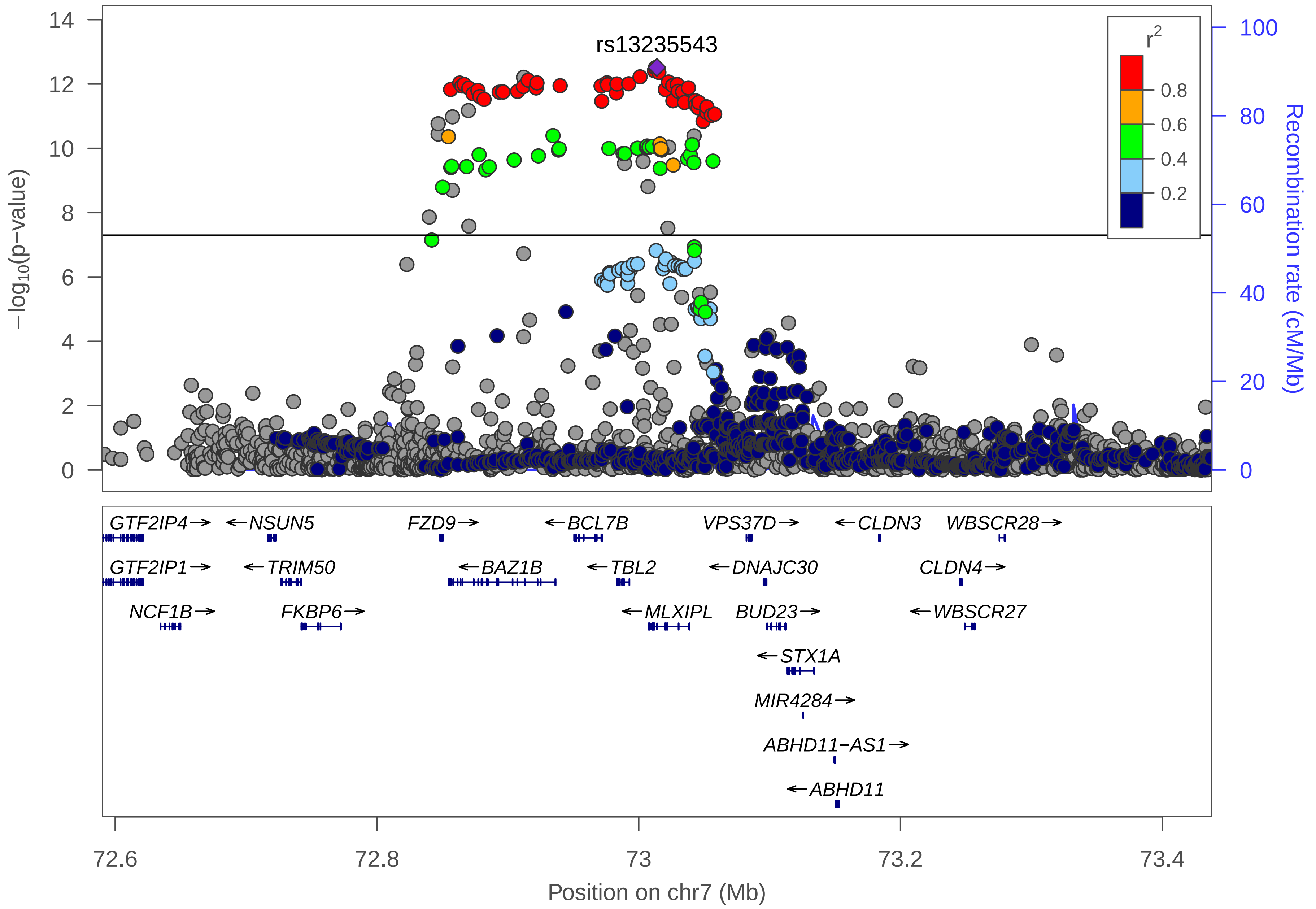

rs11153082
−log10(p−value)
Recombination rate (cM/Mb)
r2
0.8
0.6
0.4
0.2
60
50
40
30
20
10
0
100
80
60
40
20
0
FUT9→
UFL1→
←GPR63
KLHL32→
LOC101927314→
FHL5→
←NDUFAF4
←MIR548H3
←MMS22L
96.5
97
97.5
Position on chr6 (Mb)

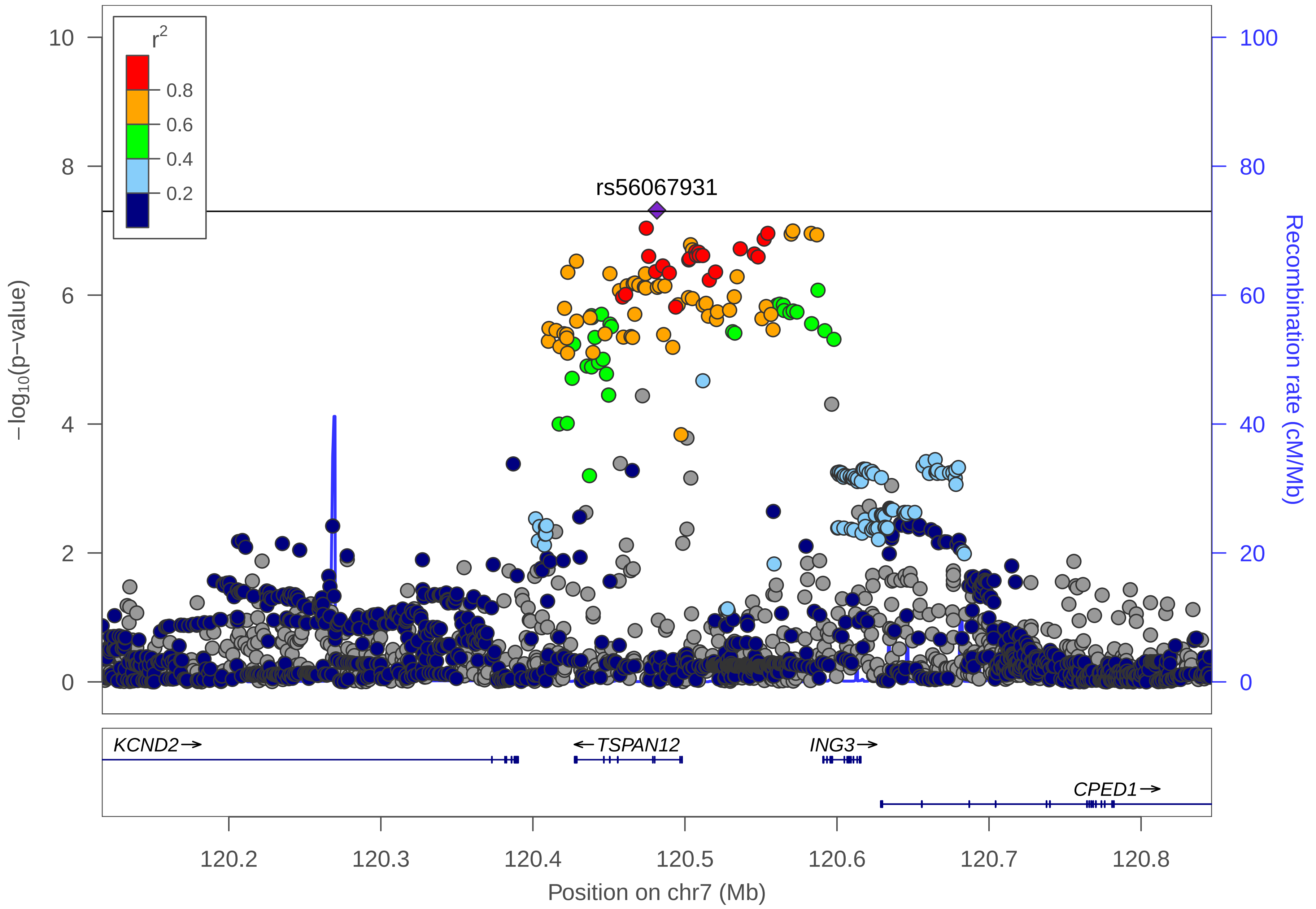

r²
0.8
0.6
0.4
0.2
rs6568677
10
8
6
4
2
0
−log₁₀(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
RPF2→
SLC16A10→
←REV3L
←TRAF3IP2
←FYN
←GSTM2P1
MFSD4B→
TRAF3IP2−AS1→
SNORD166→
111.4
111.6
111.8
112
Position on chr6 (Mb)

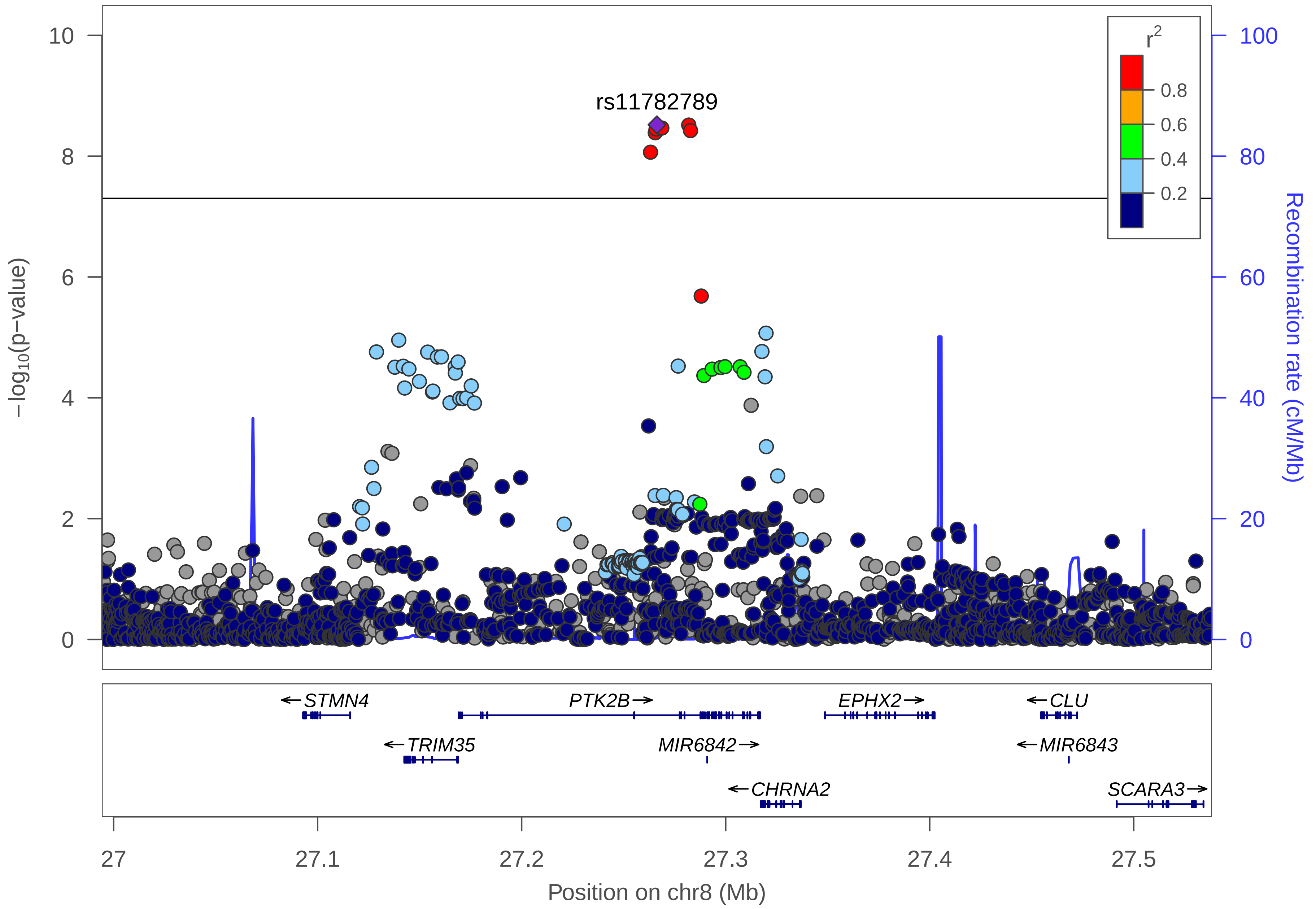

rs28455731
r²
0.8
0.6
0.4
0.2
−log₁₀(p−value)
25
20
15
10
5
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
← TBC1D32
GJA1 →
121.5
121.6
121.7
121.8
121.9
122
122.1
122.2
Position on chr6 (Mb)

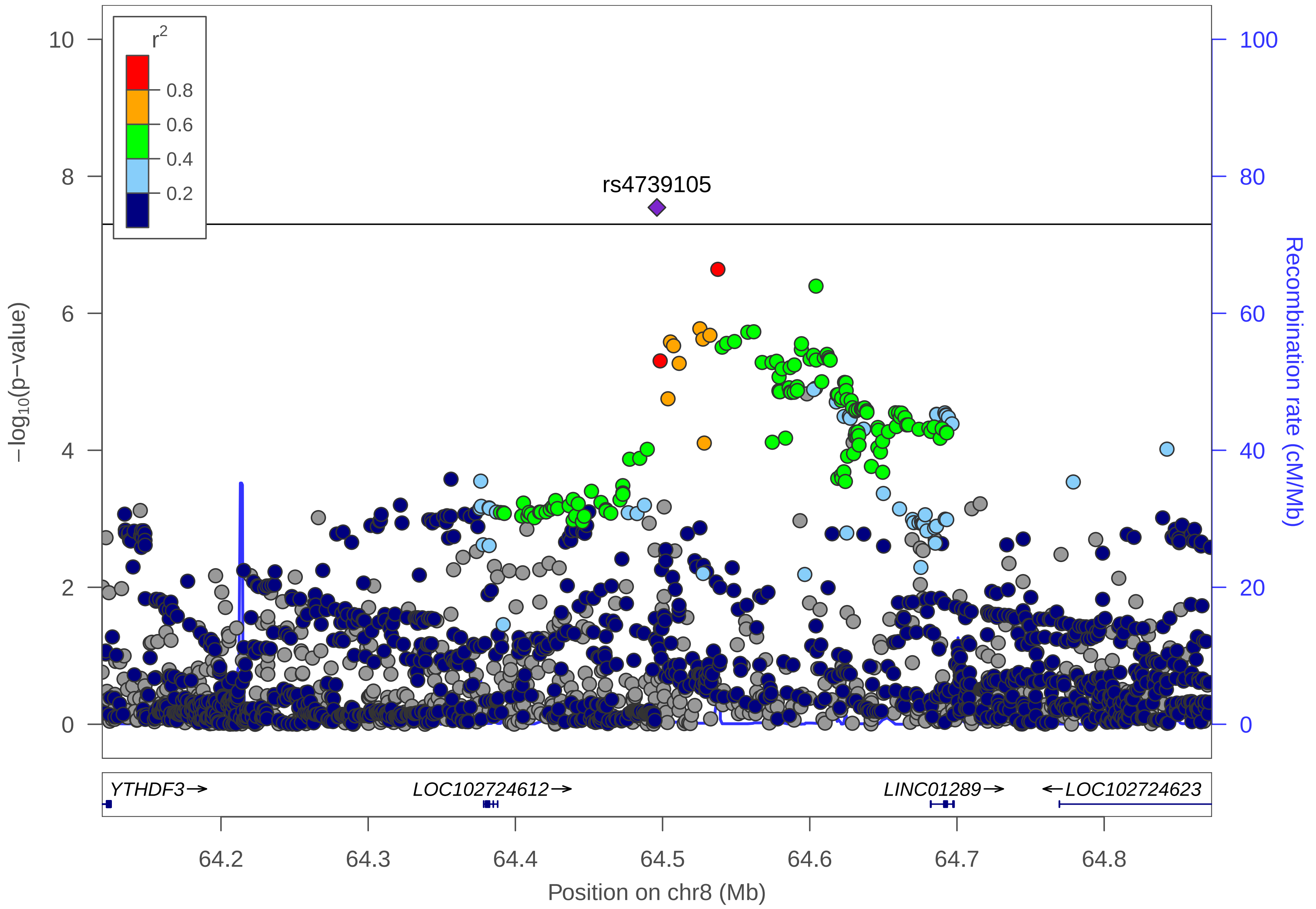

rs9383843
r2
0.8
0.6
0.4
0.2
−log10(p−value)
Recombination rate (cM/Mb)
0
2
4
6
8
10
0
20
40
60
80
100
TAB2→
SUMO4→
←ZC3H12D
←PPIL4
GINM1→
RPS18P9→
←KATNA1
←LATS1
LOC645967→
←NUP43
PCMT1→
←LRP11
RAET1E−AS1→
←RAET1E
←RAET1G
LOC105378052→
ULBP1→
ULBP2→
←RAET1L
←RAET1K
←ULBP3
PPP1R14C→
149.8
150
150.2
150.4
150.6
Position on chr6 (Mb)

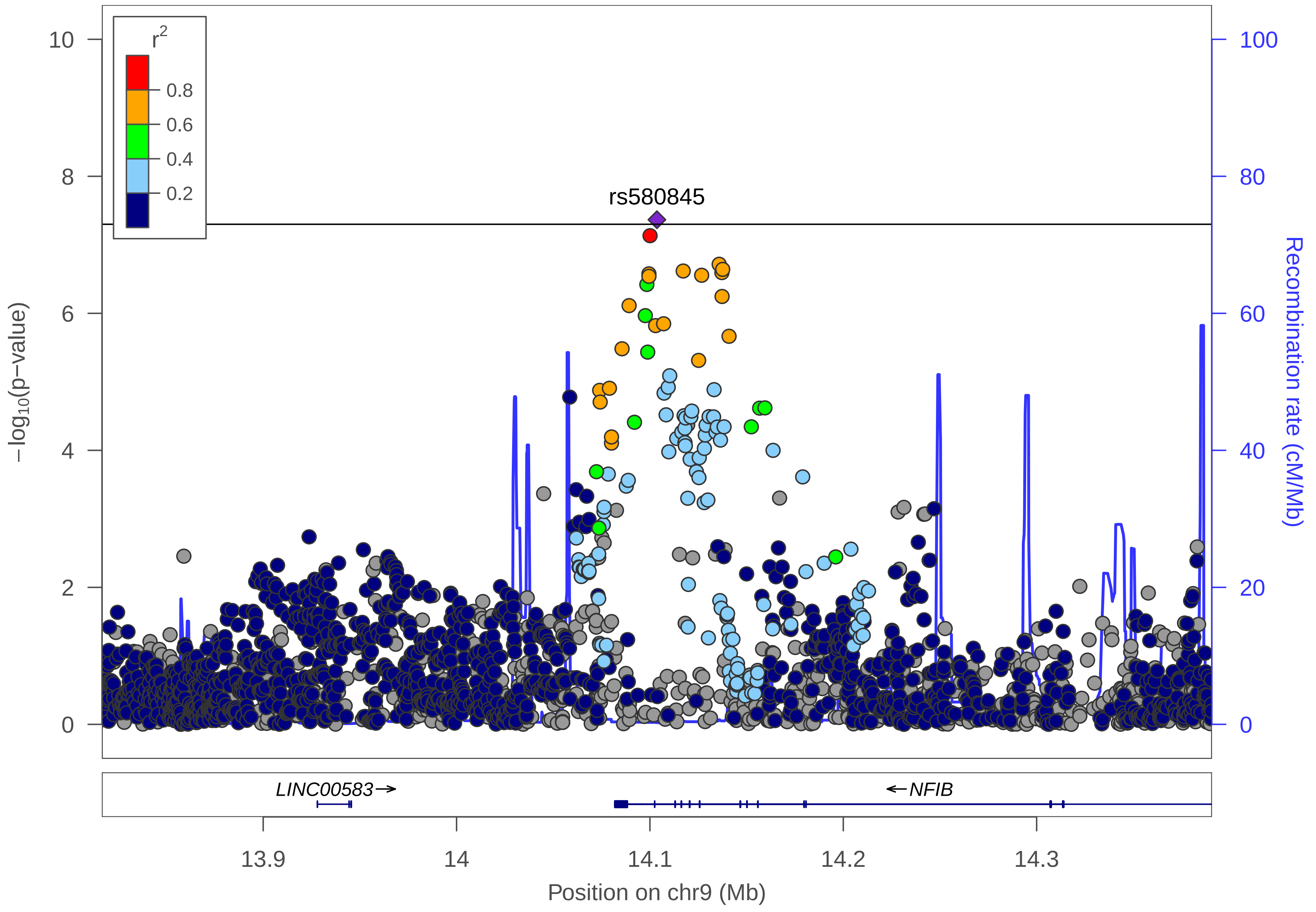

rs10234636
r²
0.8
0.6
0.4
0.2
30
25
20
15
10
5
0
−log₁₀(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
CDK13→
SUGCT→
←MPLKIP
40.2
40.4
40.6
40.8
Position on chr7 (Mb)

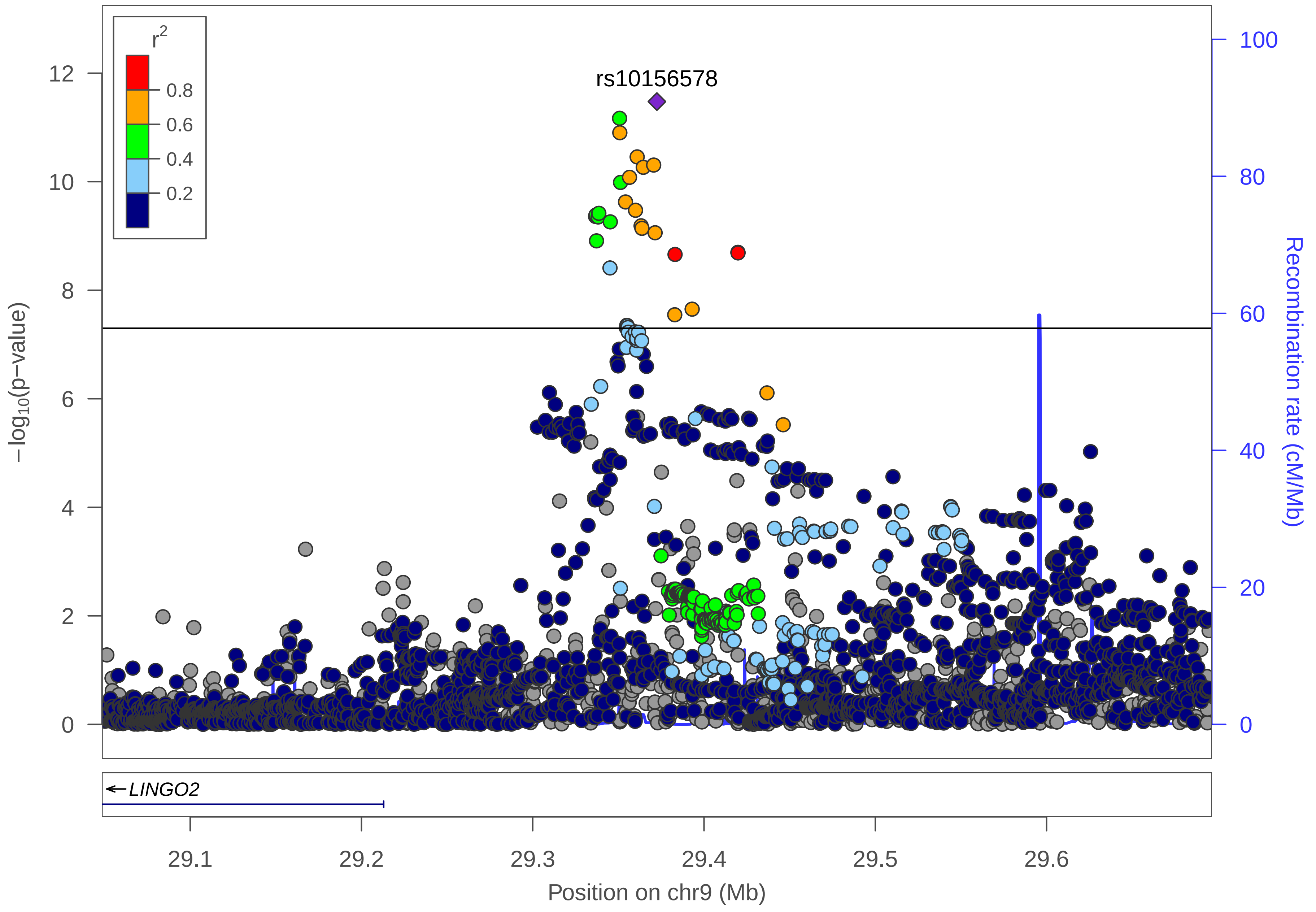

rs13235543
r^2
0.8
0.6
0.4
0.2
14
12
10
8
6
4
2
0
−log$_{10}$(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
GTF2IP4→
←NSUN5
FZD9→
←BCL7B
VPS37D→
←CLDN3
WBSCR28→
GTF2IP1→
←TRIM50
←BAZ1B
←TBL2
←DNAJC30
CLDN4→
NCF1B→
FKBP6→
←MLXIPL
BUD23→
←WBSCR27
←STX1A
MIR4284→
ABHD11−AS1→
←ABHD11
72.6
72.8
73
73.2
73.4
Position on chr7 (Mb)

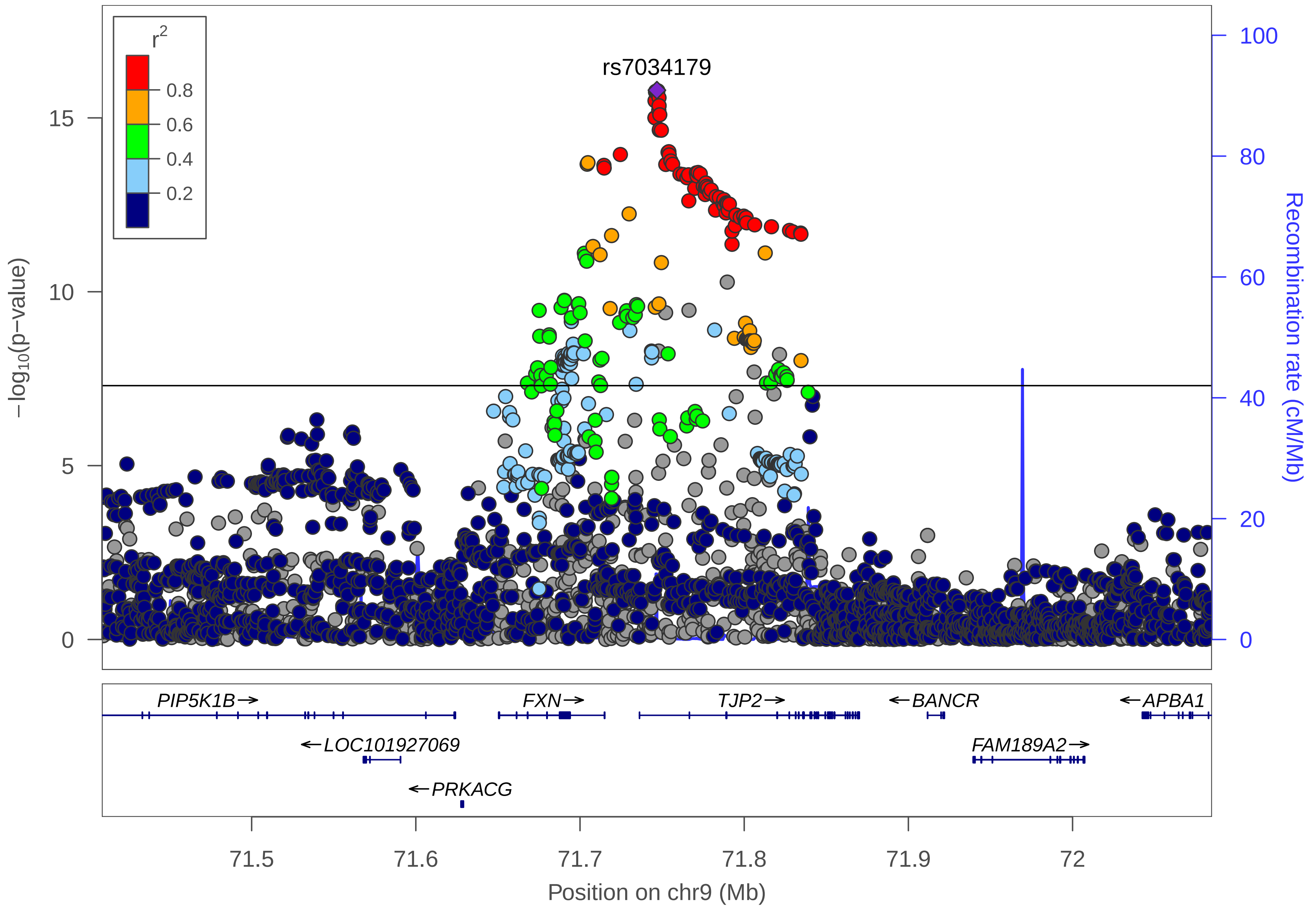

r2
0.8
0.6
0.4
0.2
rs56067931
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
KCND2→
←TSPAN12
ING3→
CPED1→
120.2
120.3
120.4
120.5
120.6
120.7
120.8
Position on chr7 (Mb)

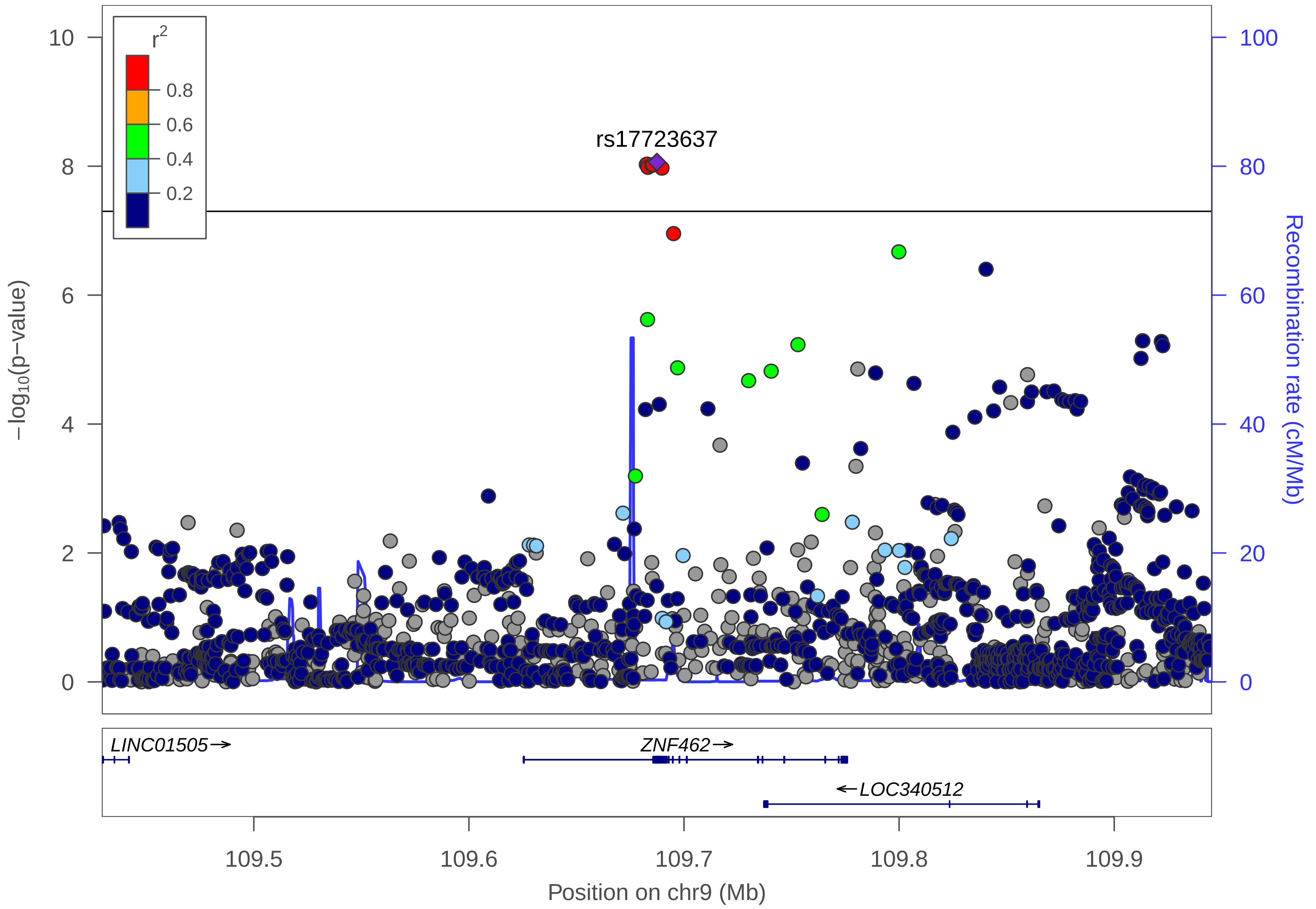

rs11782789
r2
0.8
0.6
0.4
0.2
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
←STMN4
PTK2B→
EPHX2→
←CLU
←TRIM35
MIR6842→
←MIR6843
←CHRNA2
SCARA3→
27
27.1
27.2
27.3
27.4
27.5
Position on chr8 (Mb)

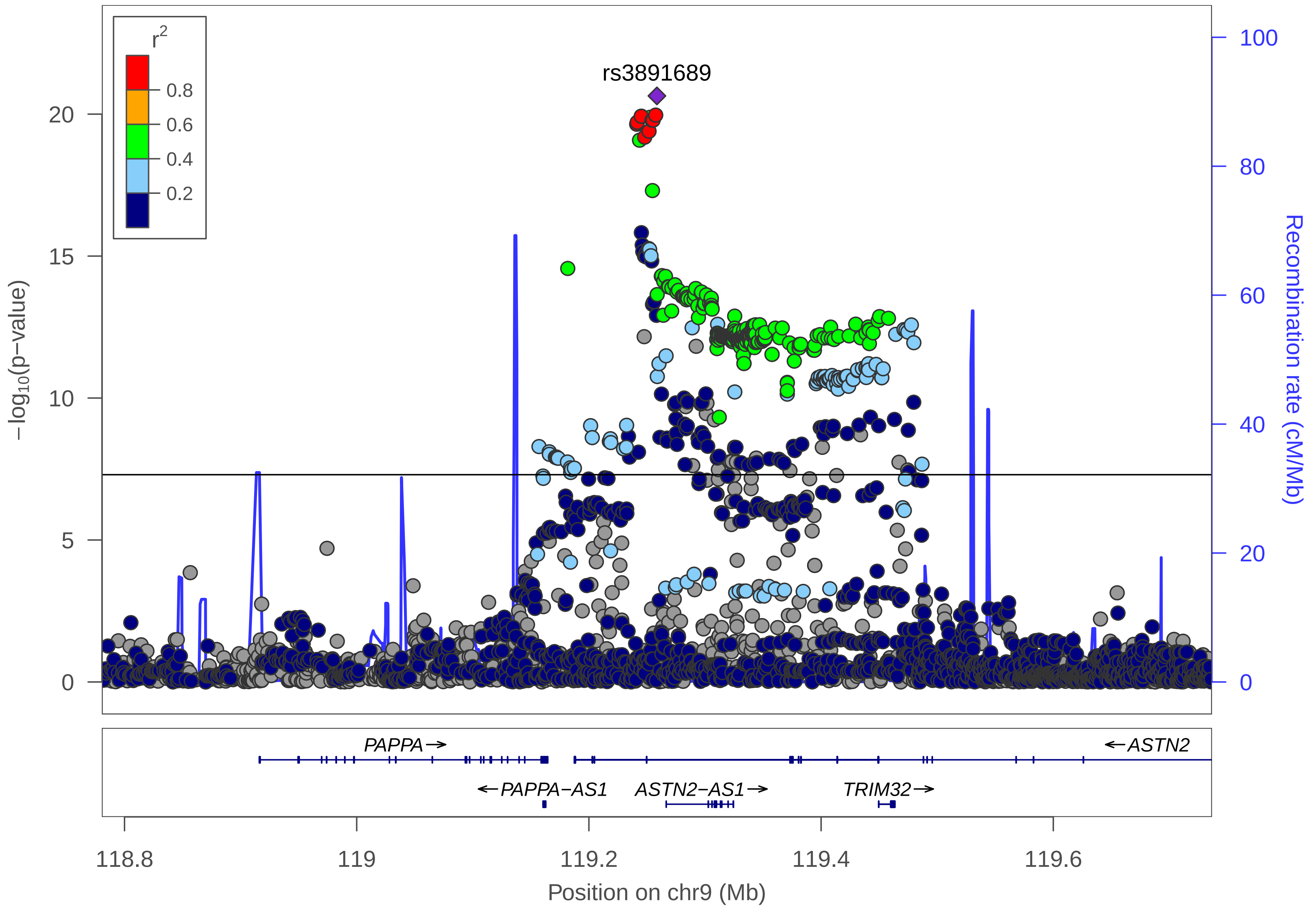

r^2
0.8
0.6
0.4
0.2
rs4739105
−log$_{10}$(p−value)
10
8
6
4
2
0
100
80
60
40
20
0
Recombination rate (cM/Mb)
YTHDF3→
LOC102724612→
LINC01289→
←LOC102724623
64.2
64.3
64.4
64.5
64.6
64.7
64.8
Position on chr8 (Mb)

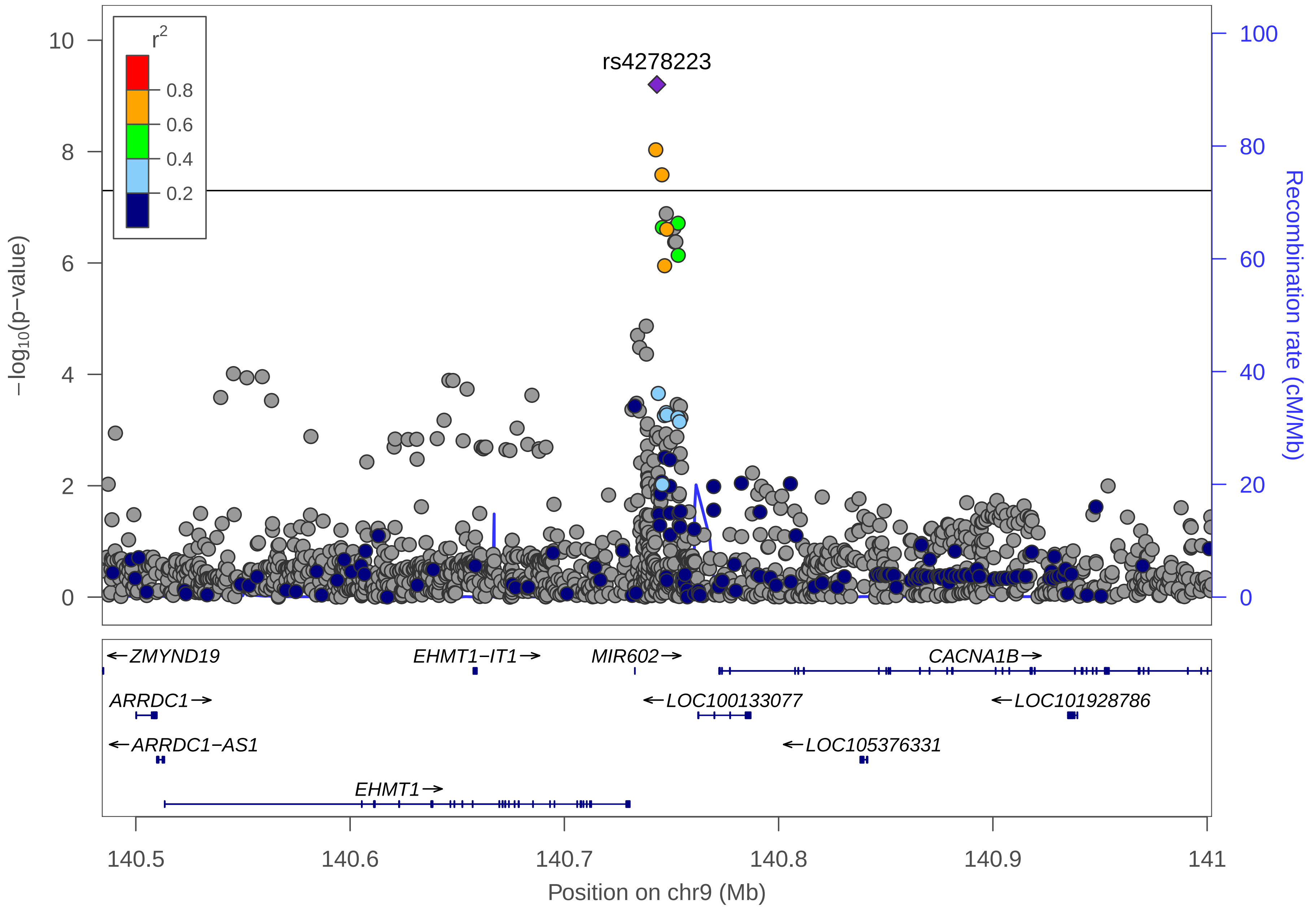

r2
0.8
0.6
0.4
0.2
rs580845
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
LINC00583→
←NFIB
13.9
14
14.1
14.2
14.3
Position on chr9 (Mb)


r2
0.8
0.6
0.4
0.2
rs10156578
12
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←LINGO2
29.1
29.2
29.3
29.4
29.5
29.6
Position on chr9 (Mb)

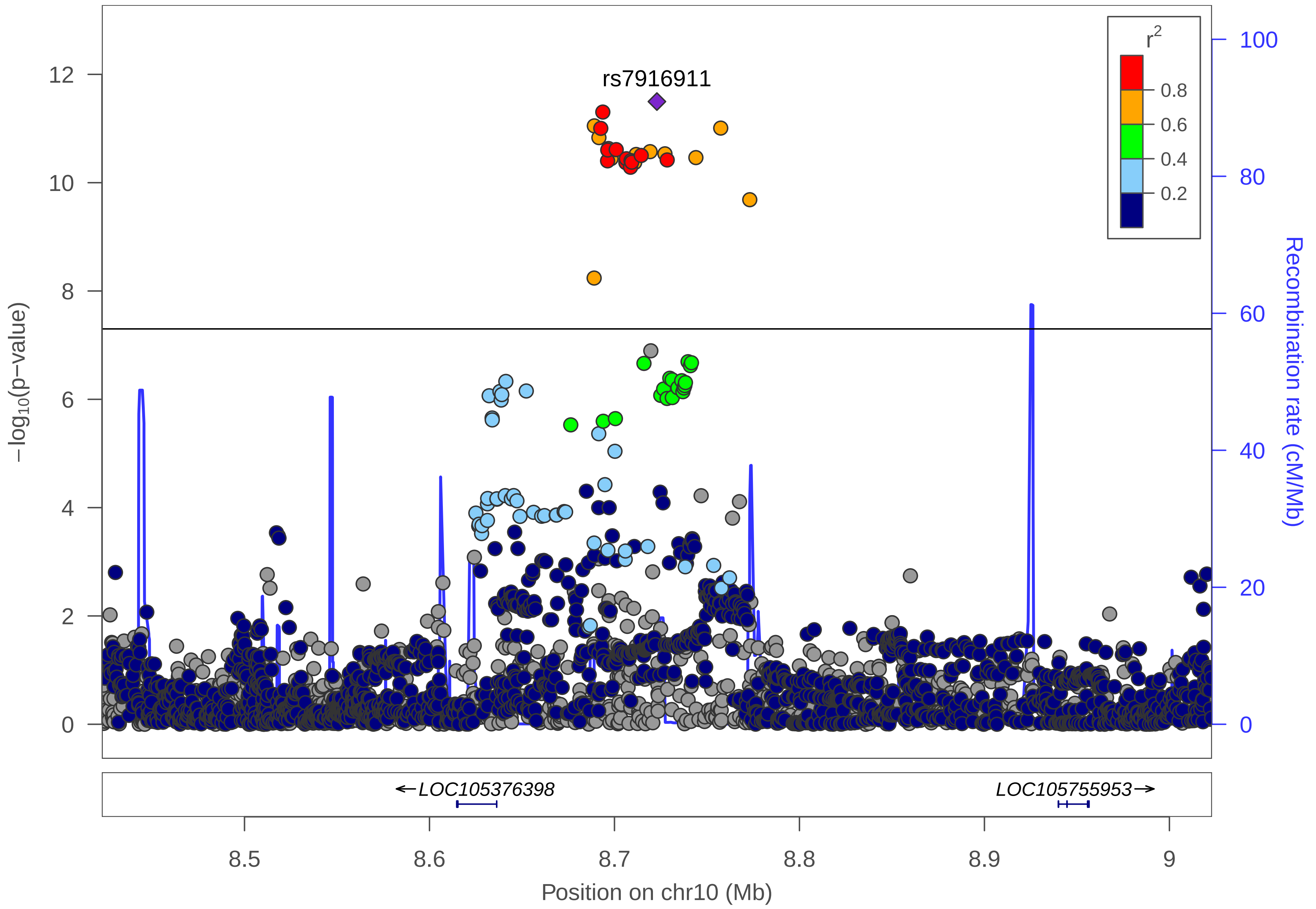

r2
0.8
0.6
0.4
0.2
rs7034179
15
10
5
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
PIP5K1B→
FXN→
TJP2→
←BANCR
←APBA1
←LOC101927069
FAM189A2→
←PRKACG
71.5
71.6
71.7
71.8
71.9
72
Position on chr9 (Mb)


r2
0.8
0.6
0.4
0.2
rs17723637
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
LINC01505→
ZNF462→
←LOC340512
109.5
109.6
109.7
109.8
109.9
Position on chr9 (Mb)

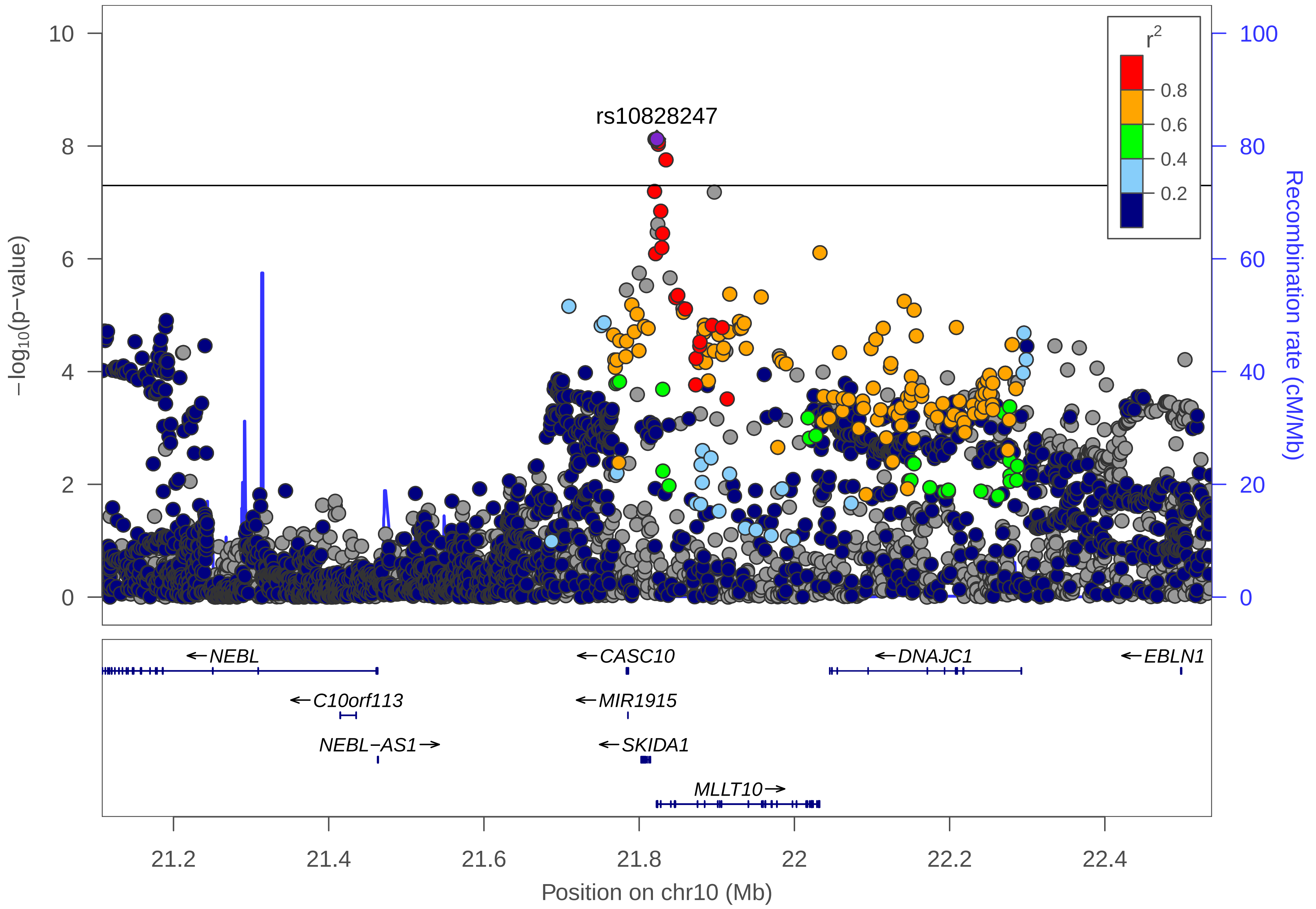

r^2
0.8
0.6
0.4
0.2
rs3891689
−log$_{10}$(p−value)
20
15
10
5
0
100
80
60
40
20
0
Recombination rate (cM/Mb)
PAPPA→
←ASTN2
←PAPPA−AS1
ASTN2−AS1→
TRIM32→
118.8
119
119.2
119.4
119.6
Position on chr9 (Mb)

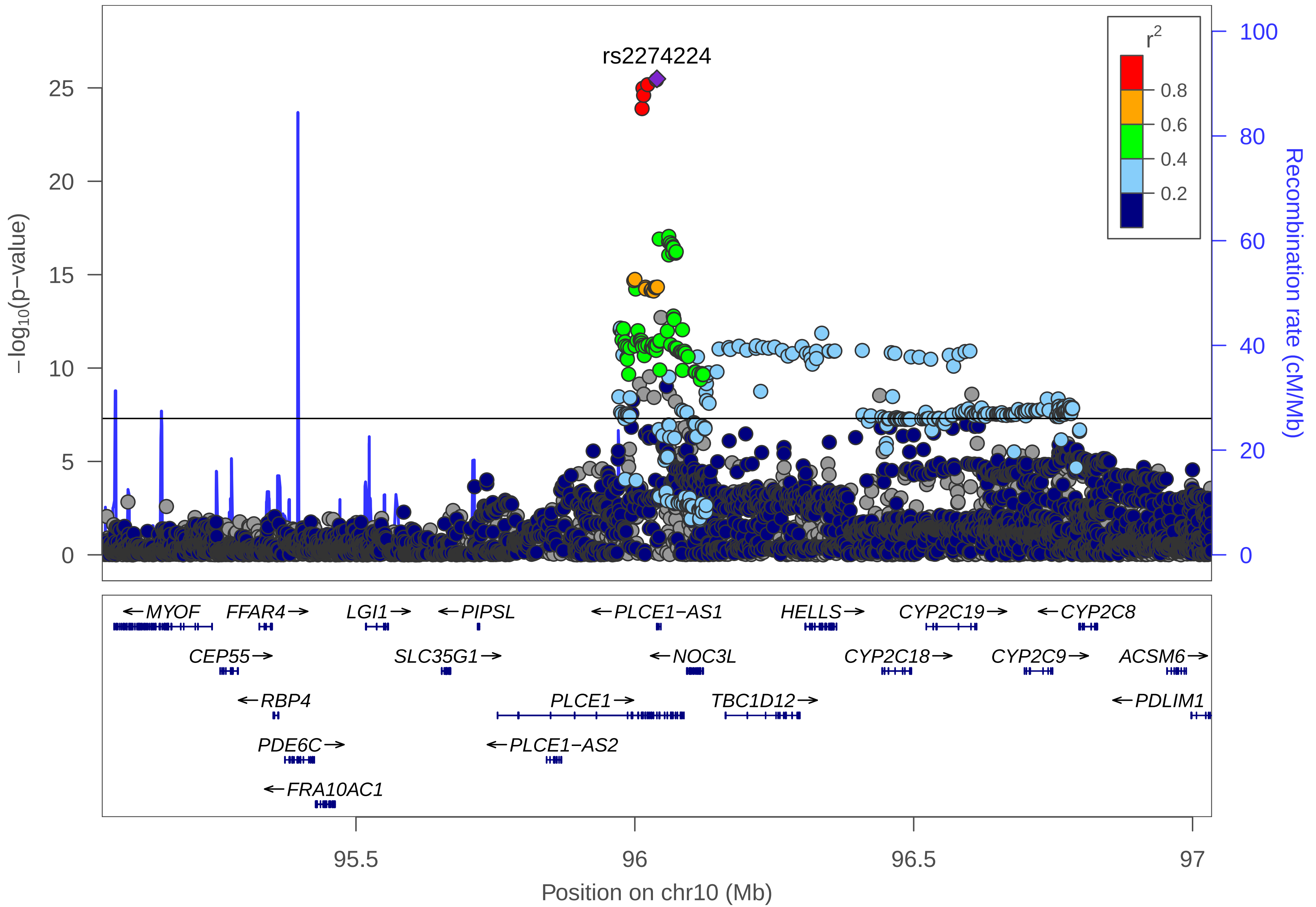


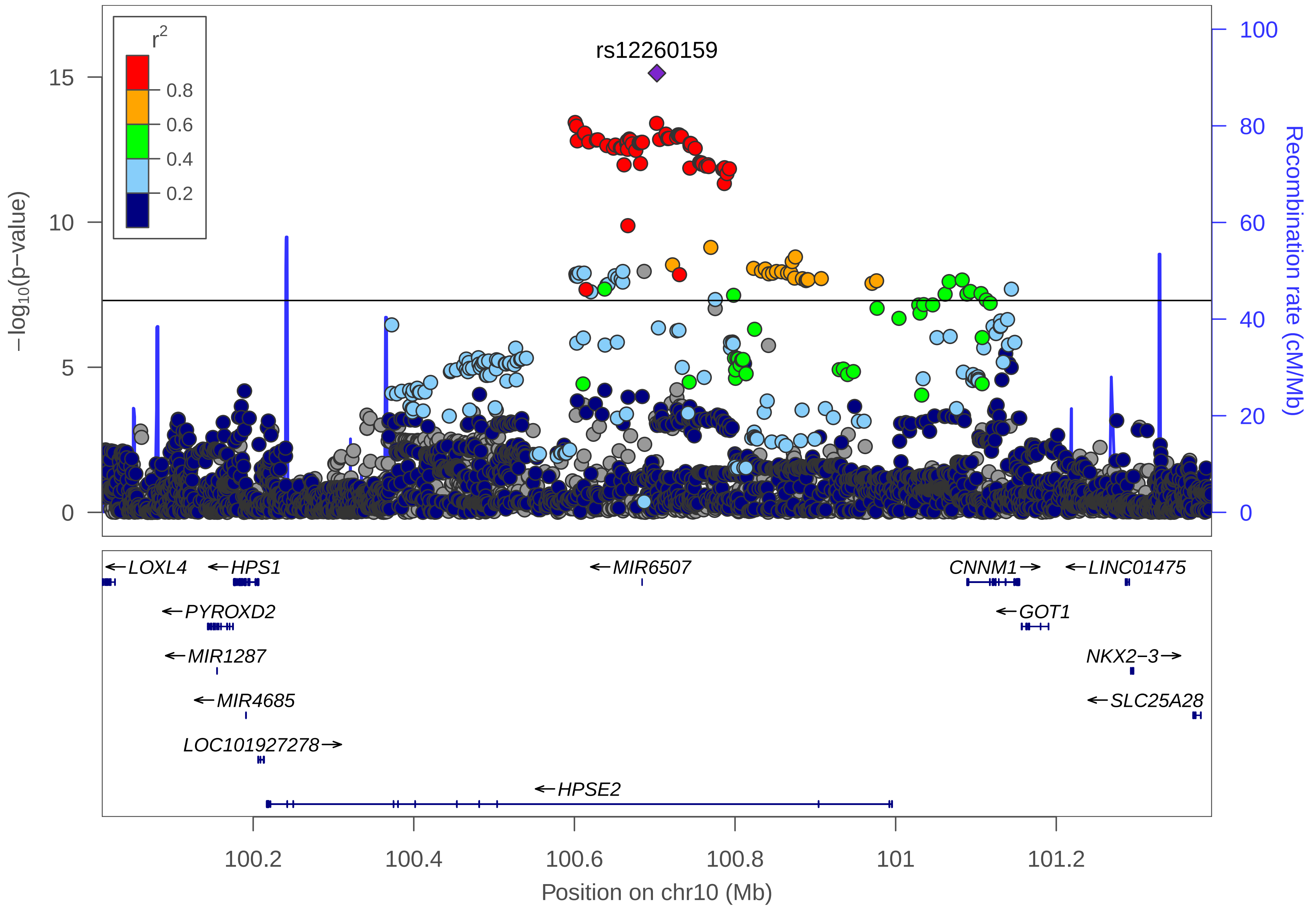
r2
0.8
0.6
0.4
0.2
rs4278223
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←ZMYND19
EHMT1−IT1→
MIR602→
CACNA1B→
ARRDC1→
←LOC100133077
←LOC101928786
←ARRDC1−AS1
←LOC105376331
EHMT1→
140.5
140.6
140.7
140.8
140.9
141
Position on chr9 (Mb)



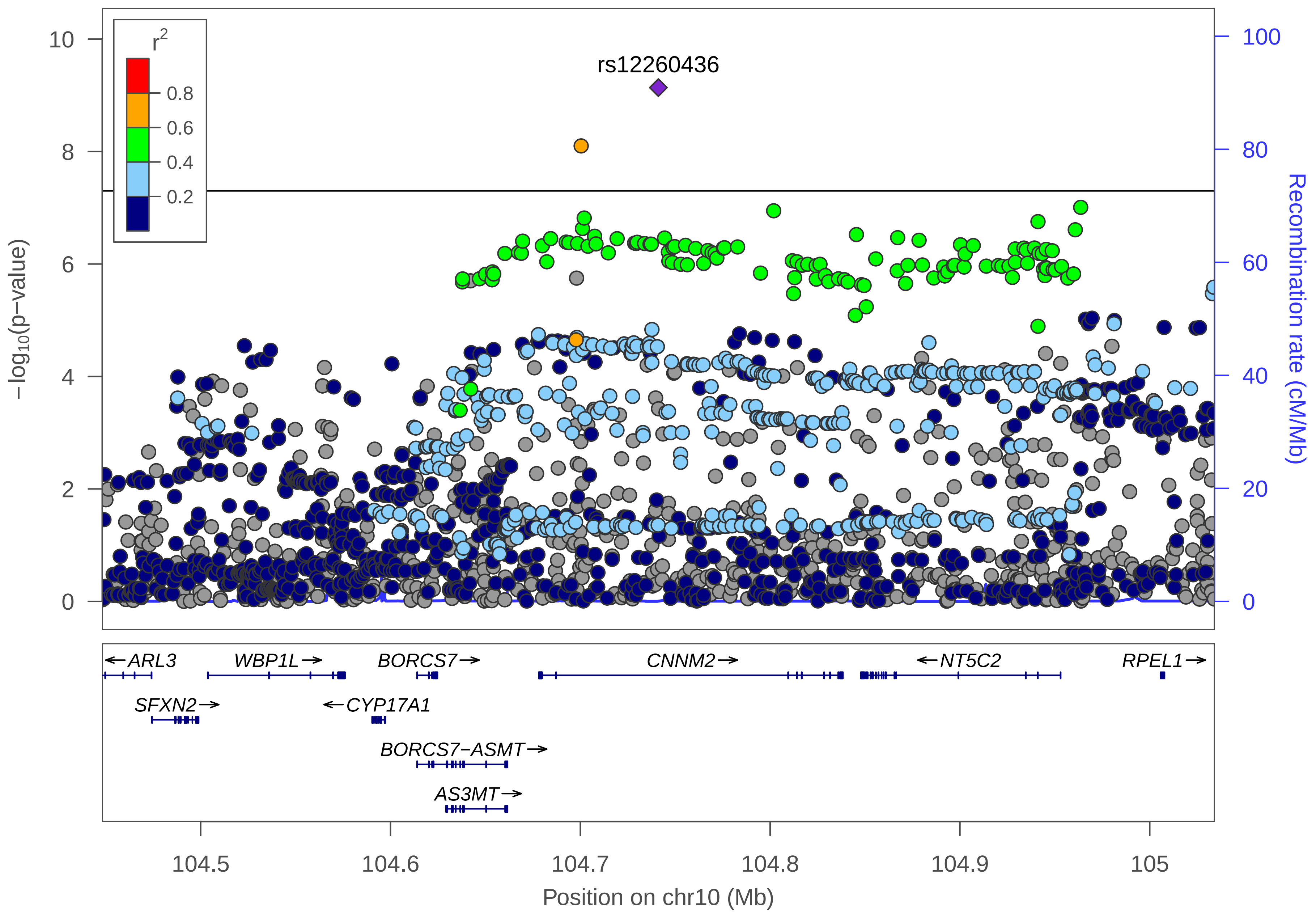
rs7916911
r2
0.8
0.6
0.4
0.2
−log10(p−value)
0
2
4
6
8
10
12
Recombination rate (cM/Mb)
0
20
40
60
80
100
←LOC105376398
LOC105755953→
8.5
8.6
8.7
8.8
8.9
9
Position on chr10 (Mb)

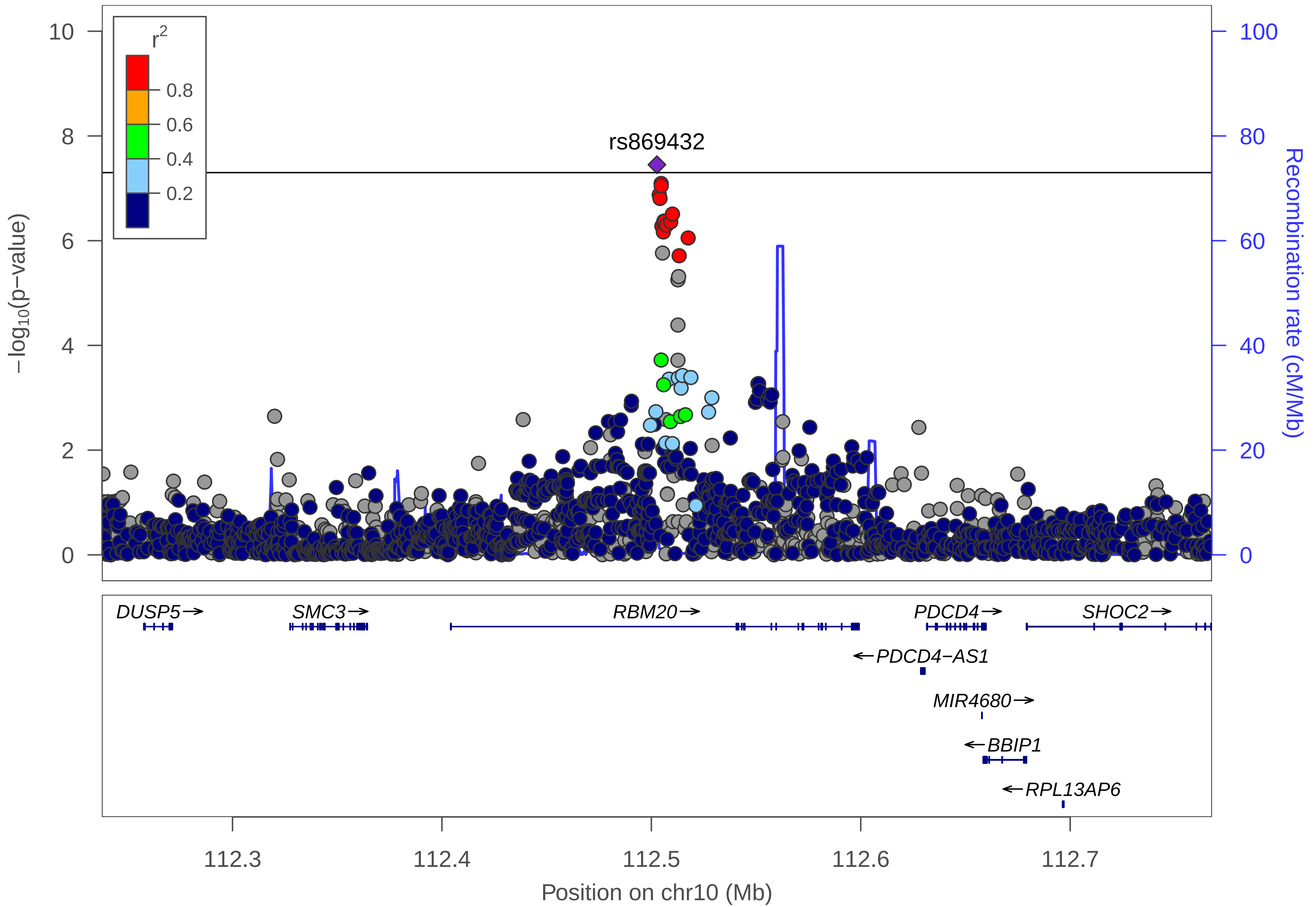

rs10828247
−log10(p−value)
Recombination rate (cM/Mb)
r2
0.8
0.6
0.4
0.2
0
2
4
6
8
10
0
20
40
60
80
100
NEBL
C10orf113
NEBL−AS1
CASC10
MIR1915
SKIDA1
MLLT10
DNAJC1
EBLN1
21.2
21.4
21.6
21.8
22
22.2
22.4
Position on chr10 (Mb)

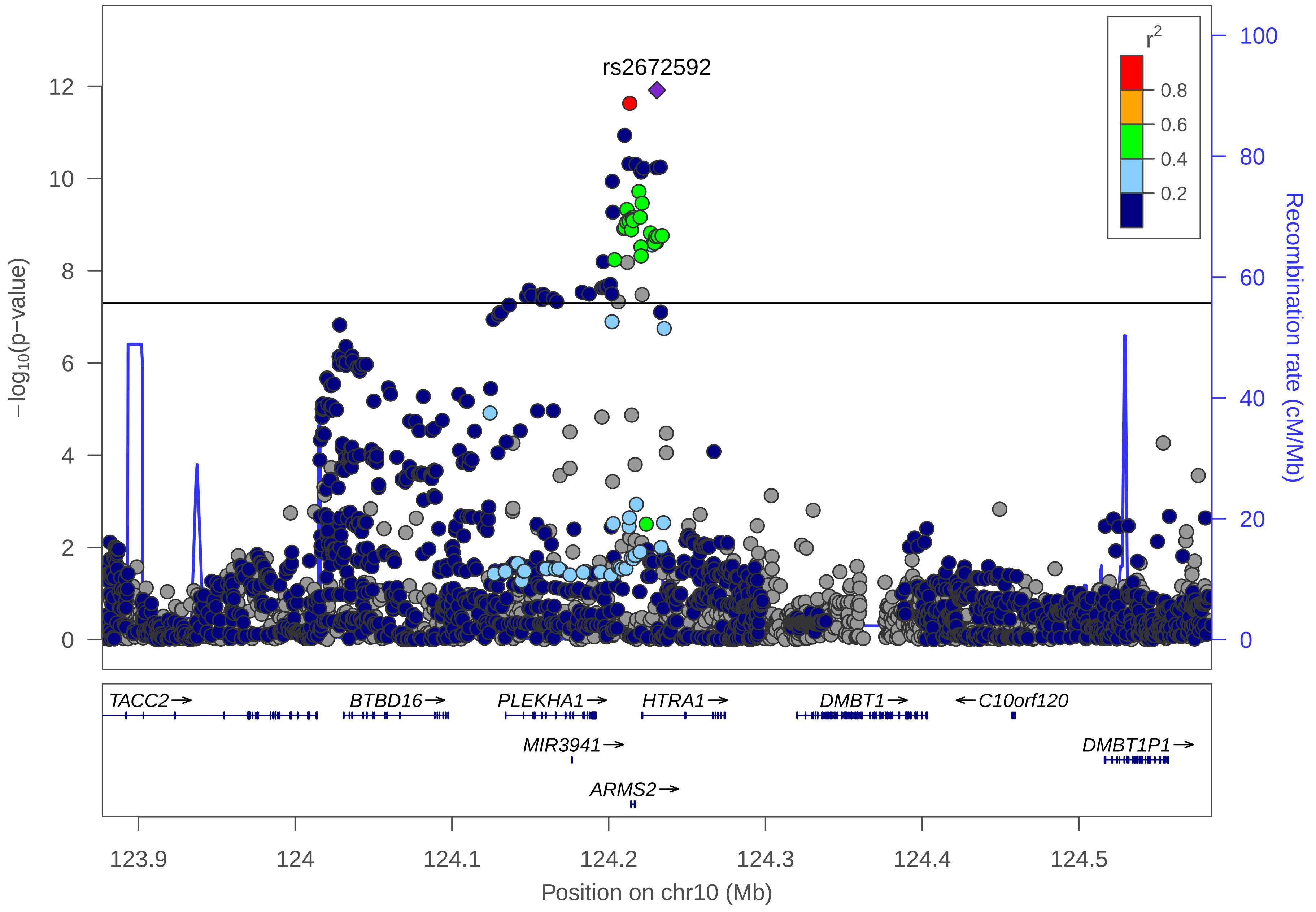

rs2274224
r2
0.8
0.6
0.4
0.2
−log10(p−value)
25
20
15
10
5
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
←MYOF
FFAR4→
LGI1→
←PIPSL
←PLCE1−AS1
HELLS→
CYP2C19→
←CYP2C8
CEP55→
SLC35G1→
←NOC3L
CYP2C18→
CYP2C9→
ACSM6→
←RBP4
PLCE1→
TBC1D12→
←PDLIM1
PDE6C→
←PLCE1−AS2
←FRA10AC1
95.5
96
96.5
97
Position on chr10 (Mb)

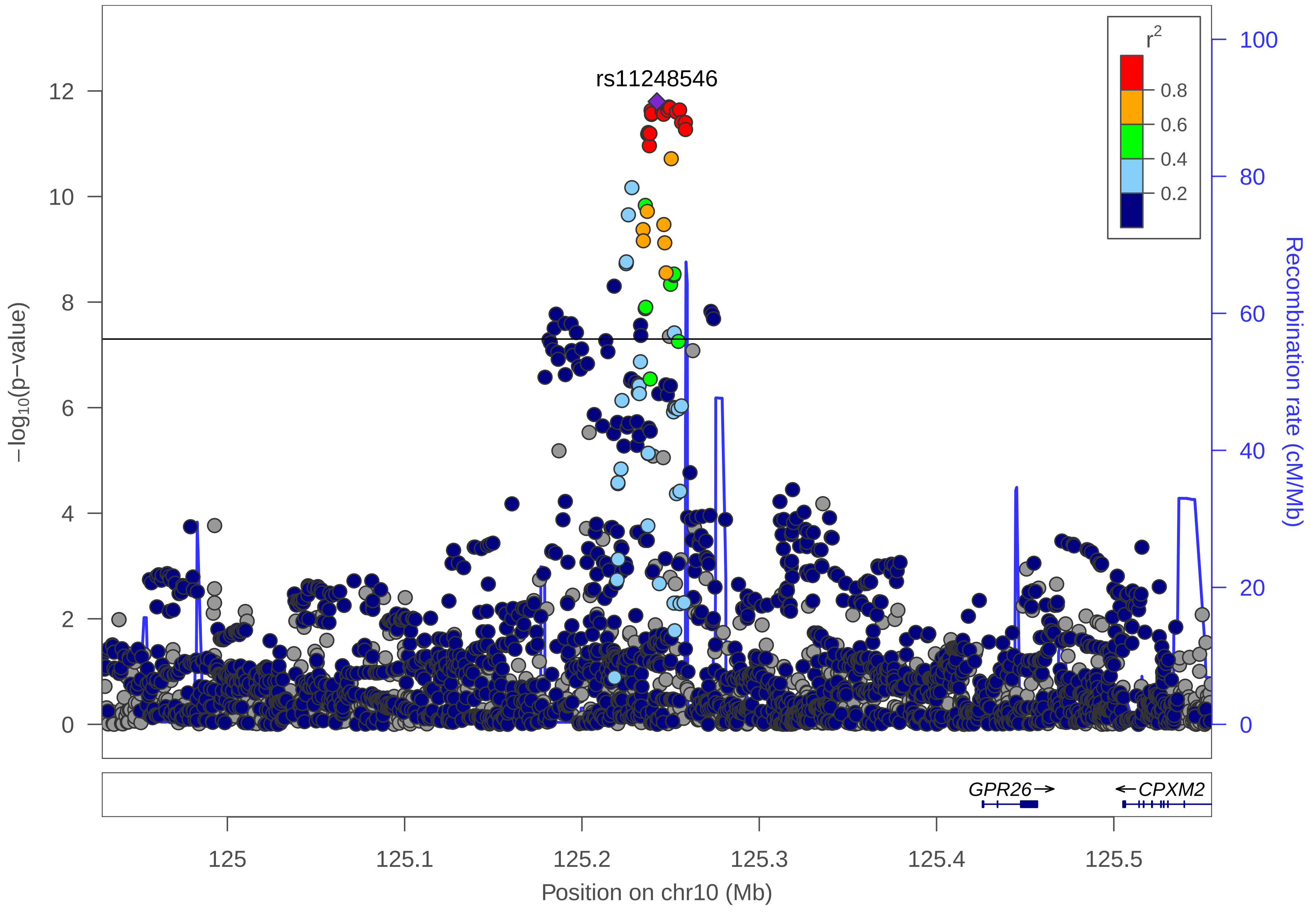


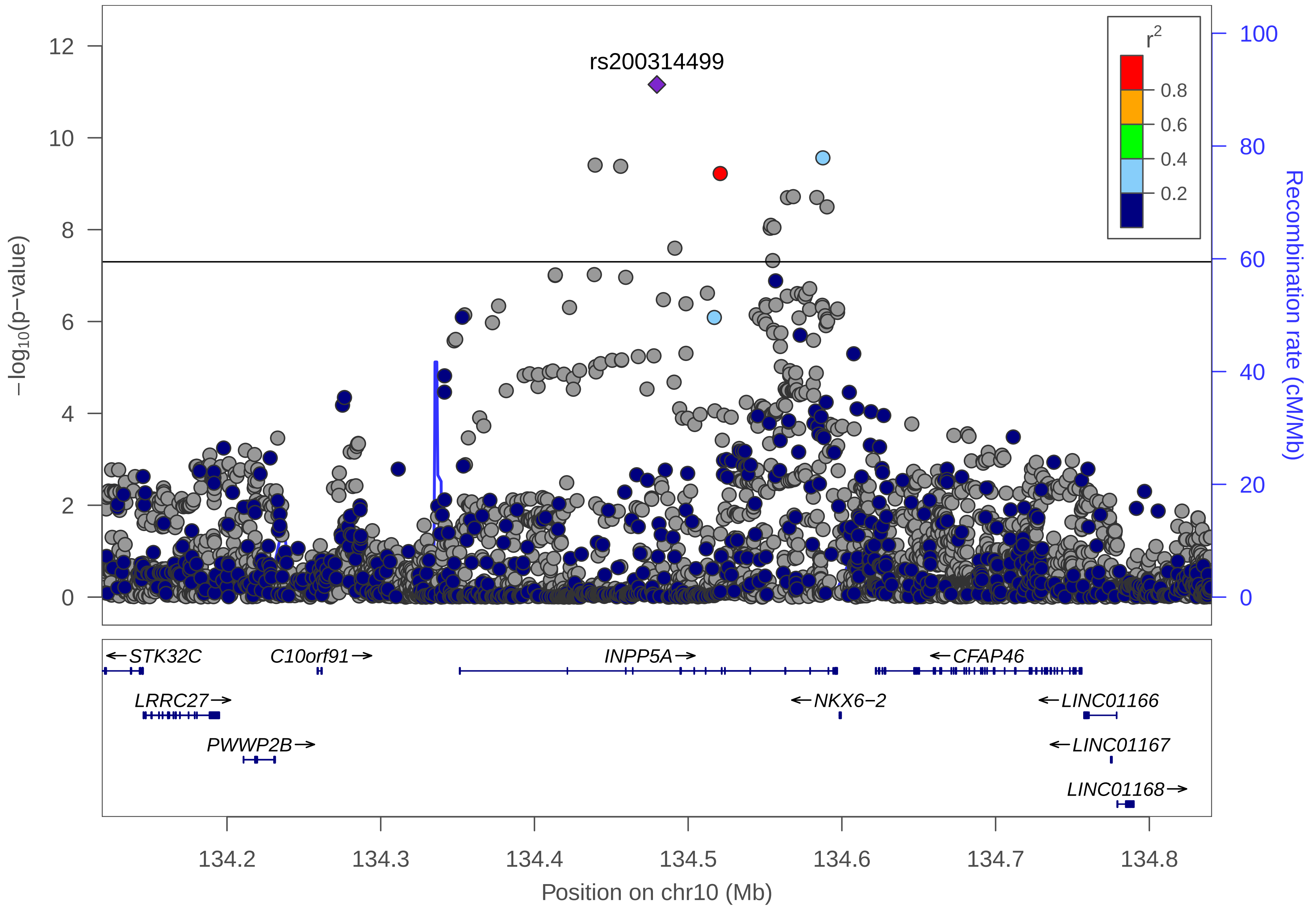
r²
0.8
0.6
0.4
0.2
rs12260159
−log10(p−value)
15
10
5
0
100
80
60
40
20
0
Recombination rate (cM/Mb)
←LOXL4
←HPS1
←MIR6507
CNNM1→
←LINC01475
←PYROXD2
←GOT1
←MIR1287
NKX2−3→
←MIR4685
←SLC25A28
LOC101927278→
←HPSE2
100.2
100.4
100.6
100.8
101
101.2
Position on chr10 (Mb)

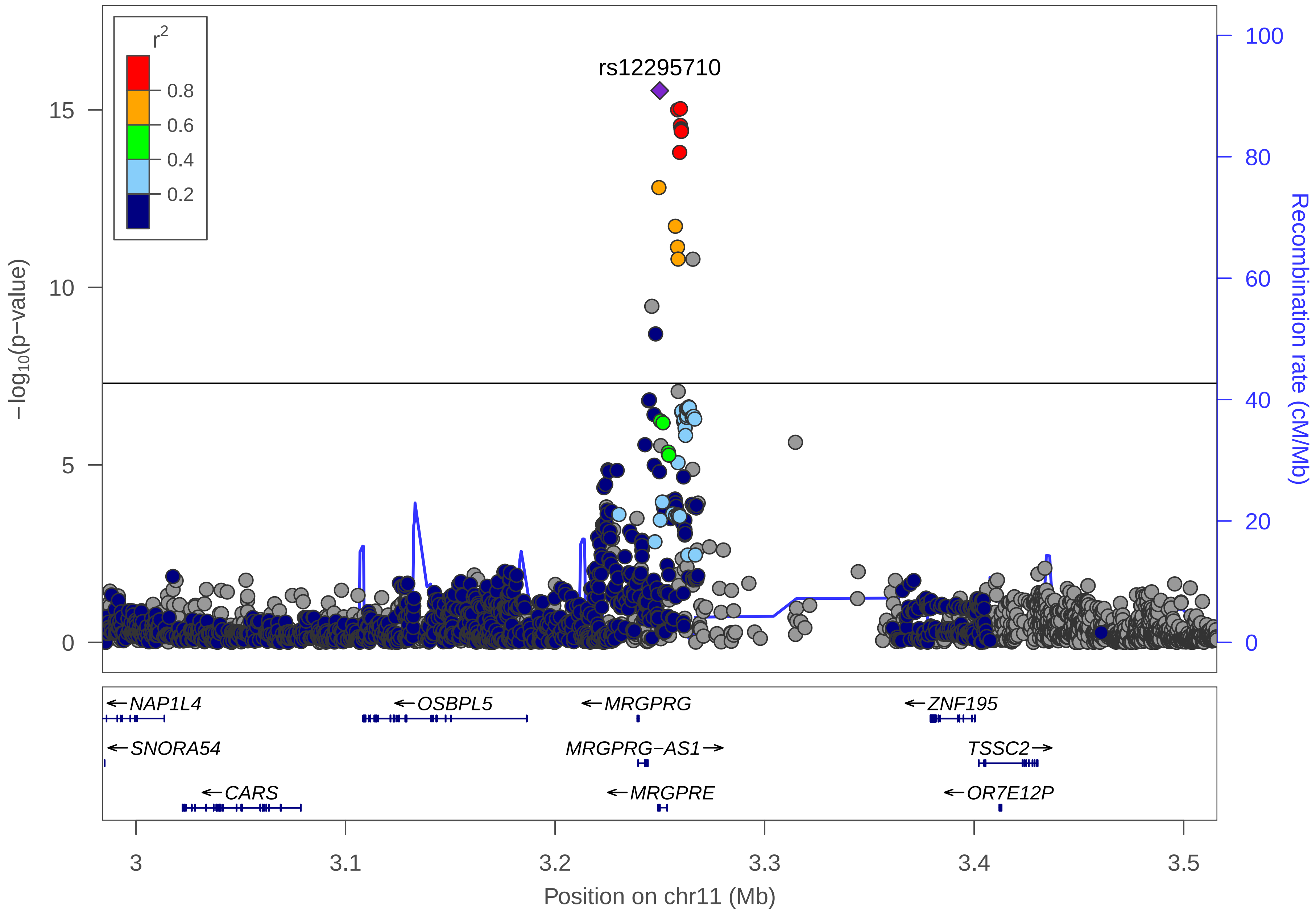

r²
0.8
0.6
0.4
0.2
rs12260436
10
8
6
4
2
0
−log₁₀(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←ARL3
WBP1L→
BORCS7→
CNNM2→
←NT5C2
RPEL1→
SFXN2→
←CYP17A1
BORCS7−ASMT→
AS3MT→
104.5
104.6
104.7
104.8
104.9
105
Position on chr10 (Mb)

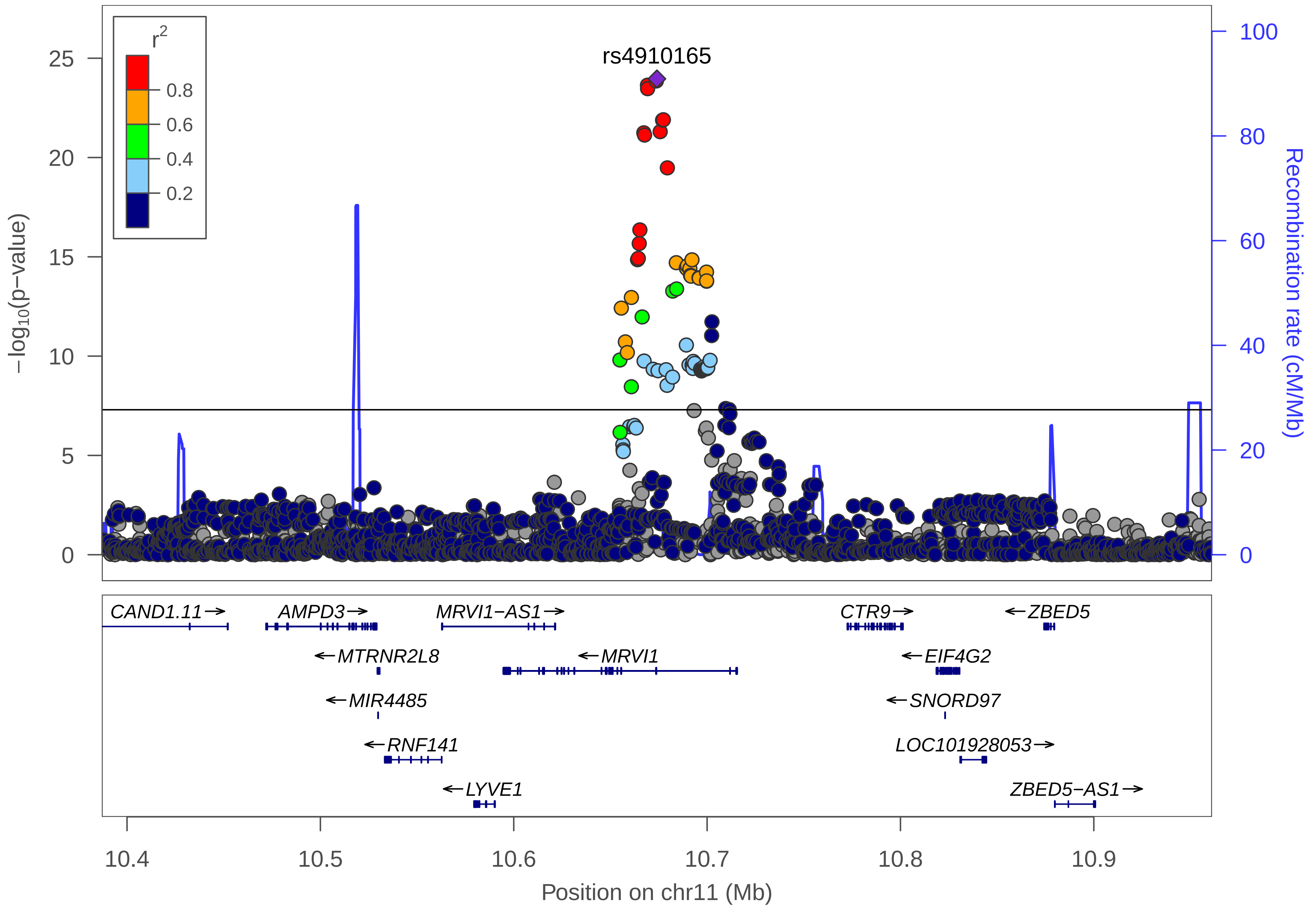

r2
0.8
0.6
0.4
0.2
rs869432
−log10(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
DUSP5→
SMC3→
RBM20→
PDCD4→
SHOC2→
←PDCD4−AS1
MIR4680→
←BBIP1
←RPL13AP6
112.3
112.4
112.5
112.6
112.7
Position on chr10 (Mb)

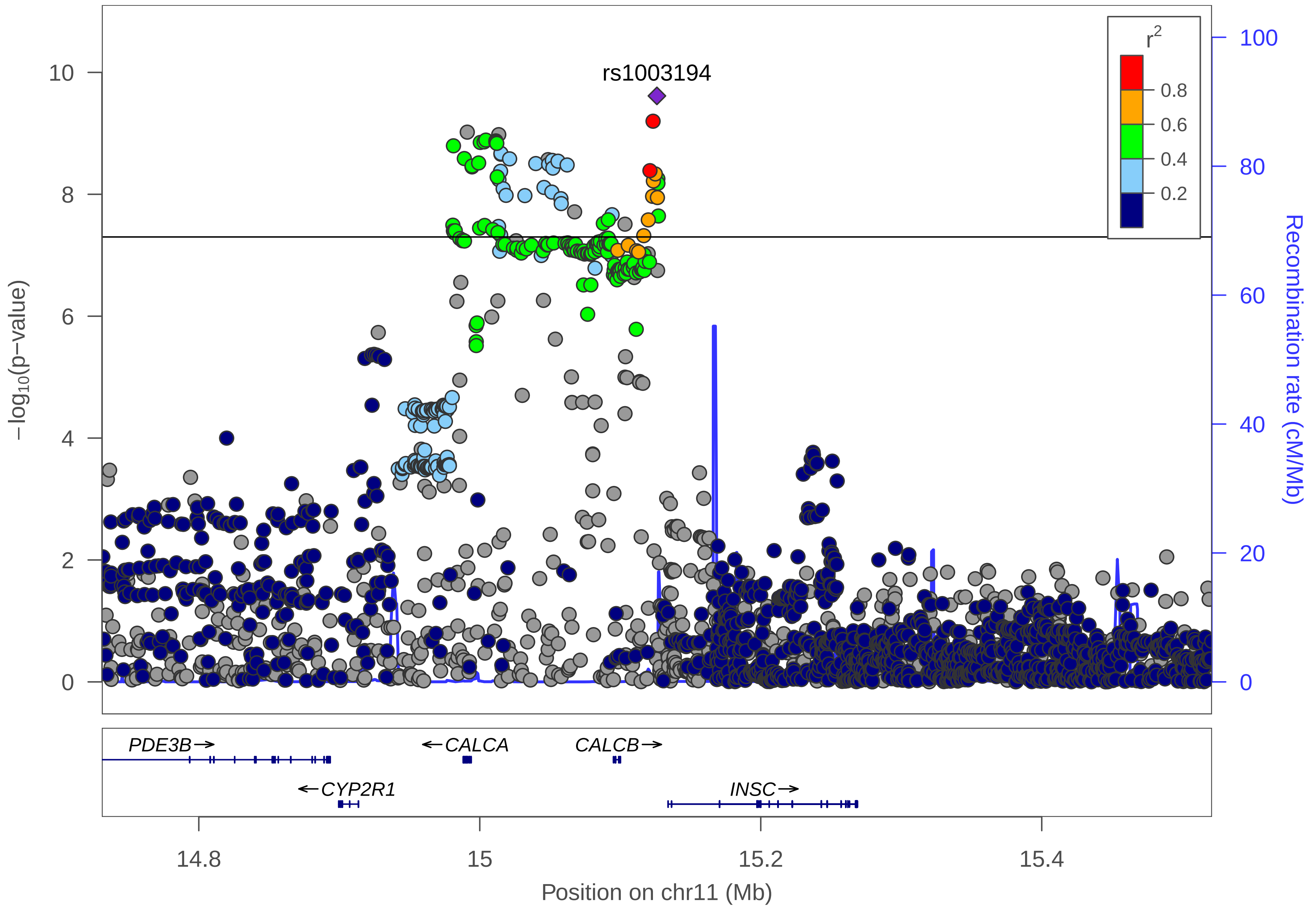

rs2672592
r^2
0.8
0.6
0.4
0.2
−log10(p−value)
0
2
4
6
8
10
12
Recombination rate (cM/Mb)
0
20
40
60
80
100
TACC2→
BTBD16→
PLEKHA1→
HTRA1→
DMBT1→
←C10orf120
MIR3941→
DMBT1P1→
ARMS2→
123.9
124
124.1
124.2
124.3
124.4
124.5
Position on chr10 (Mb)

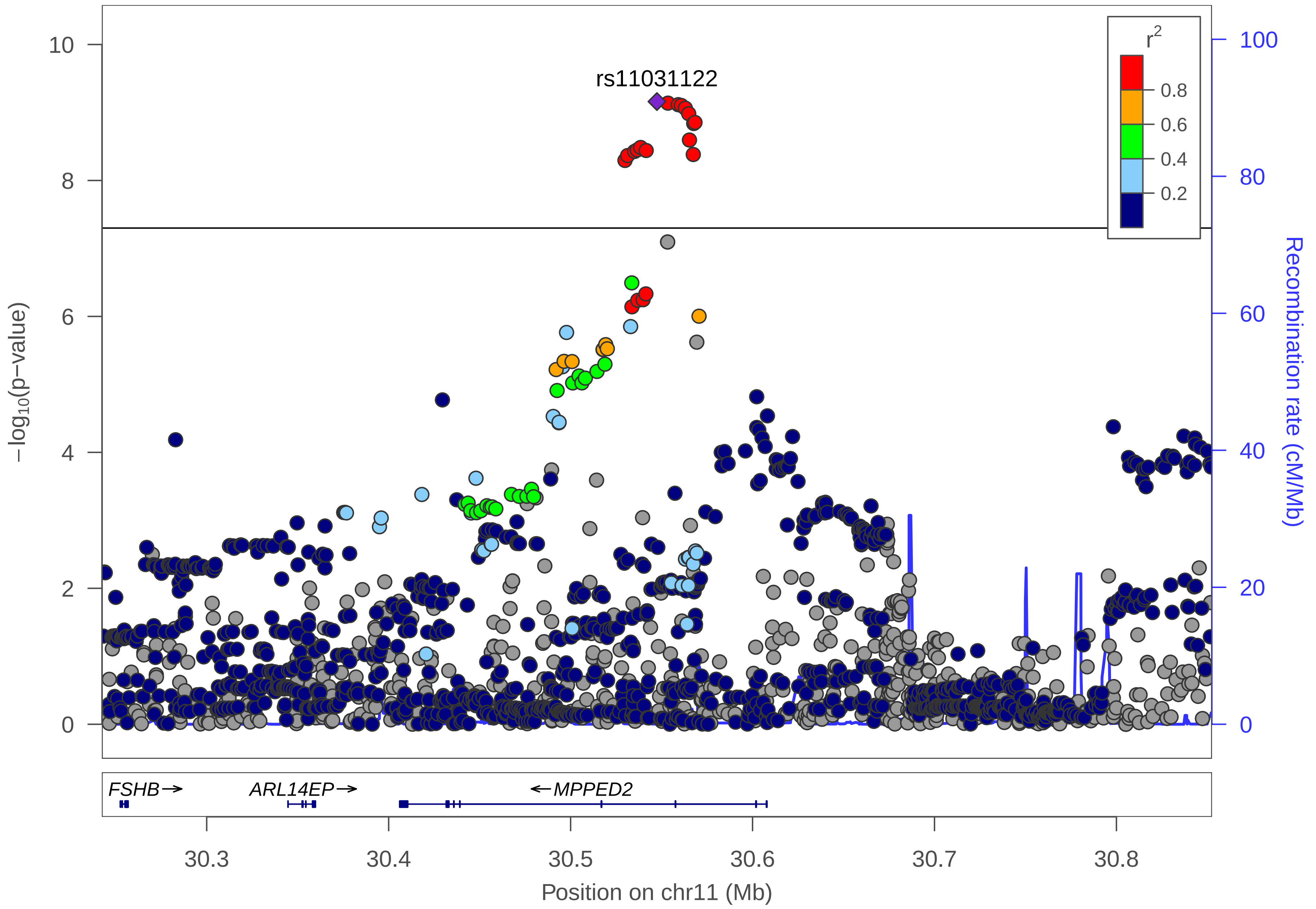

rs11248546
r²
0.8
0.6
0.4
0.2
−log10(p−value)
0
2
4
6
8
10
12
Recombination rate (cM/Mb)
0
20
40
60
80
100
GPR26→
←CPXM2
125
125.1
125.2
125.3
125.4
125.5
Position on chr10 (Mb)

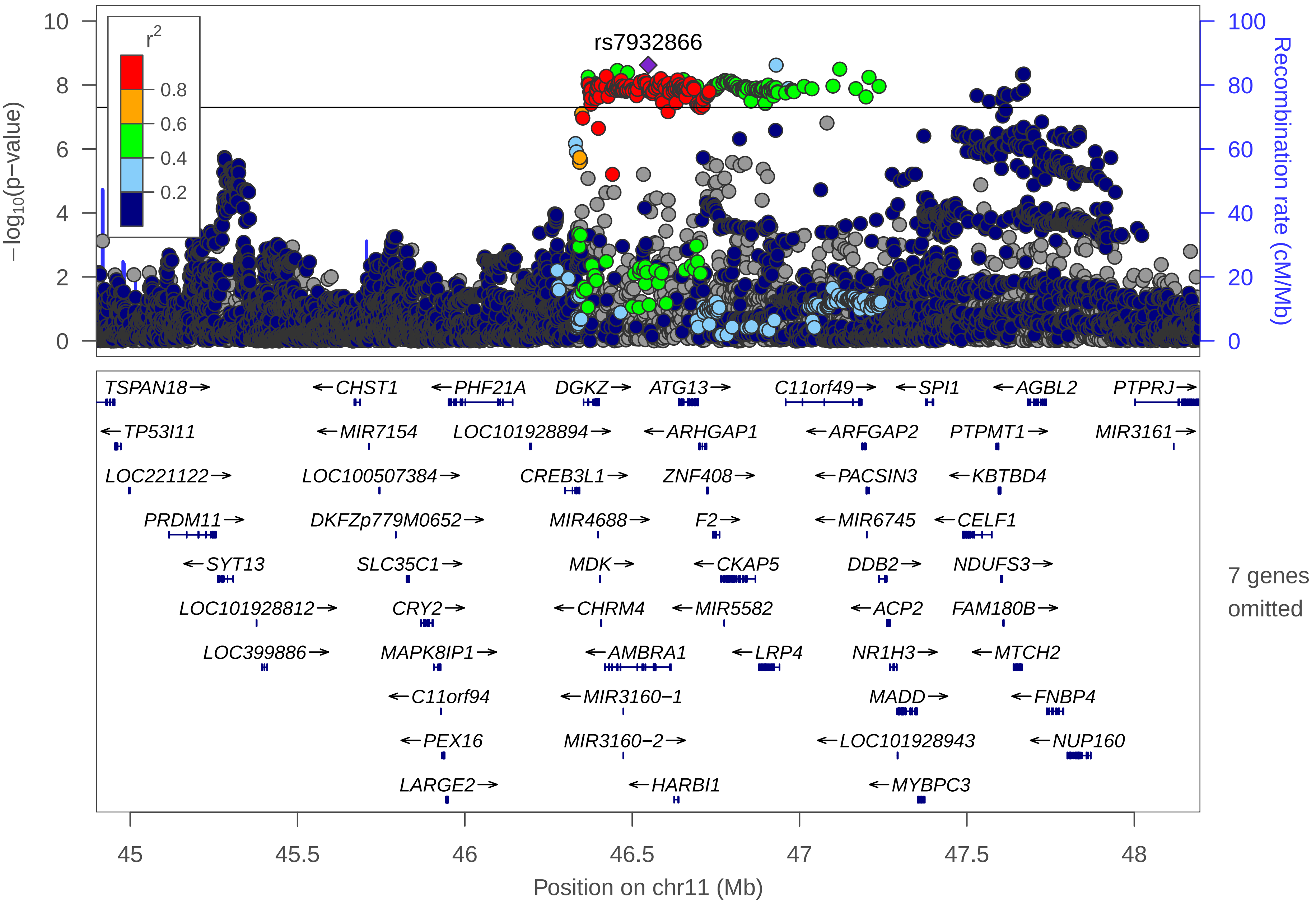

rs200314499
r2
0.8
0.6
0.4
0.2
−log10(p−value)
12
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
STK32C
C10orf91
INPP5A
CFAP46
LRRC27
NKX6−2
LINC01166
PWWP2B
LINC01167
LINC01168
134.2
134.3
134.4
134.5
134.6
134.7
134.8
Position on chr10 (Mb)

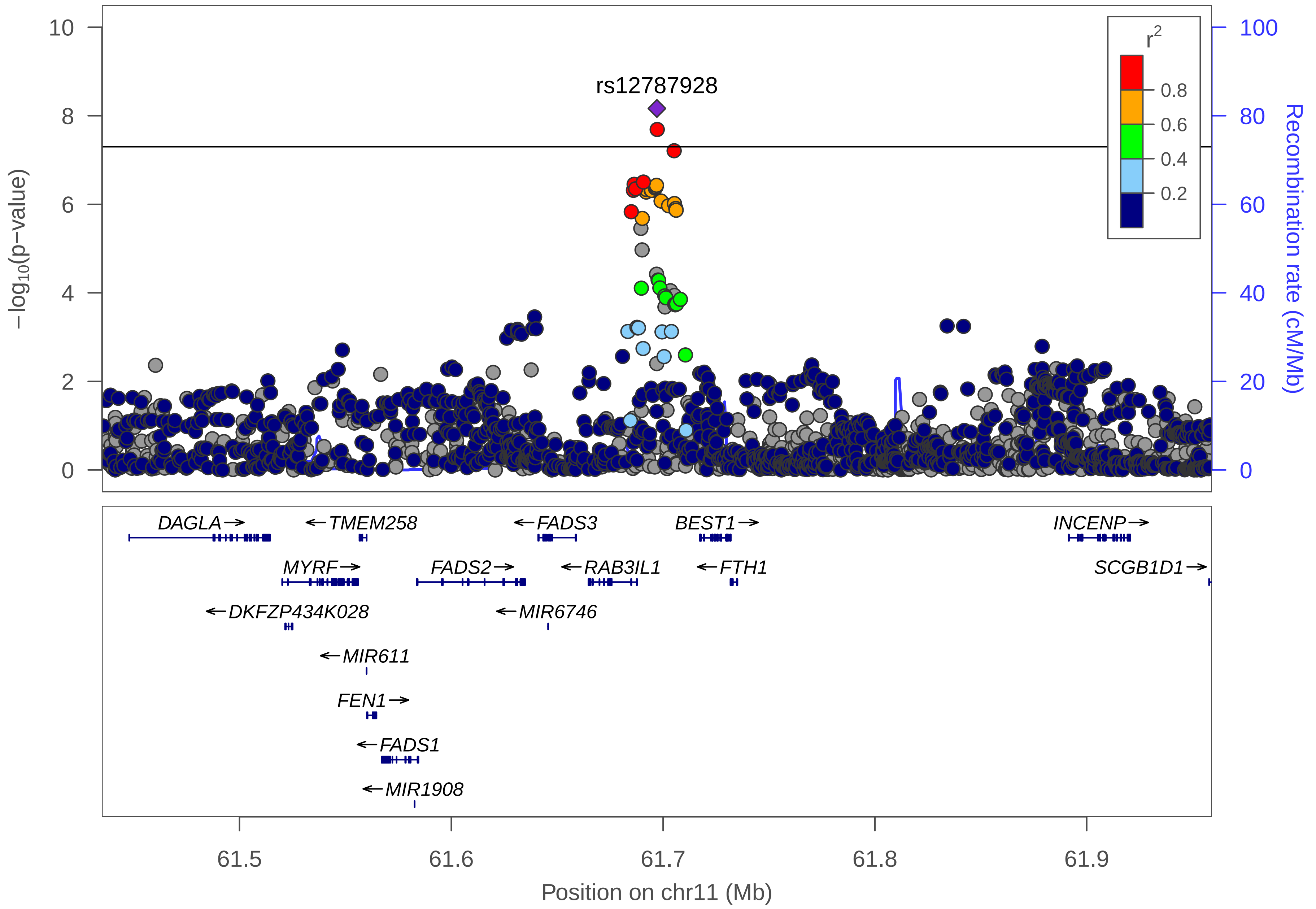

r2
0.8
0.6
0.4
0.2
rs12295710
15
10
5
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←NAP1L4
←SNORA54
←CARS
←OSBPL5
←MRGPRG
MRGPRG−AS1→
←MRGPRE
←ZNF195
TSSC2→
←OR7E12P
3
3.1
3.2
3.3
3.4
3.5
Position on chr11 (Mb)

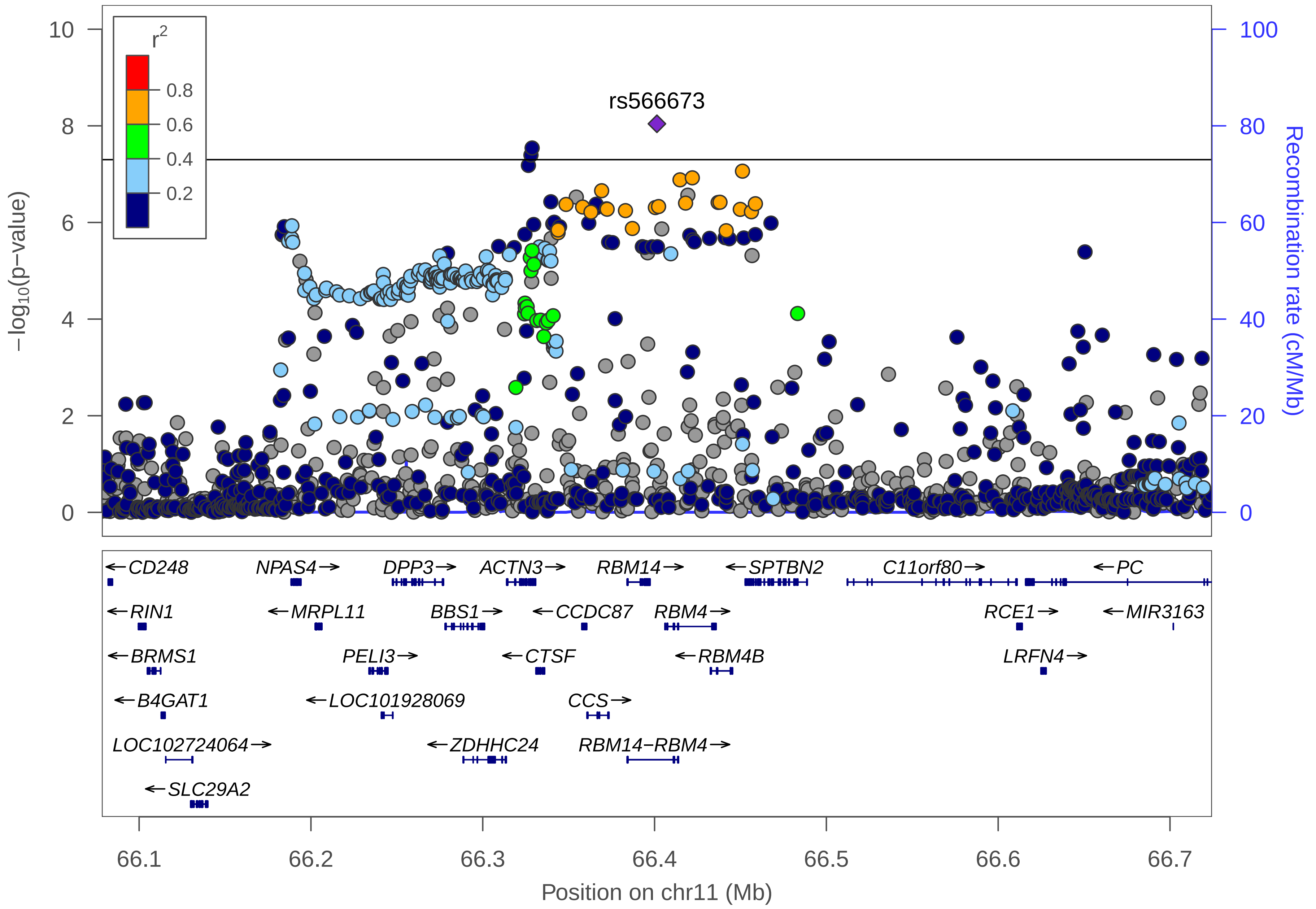

rs4910165
r2
0.8
0.6
0.4
0.2
−log10(p−value)
25
20
15
10
5
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
CAND1.11→
AMPD3→
MRVI1−AS1→
CTR9→
←ZBED5
←MTRNR2L8
←MRVI1
←EIF4G2
←MIR4485
←SNORD97
←RNF141
LOC101928053→
←LYVE1
ZBED5−AS1→
10.4
10.5
10.6
10.7
10.8
10.9
Position on chr11 (Mb)

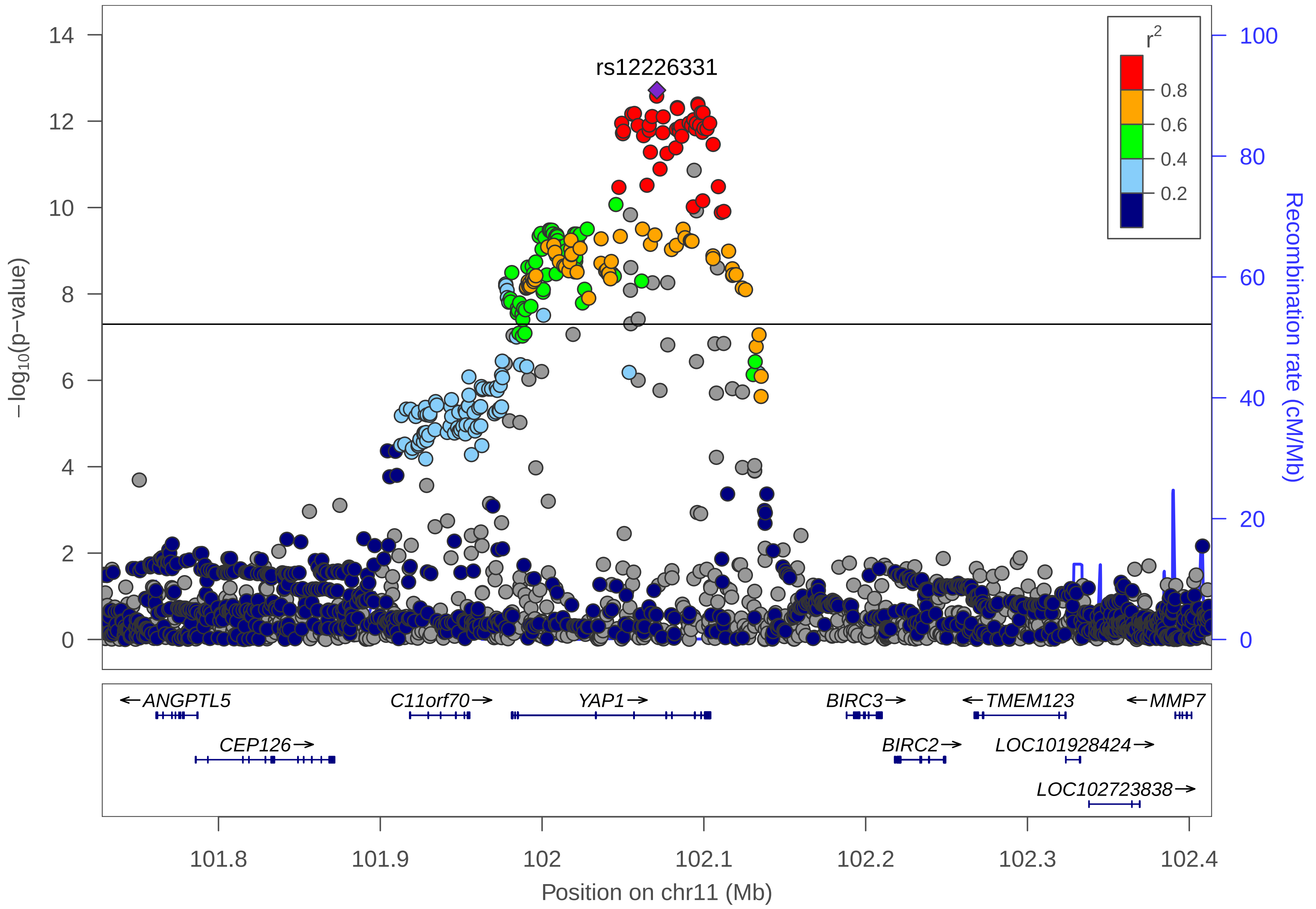

rs1003194
r²
0.8
0.6
0.4
0.2
−log₁₀(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
PDE3B→
←CALCA
CALCB→
←CYP2R1
INSC→
14.8
15
15.2
15.4
Position on chr11 (Mb)

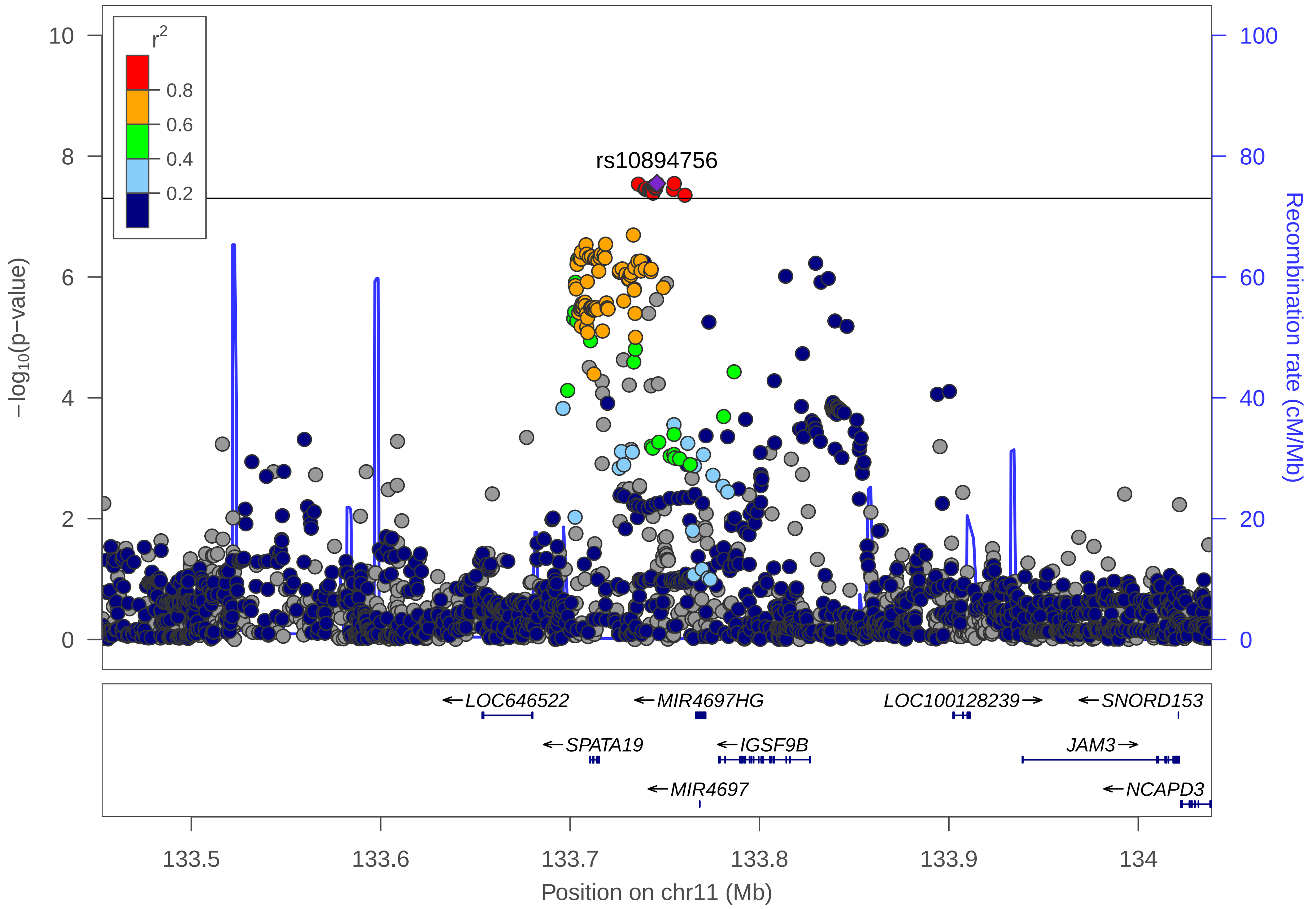

rs11031122
r2
0.8
0.6
0.4
0.2
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
FSHB→
ARL14EP→
←MPPED2
30.3
30.4
30.5
30.6
30.7
30.8
Position on chr11 (Mb)

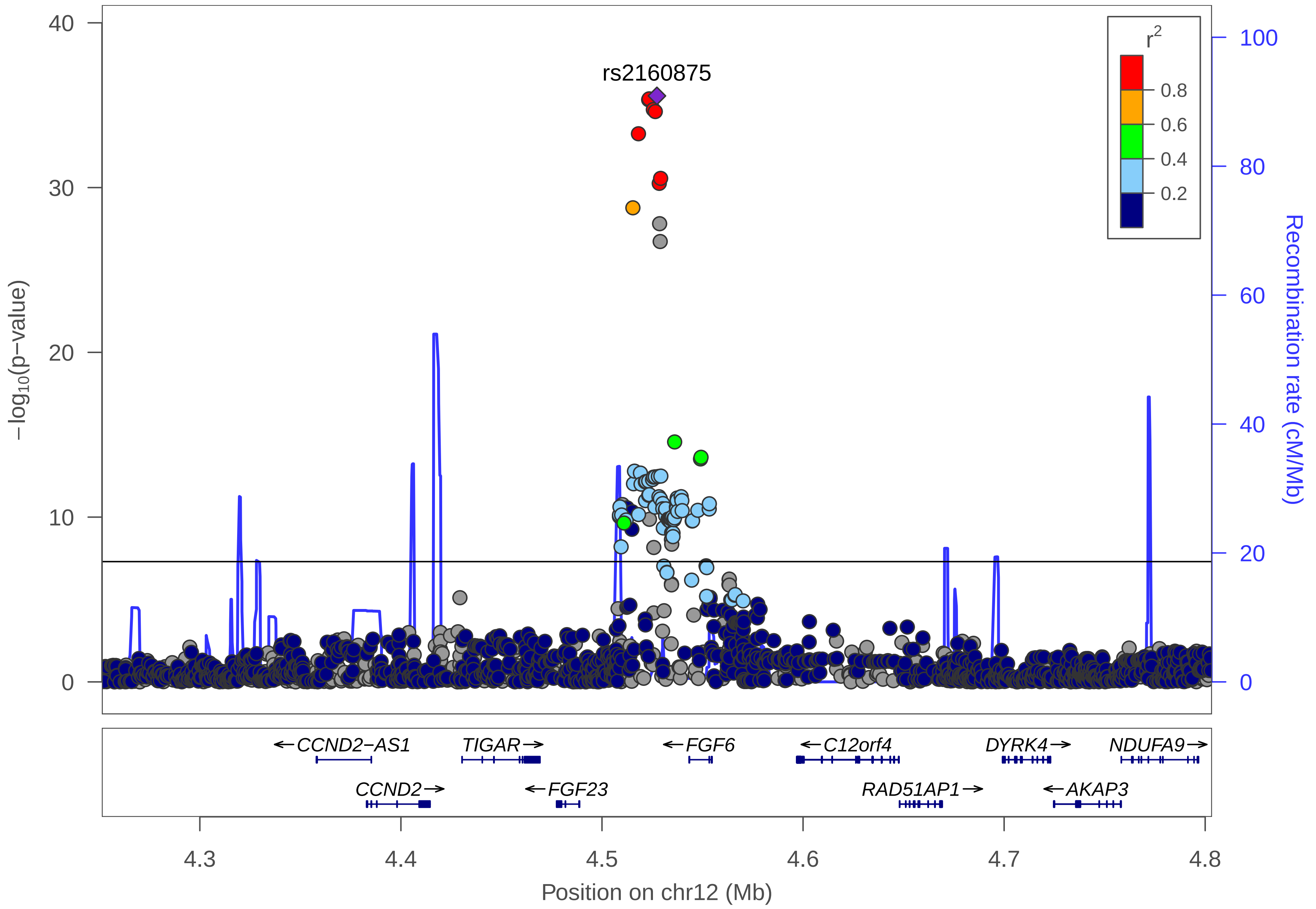

rs7932866
r2
0.8
0.6
0.4
0.2
−log10(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
TSPAN18→
←CHST1
←PHF21A
DGKZ→
ATG13→
C11orf49→
←SPI1
←AGBL2
PTPRJ→
←TP53I11
←MIR7154
LOC101928894→
←ARHGAP1
←ARFGAP2
PTPMT1→
MIR3161→
LOC221122→
LOC100507384→
CREB3L1→
ZNF408→
←PACSIN3
←KBTBD4
PRDM11→
DKFZp779M0652→
MIR4688→
F2→
←MIR6745
←CELF1
←SYT13
SLC35C1→
MDK→
←CKAP5
DDB2→
NDUFS3→
LOC101928812→
CRY2→
←CHRM4
←MIR5582
←ACP2
FAM180B→
LOC399886→
MAPK8IP1→
←AMBRA1
←LRP4
NR1H3→
←MTCH2
←C11orf94
←MIR3160−1
MADD→
←FNBP4
←PEX16
MIR3160−2→
←LOC101928943
←NUP160
LARGE2→
←HARBI1
←MYBPC3
7 genes omitted
45
45.5
46
46.5
47
47.5
48
Position on chr11 (Mb)

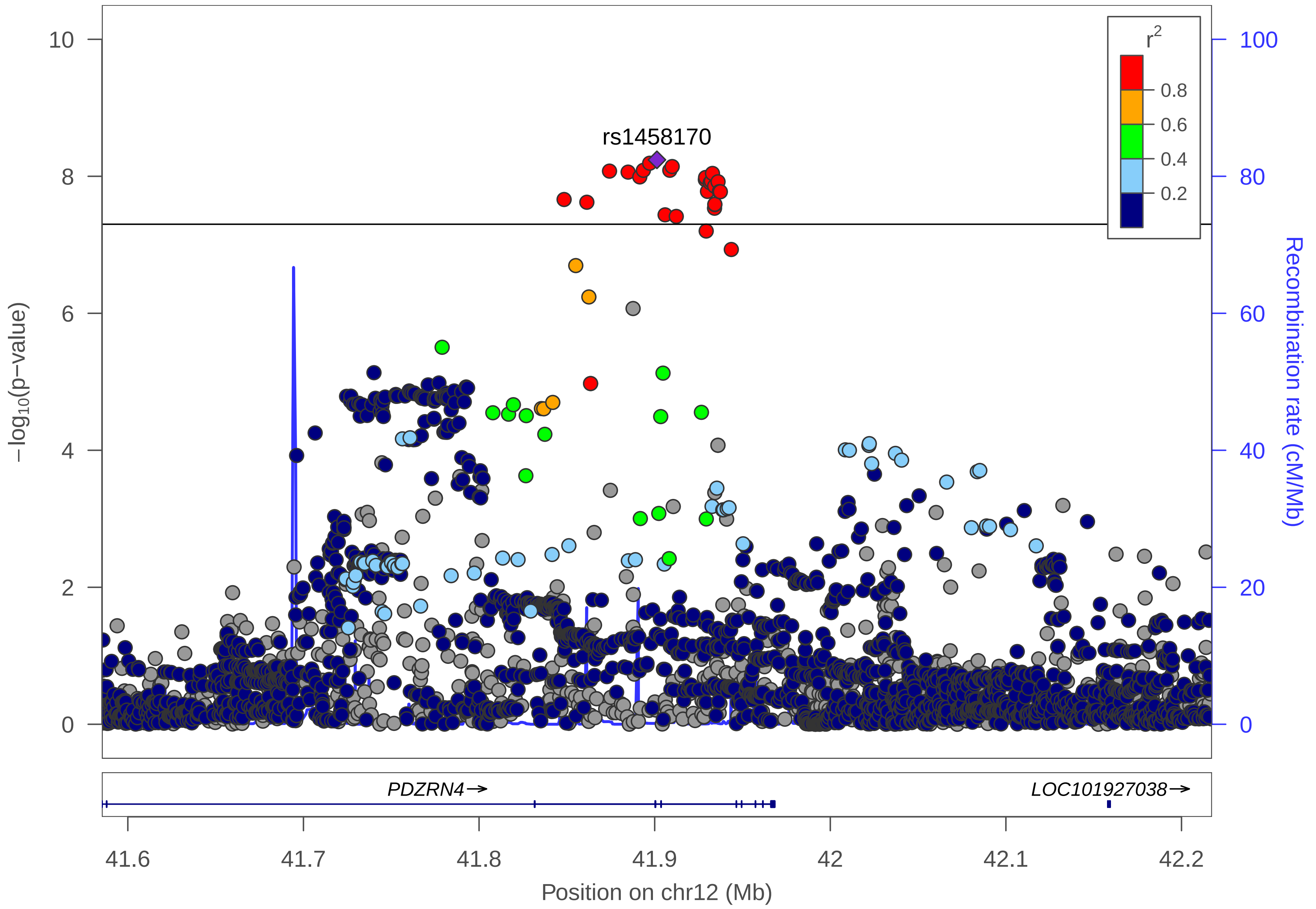

rs12787928
r²
0.8
0.6
0.4
0.2
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
DAGLA→
←TMEM258
←FADS3
BEST1→
INCENP→
MYRF→
FADS2→
←RAB3IL1
←FTH1
SCGB1D1→
←DKFZP434K028
←MIR6746
←MIR611
FEN1→
←FADS1
←MIR1908
61.5
61.6
61.7
61.8
61.9
Position on chr11 (Mb)

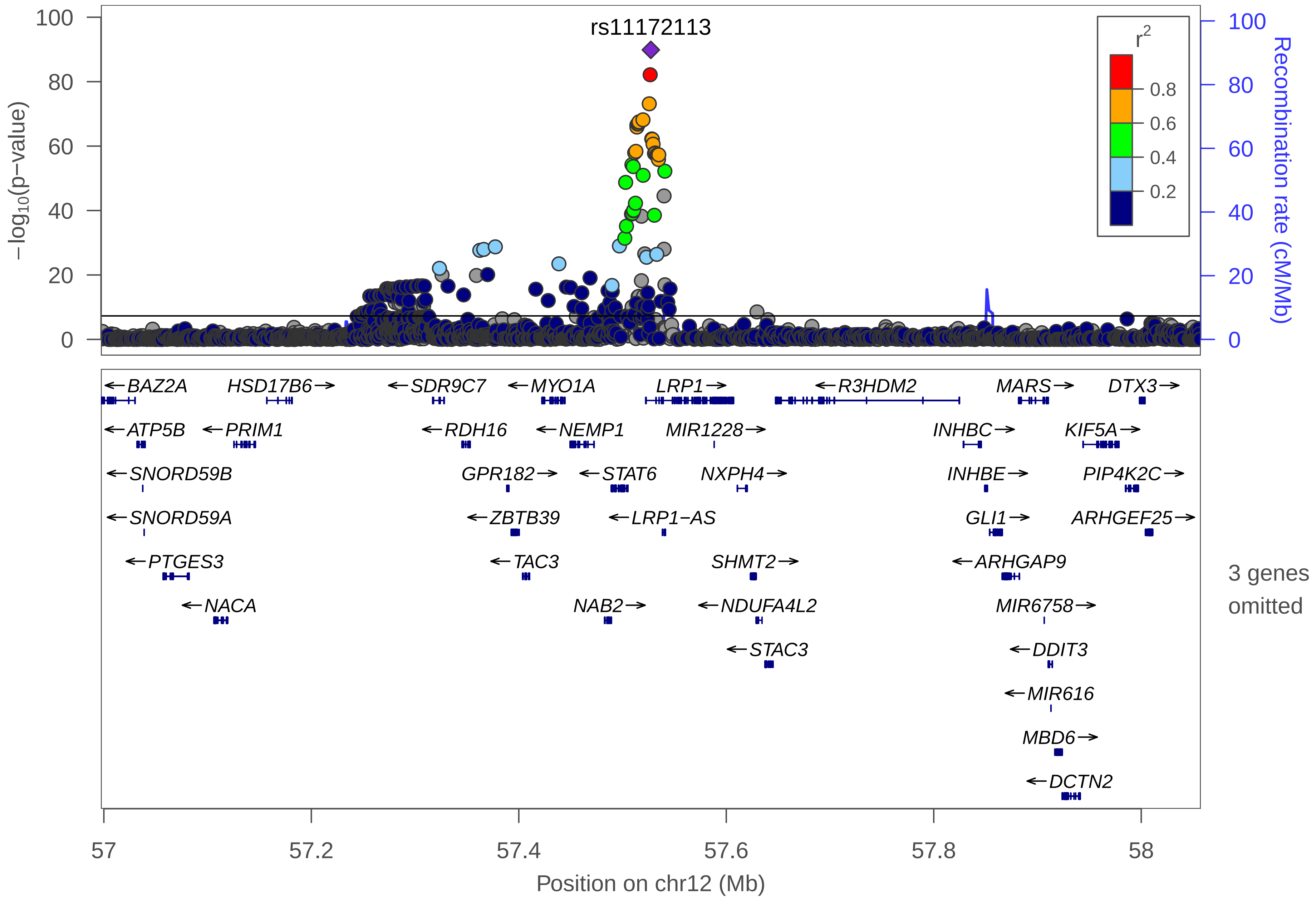

r2
0.8
0.6
0.4
0.2
rs566673
$-\log_{10}$(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
CD248
NPAS4
DPP3
ACTN3
RBM14
SPTBN2
C11orf80
PC
RIN1
MRPL11
BBS1
CCDC87
RBM4
RCE1
MIR3163
BRMS1
PELI3
CTSF
RBM4B
LRFN4
B4GAT1
LOC101928069
CCS
LOC102724064
ZDHHC24
RBM14−RBM4
SLC29A2
66.1
66.2
66.3
66.4
66.5
66.6
66.7
Position on chr11 (Mb)

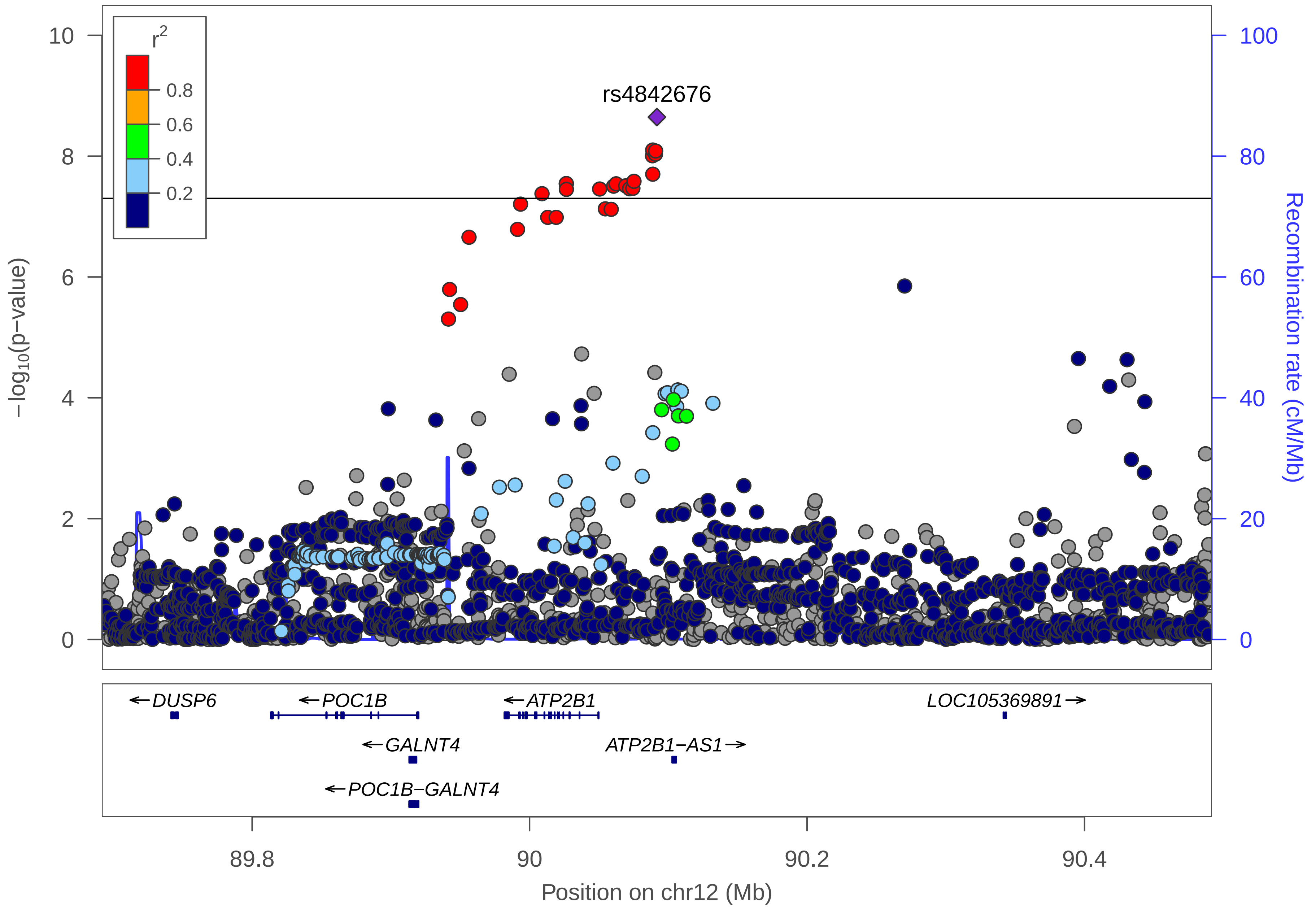

rs12226331
r^2
0.8
0.6
0.4
0.2
14
12
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←ANGPTL5
CEP126→
C11orf70→
YAP1→
BIRC3→
BIRC2→
←TMEM123
LOC101928424→
←MMP7
LOC102723838→
101.8
101.9
102
102.1
102.2
102.3
102.4
Position on chr11 (Mb)

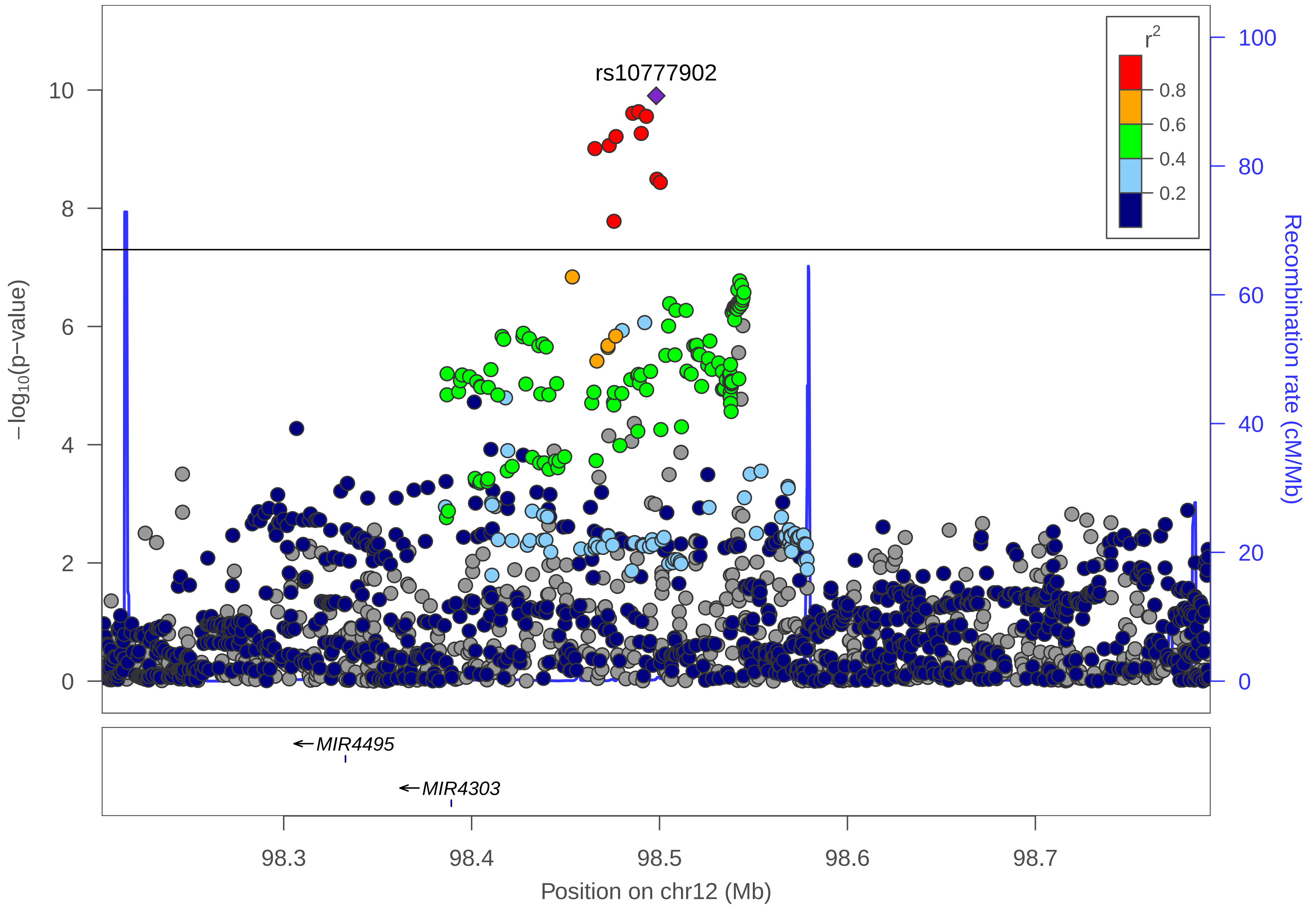

r²
0.8
0.6
0.4
0.2
rs10894756
−log10(p−value)
Recombination rate (cM/Mb)
10
8
6
4
2
0
100
80
60
40
20
0
←LOC646522
←MIR4697HG
LOC100128239→
←SNORD153
←SPATA19
←IGSF9B
JAM3→
←MIR4697
←NCAPD3
133.5
133.6
133.7
133.8
133.9
134
Position on chr11 (Mb)

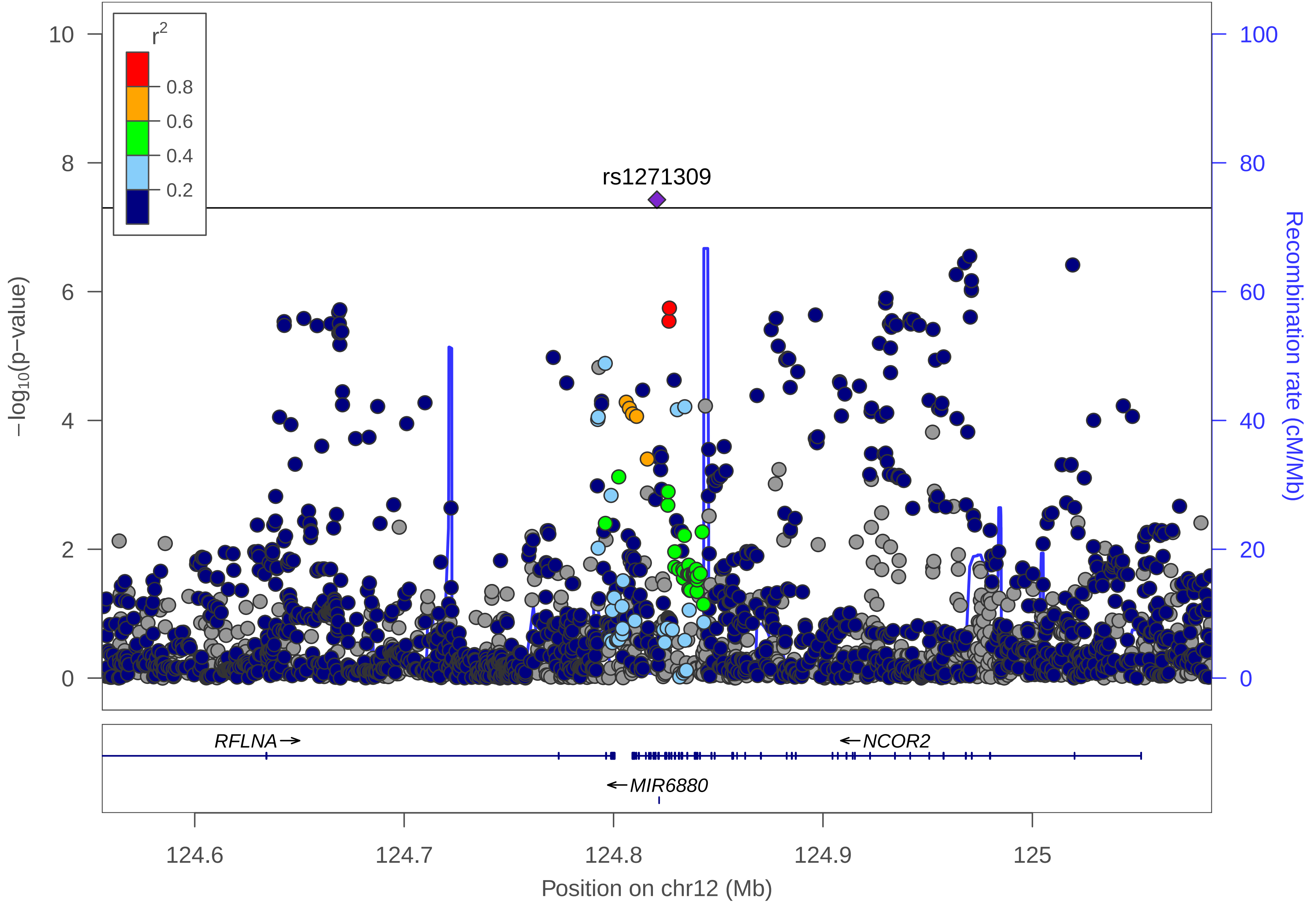

rs2160875
r2
0.8
0.6
0.4
0.2
−log10(p−value)
0
10
20
30
40
Recombination rate (cM/Mb)
0
20
40
60
80
100
CCND2−AS1
TIGAR
FGF6
C12orf4
DYRK4
NDUFA9
CCND2
FGF23
RAD51AP1
AKAP3
4.3
4.4
4.5
4.6
4.7
4.8
Position on chr12 (Mb)

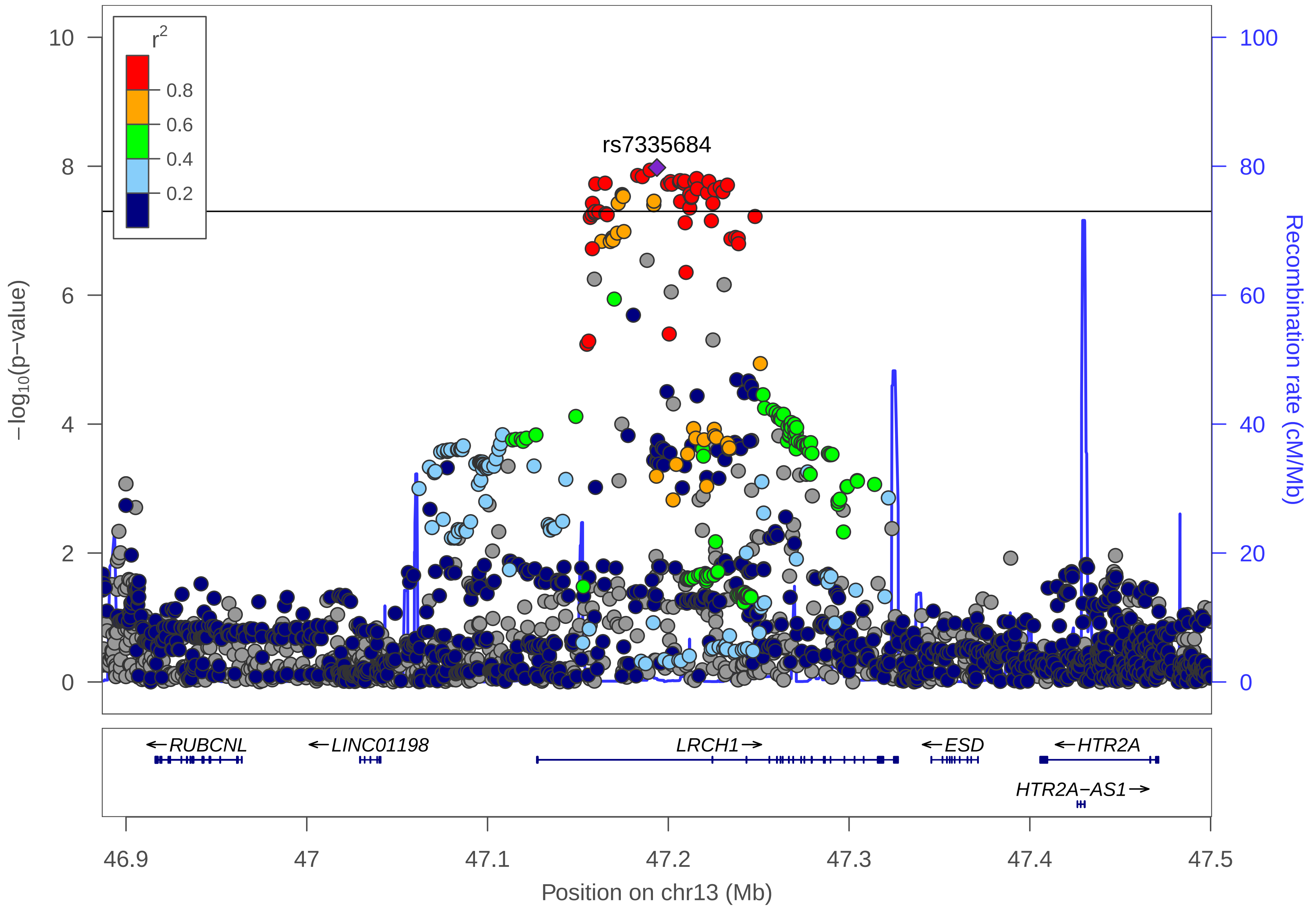

rs1458170
r²
0.8
0.6
0.4
0.2
10
8
6
4
2
0
100
80
60
40
20
0
−log₁₀(p−value)
Recombination rate (cM/Mb)
PDZRN4→
LOC101927038→
41.6
41.7
41.8
41.9
42
42.1
42.2
Position on chr12 (Mb)

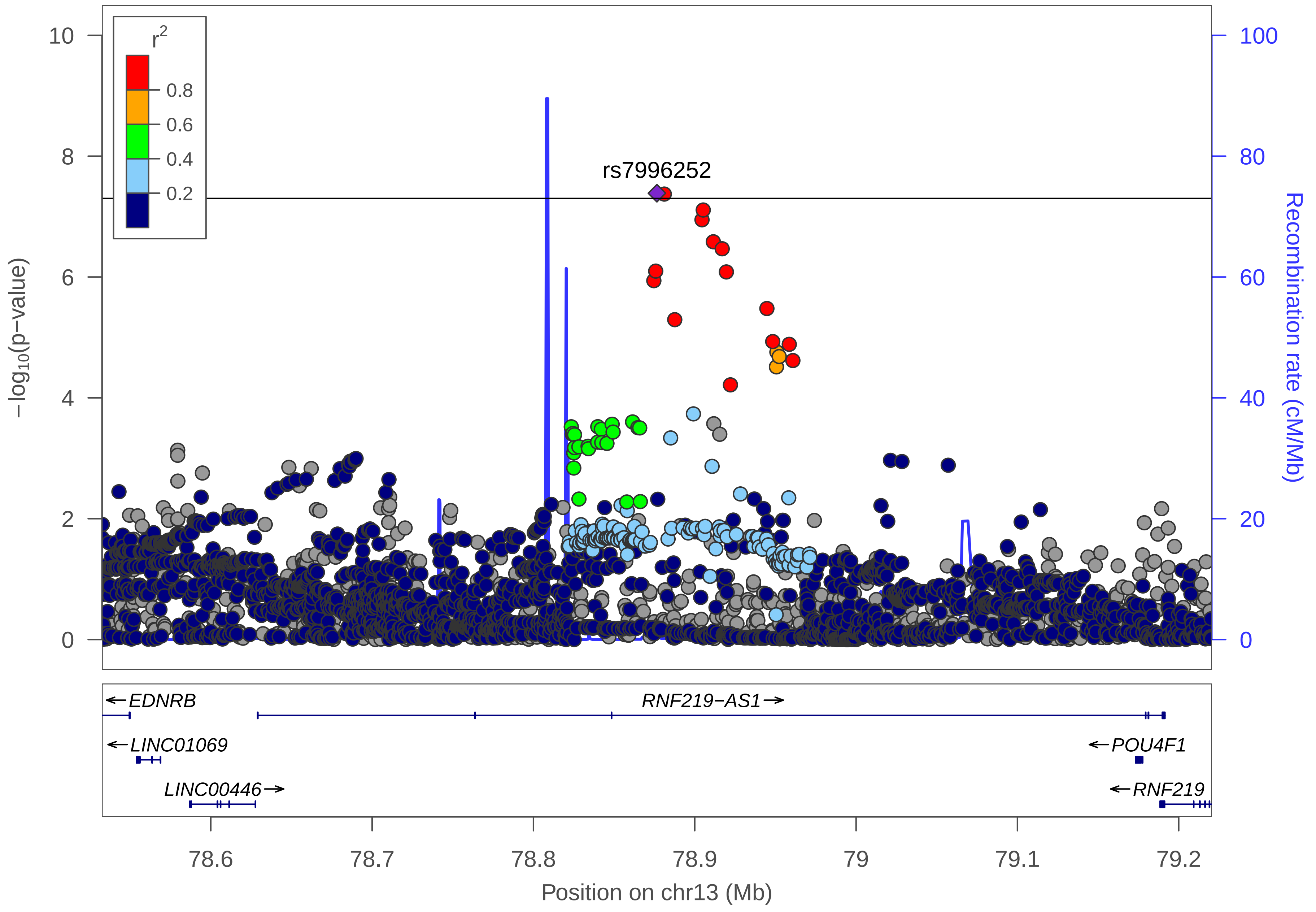

rs11172113
100
80
60
40
20
0
−log10(p−value)
r2
0.8
0.6
0.4
0.2
100
80
60
40
20
0
Recombination rate (cM/Mb)
←BAZ2A
HSD17B6→
←SDR9C7
←MYO1A
LRP1→
←R3HDM2
MARS→
DTX3→
←ATP5B
←PRIM1
←RDH16
←NEMP1
MIR1228→
INHBC→
KIF5A→
←SNORD59B
GPR182→
←STAT6
NXPH4→
INHBE→
PIP4K2C→
←SNORD59A
←ZBTB39
←LRP1−AS
GLI1→
ARHGEF25→
←PTGES3
←TAC3
SHMT2→
←ARHGAP9
←NACA
NAB2→
←NDUFA4L2
MIR6758→
←STAC3
←DDIT3
←MIR616
MBD6→
←DCTN2
3 genes omitted
57
57.2
57.4
57.6
57.8
58
Position on chr12 (Mb)

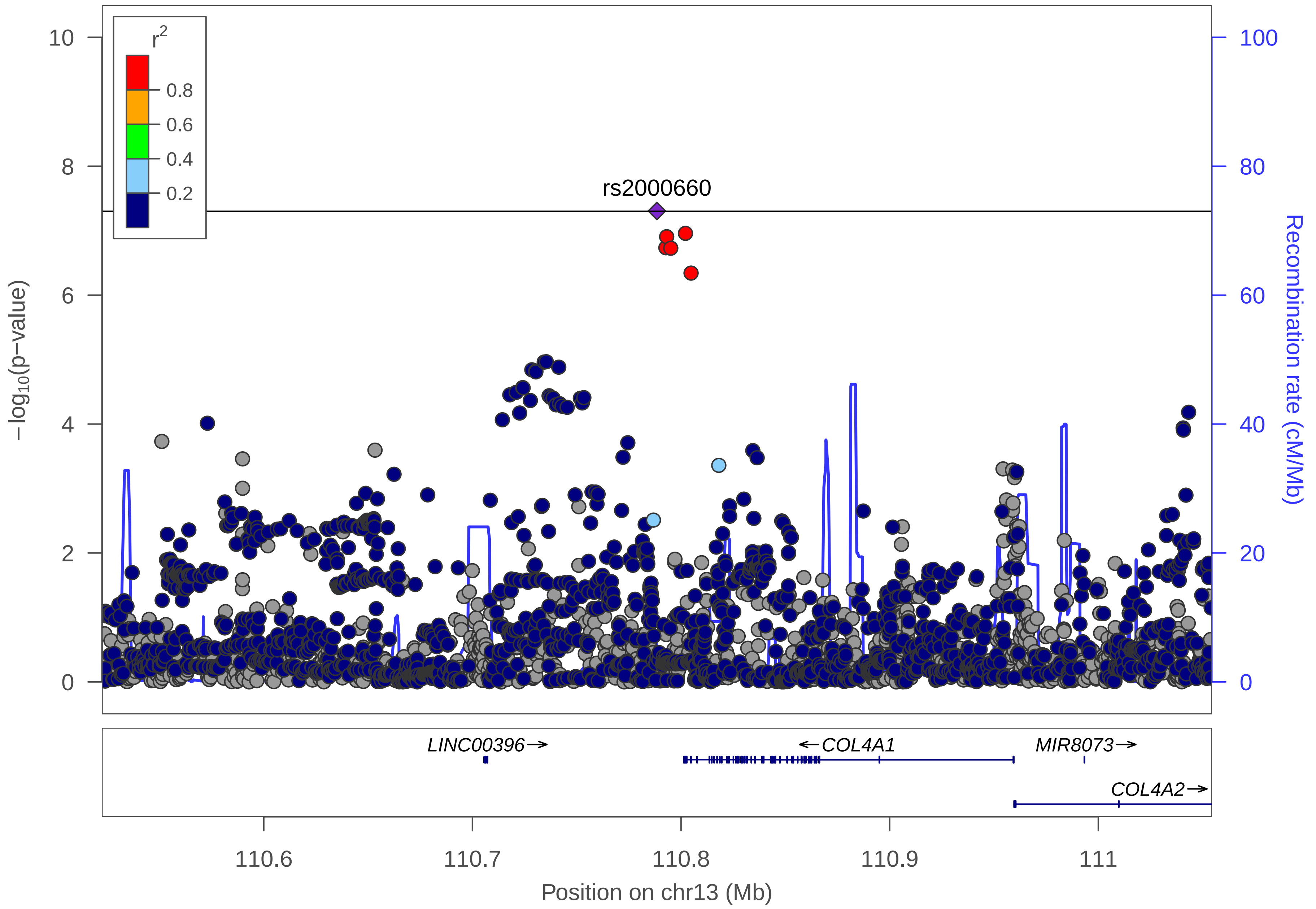

r2
0.8
0.6
0.4
0.2
rs4842676
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←DUSP6
←POC1B
←ATP2B1
LOC105369891→
←GALNT4
ATP2B1−AS1→
←POC1B−GALNT4
89.8
90
90.2
90.4
Position on chr12 (Mb)


rs10777902
r2
0.8
0.6
0.4
0.2
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
MIR4495
MIR4303
98.3
98.4
98.5
98.6
98.7
Position on chr12 (Mb)

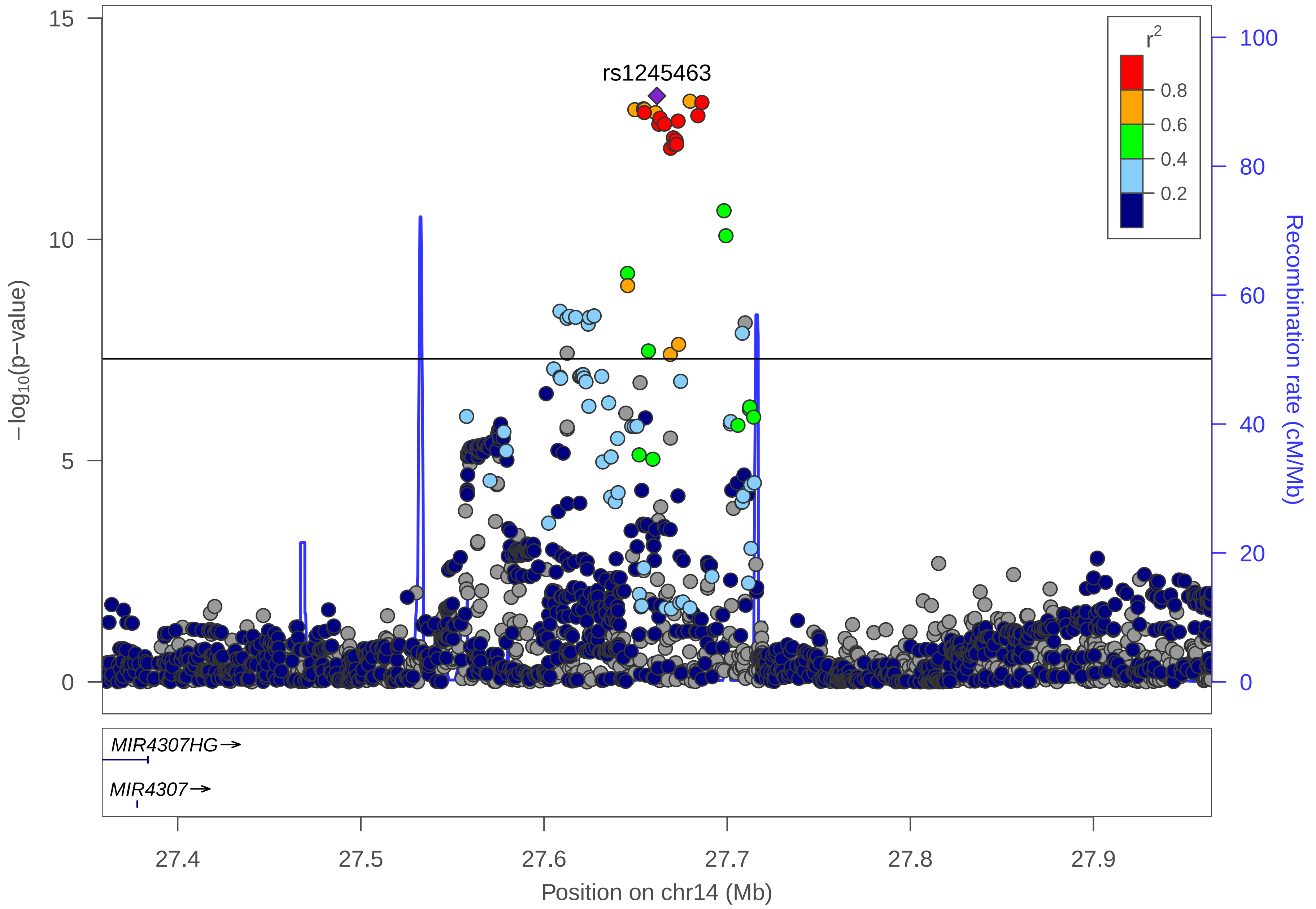

r2
0.8
0.6
0.4
0.2
rs1271309
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
RFLNA→
←NCOR2
←MIR6880
124.6
124.7
124.8
124.9
125
Position on chr12 (Mb)

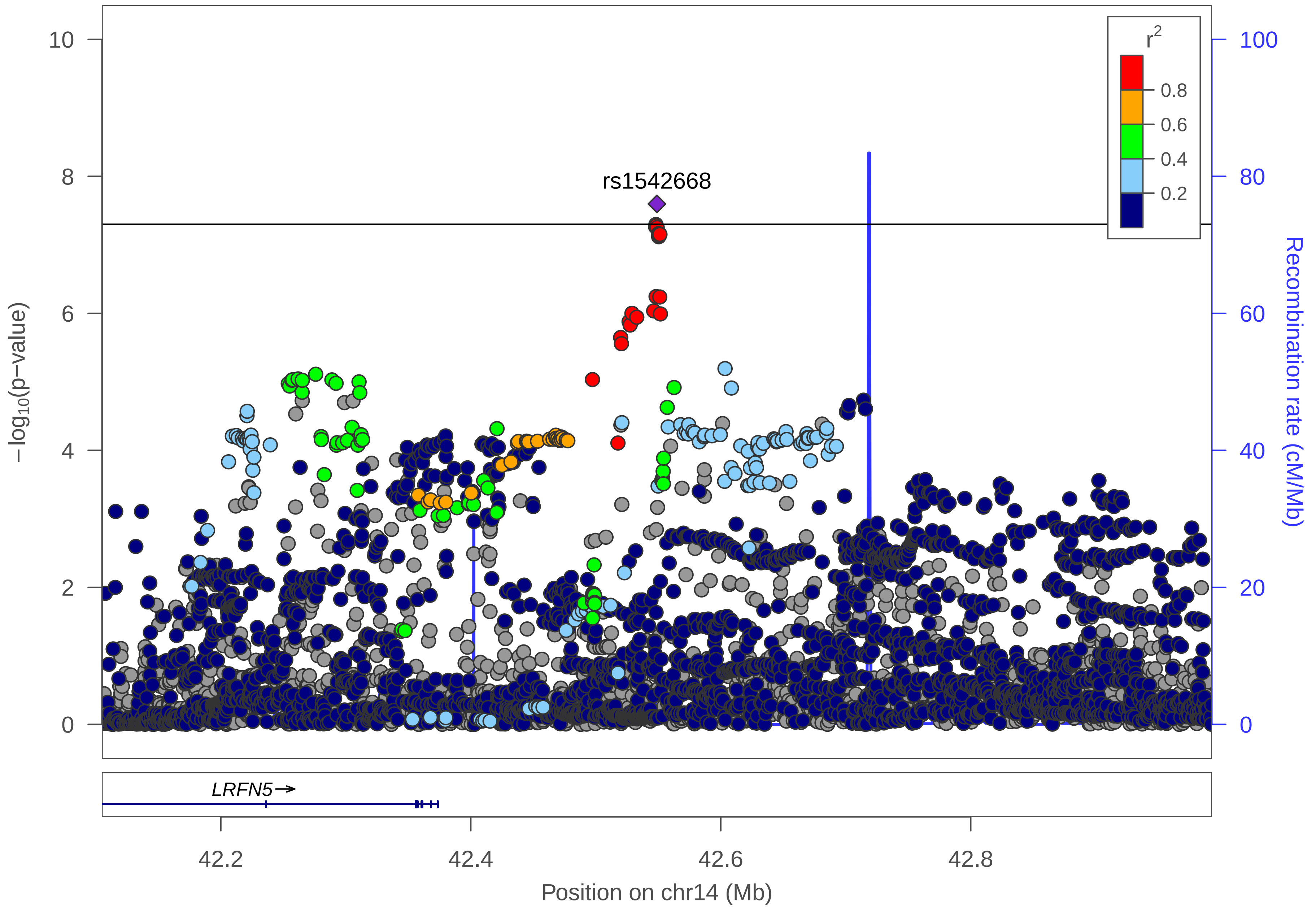

r2
0.8
0.6
0.4
0.2
rs7335684
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
←RUBCNL
←LINC01198
LRCH1→
←ESD
←HTR2A
HTR2A−AS1→
46.9
47
47.1
47.2
47.3
47.4
47.5
Position on chr13 (Mb)

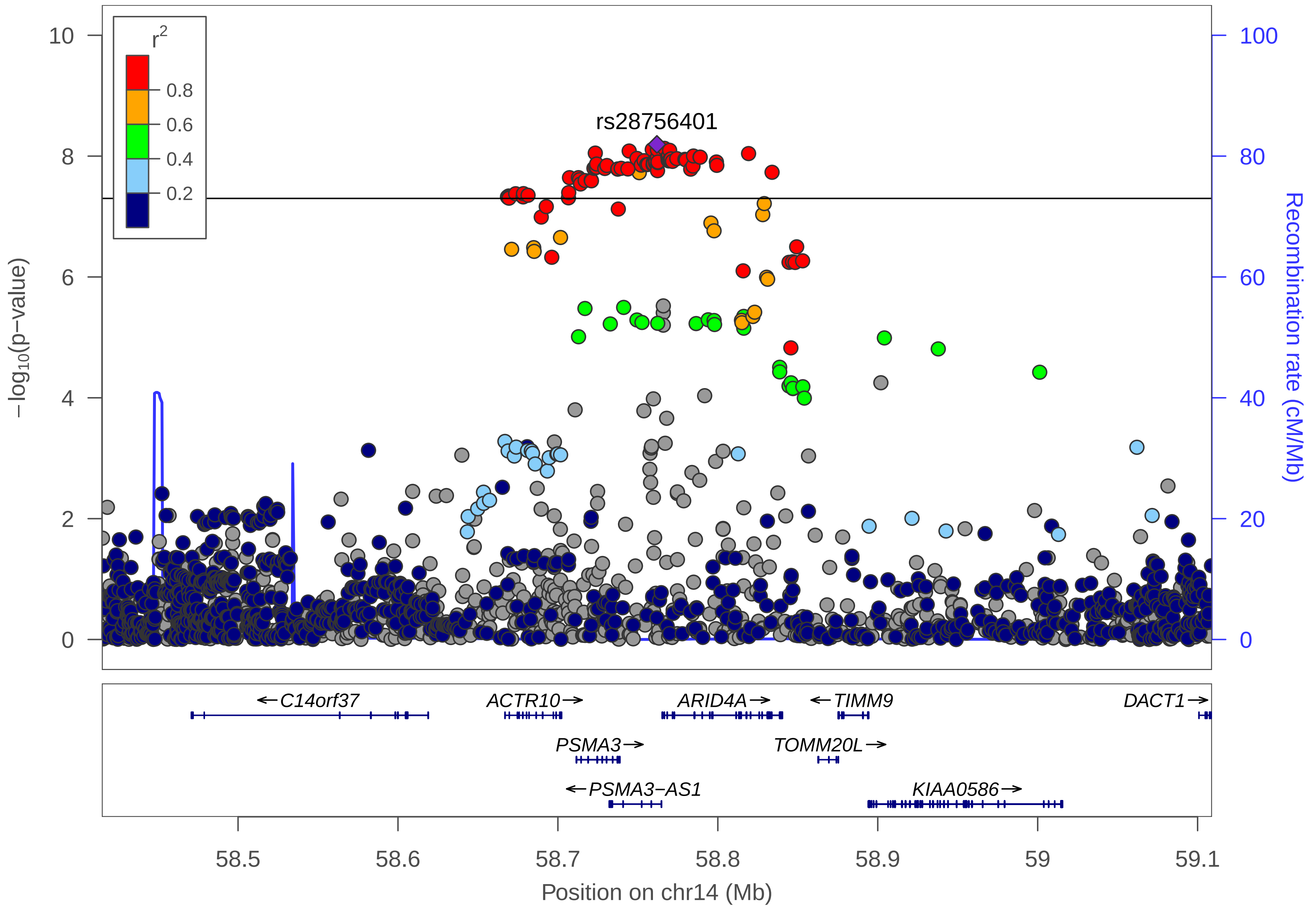

r2
0.8
0.6
0.4
0.2
rs7996252
−log10(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
←EDNRB
RNF219−AS1→
←LINC01069
←POU4F1
LINC00446→
←RNF219
78.6
78.7
78.8
78.9
79
79.1
79.2
Position on chr13 (Mb)

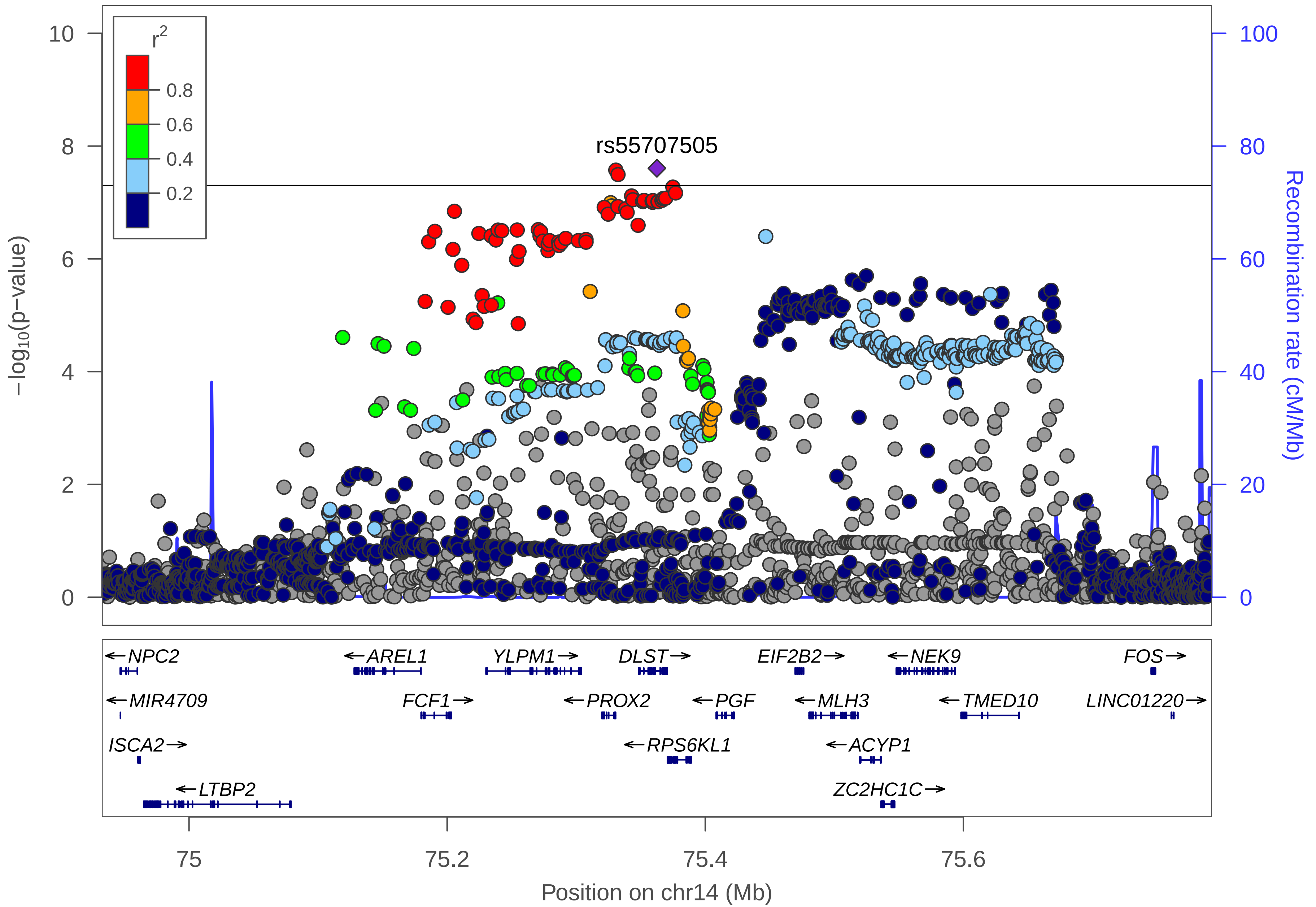


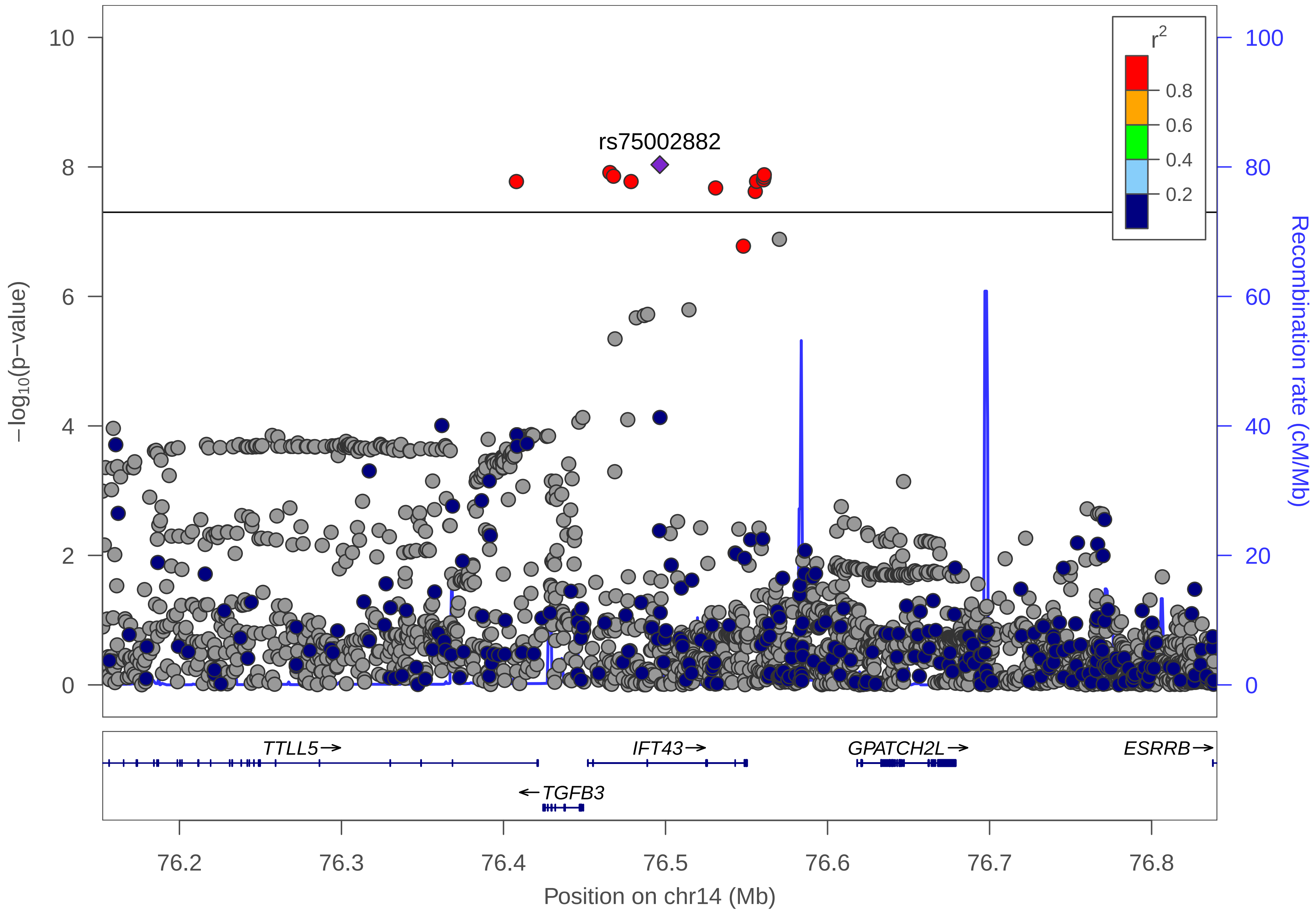
r2
0.8
0.6
0.4
0.2
rs2000660
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
LINC00396→
←COL4A1
MIR8073→
COL4A2→
110.6
110.7
110.8
110.9
111
Position on chr13 (Mb)

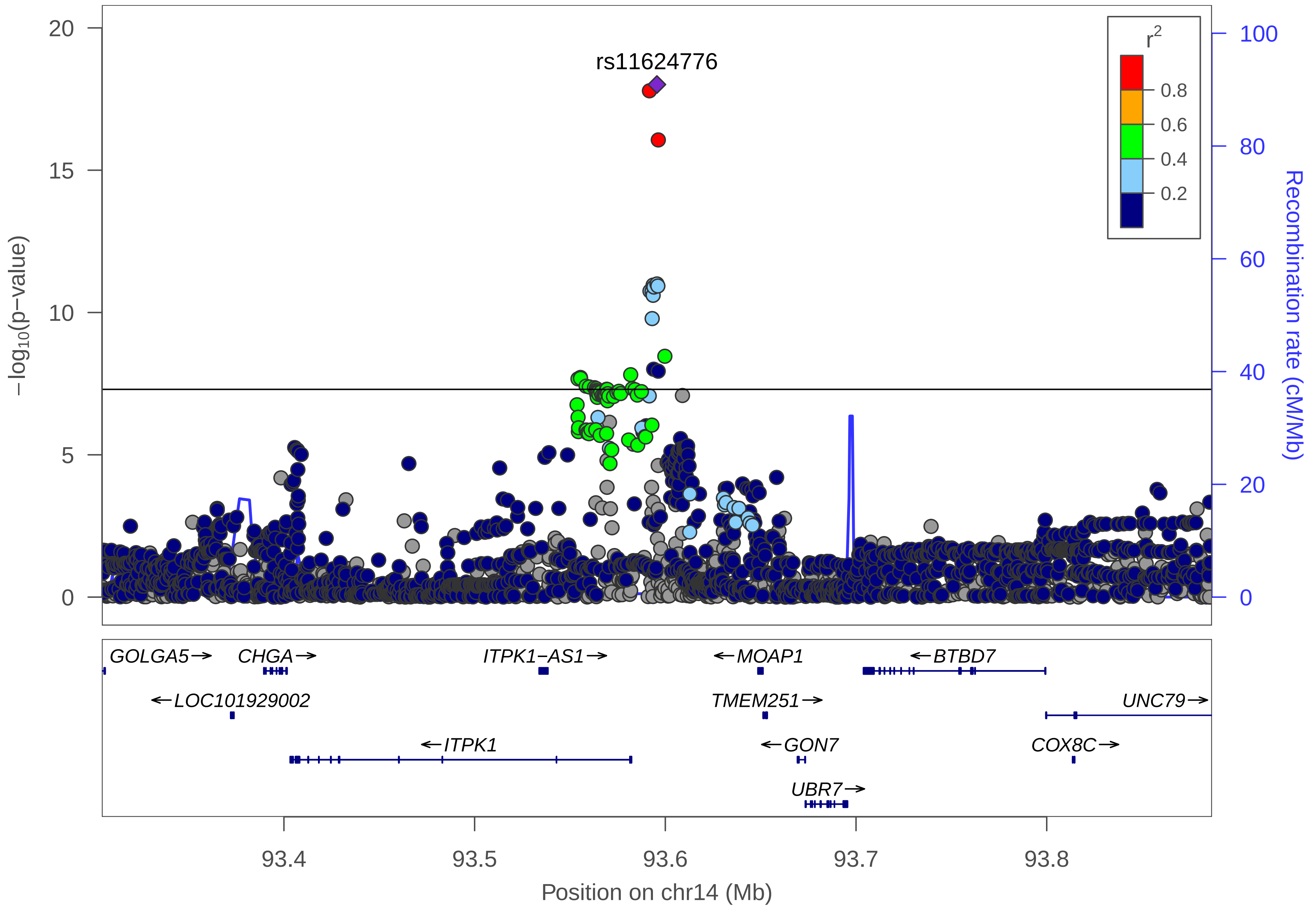

rs1245463
−log10(p−value)
15
10
5
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
r2
0.8
0.6
0.4
0.2
MIR4307HG→
MIR4307→
27.4
27.5
27.6
27.7
27.8
27.9
Position on chr14 (Mb)

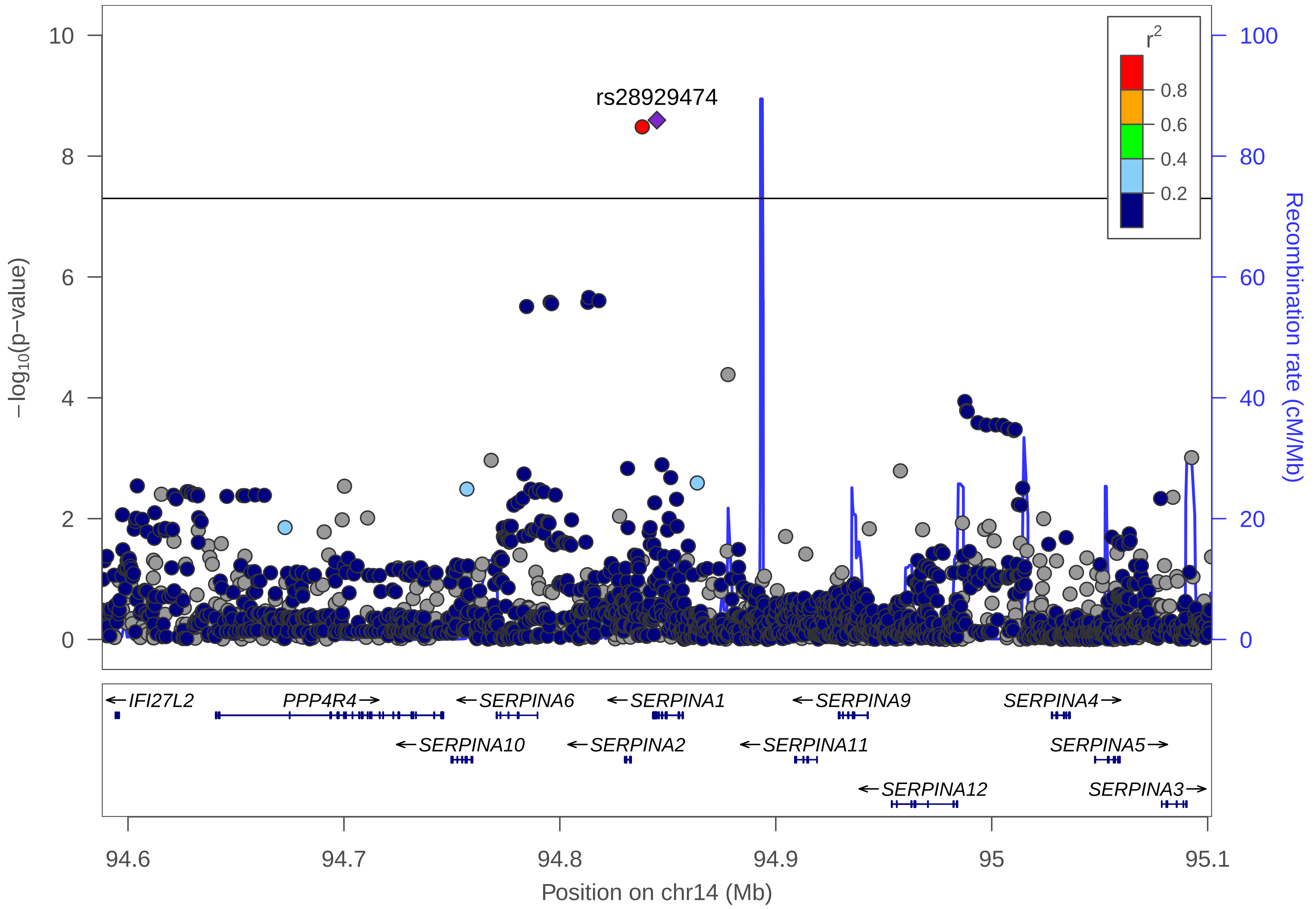

rs1542668
r^2
0.8
0.6
0.4
0.2
−log10(p−value)
Recombination rate (cM/Mb)
0
2
4
6
8
10
0
20
40
60
80
100
LRFN5→
42.2
42.4
42.6
42.8
Position on chr14 (Mb)

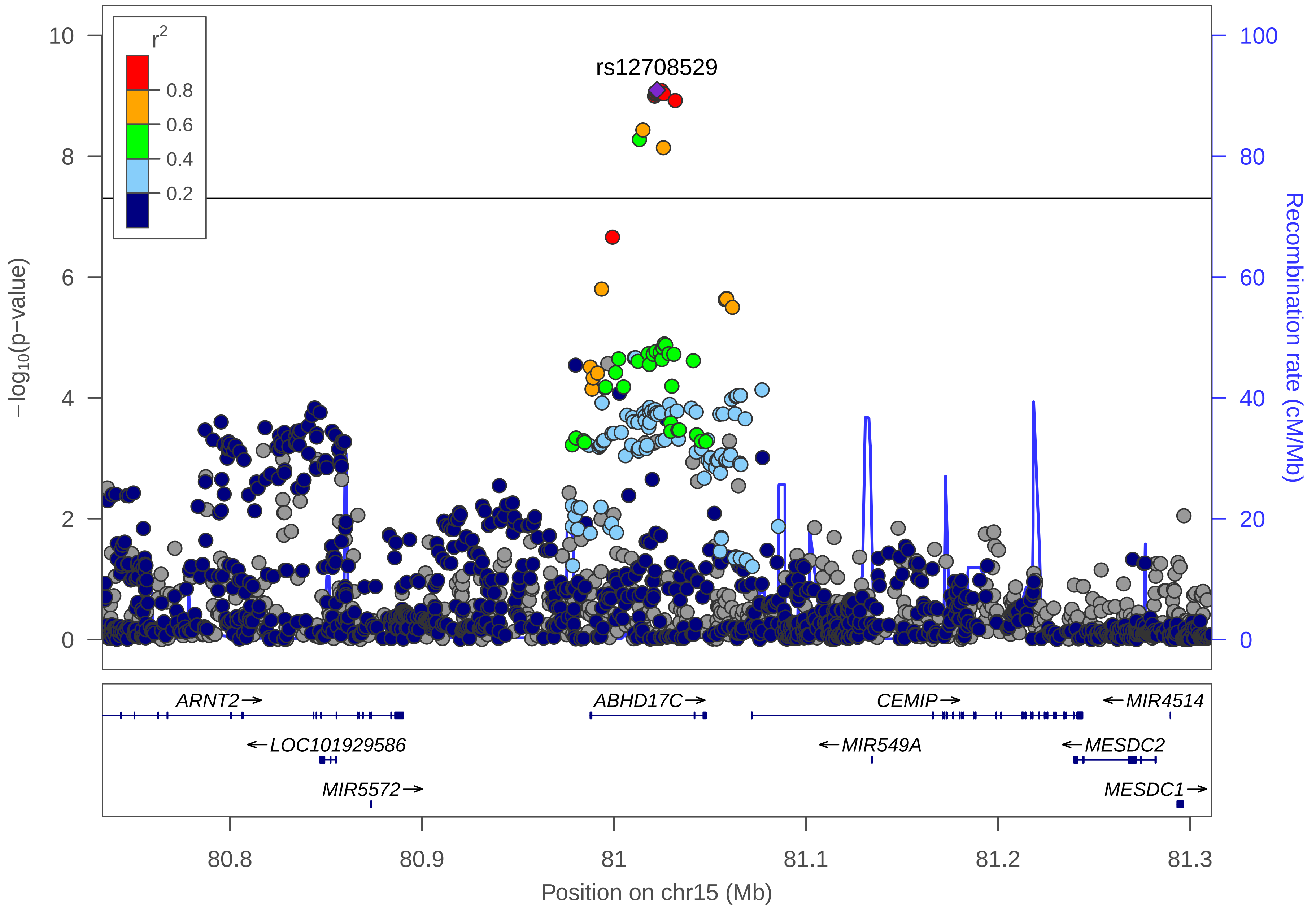

r²
0.8
0.6
0.4
0.2
rs28756401
10
8
6
4
2
0
−log₁₀(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←C14orf37
ACTR10→
ARID4A→
←TIMM9
DACT1→
PSMA3→
TOMM20L→
←PSMA3−AS1
KIAA0586→
58.5
58.6
58.7
58.8
58.9
59
59.1
Position on chr14 (Mb)

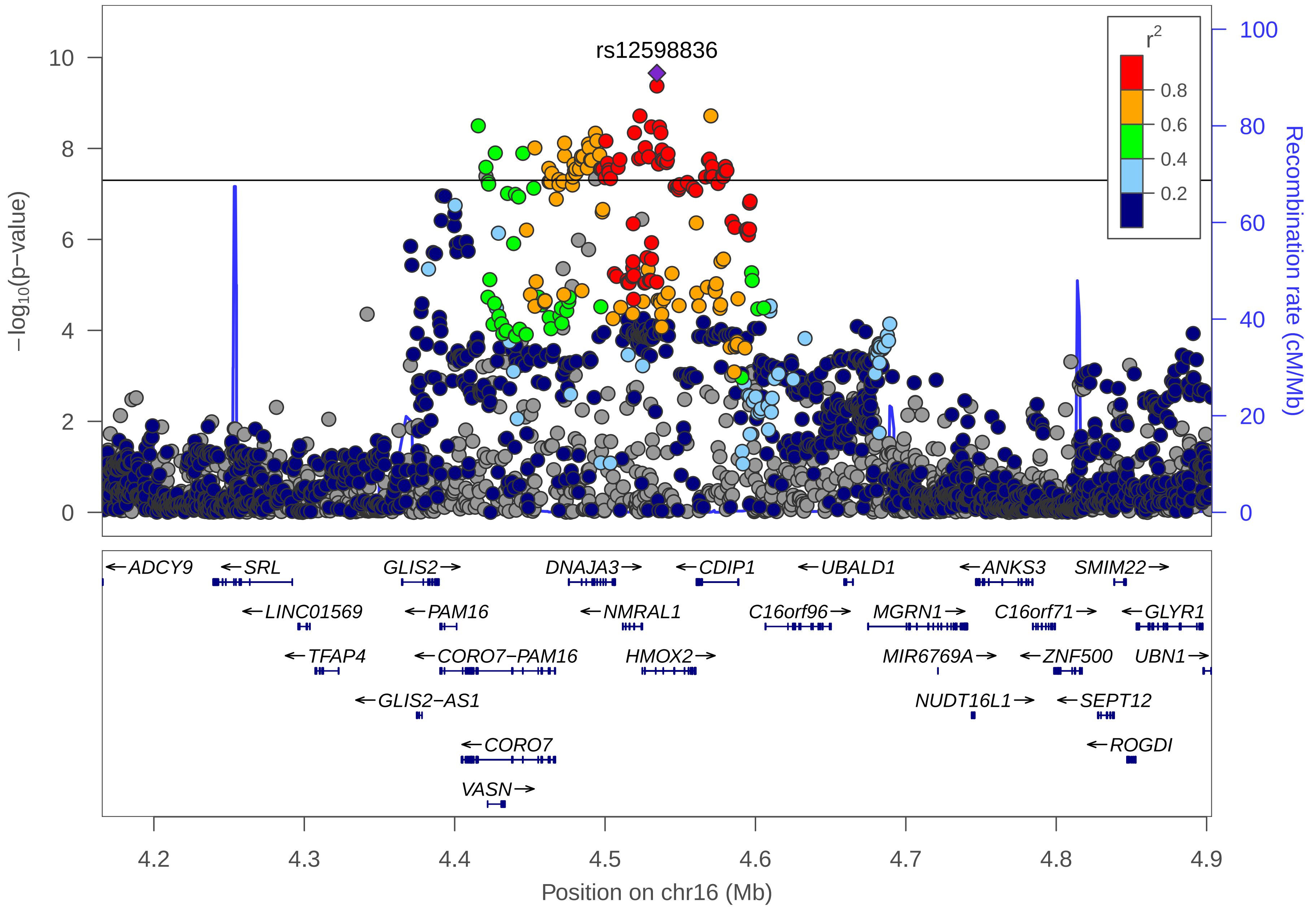

r²
0.8
0.6
0.4
0.2
rs55707505
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
←NPC2
←MIR4709
ISCA2→
←LTBP2
←AREL1
FCF1→
YLPM1→
←PROX2
DLST→
←RPS6KL1
←PGF
EIF2B2→
←MLH3
←ACYP1
ZC2HC1C→
←NEK9
←TMED10
FOS→
LINC01220→
75
75.2
75.4
75.6
Position on chr14 (Mb)

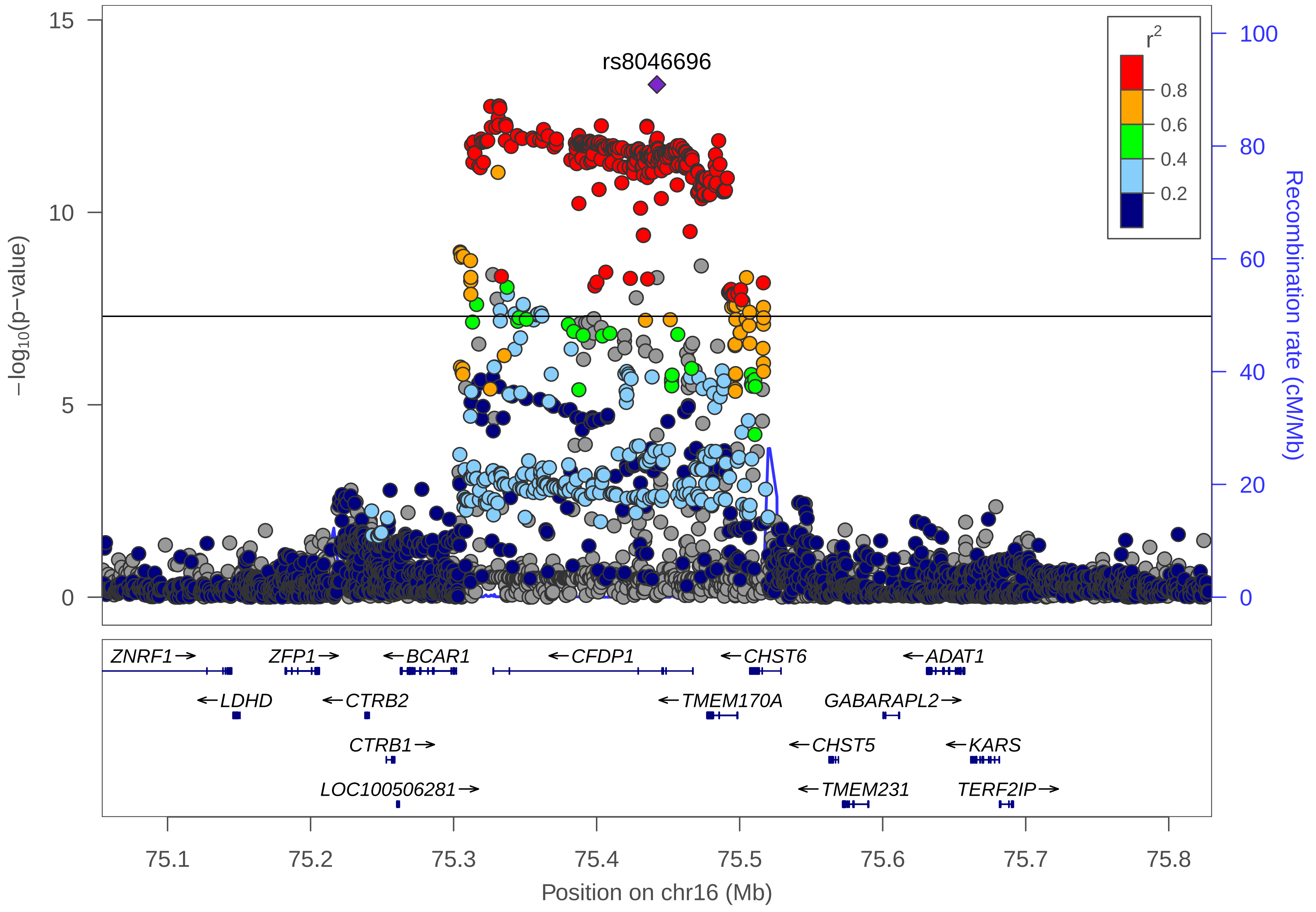

rs75002882
r²
0.8
0.6
0.4
0.2
−log₁₀(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
TTLL5→
IFT43→
GPATCH2L→
ESRRB→
←TGFB3
76.2
76.3
76.4
76.5
76.6
76.7
76.8
Position on chr14 (Mb)

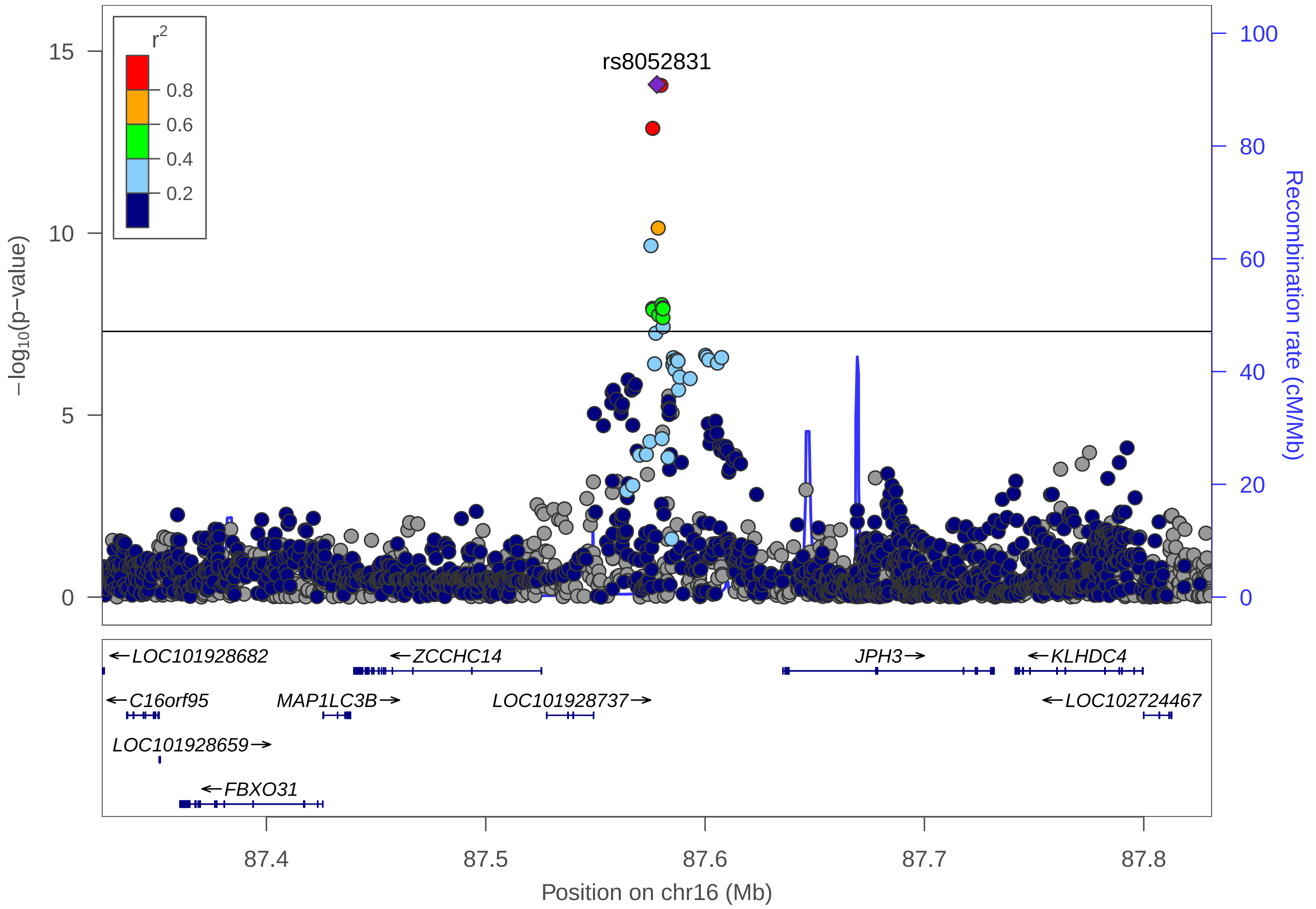

rs11624776
r2
0.8
0.6
0.4
0.2
20
15
10
5
0
$-\log_{10}$(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
GOLGA5→
CHGA→
ITPK1−AS1→
←MOAP1
←BTBD7
←LOC101929002
TMEM251→
UNC79→
←ITPK1
←GON7
COX8C→
UBR7→
93.4
93.5
93.6
93.7
93.8
Position on chr14 (Mb)

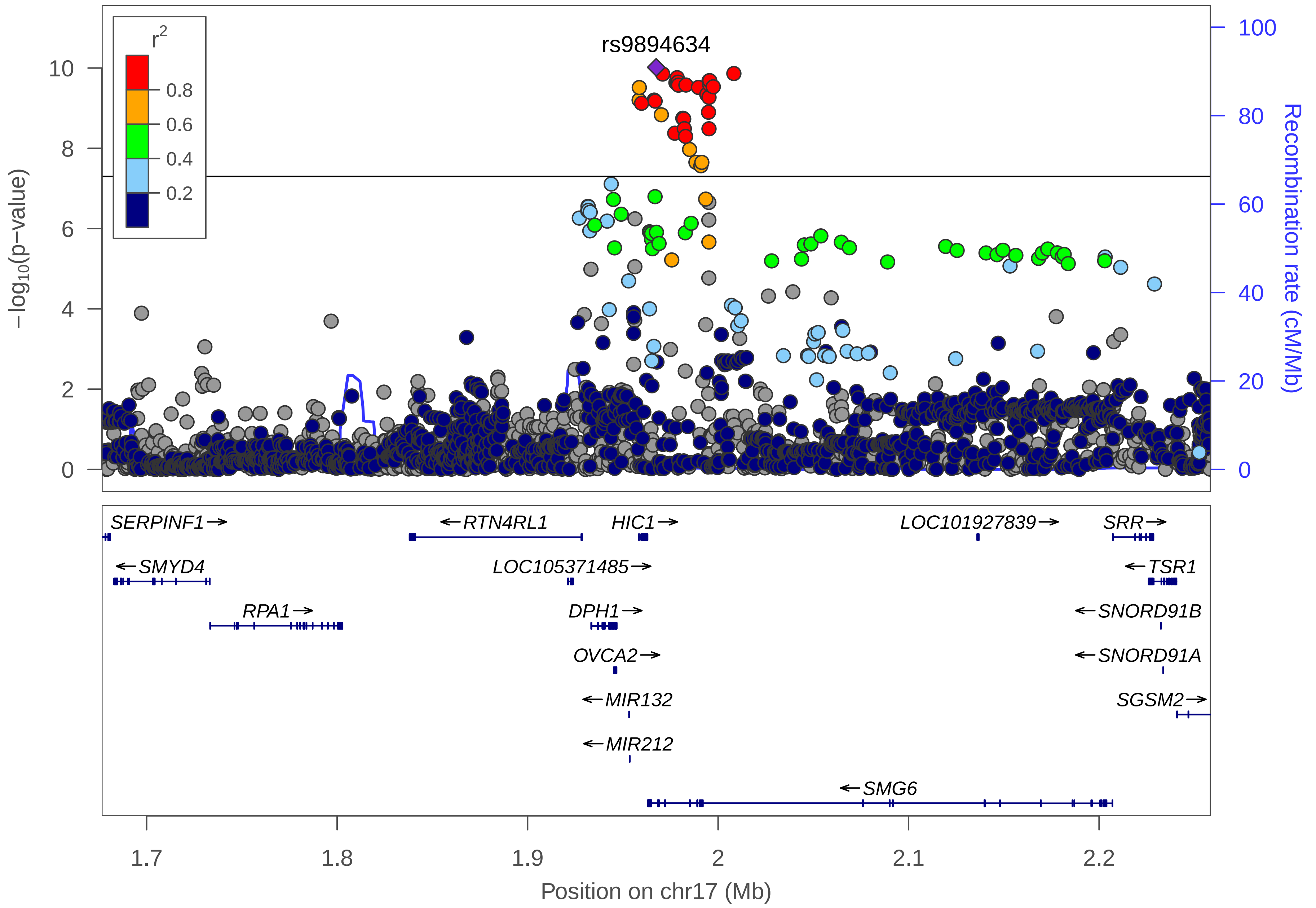

rs28929474
r2
0.8
0.6
0.4
0.2
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
←IFI27L2
PPP4R4→
←SERPINA6
←SERPINA1
←SERPINA9
SERPINA4→
←SERPINA10
←SERPINA2
←SERPINA11
SERPINA5→
←SERPINA12
SERPINA3→
94.6
94.7
94.8
94.9
95
95.1
Position on chr14 (Mb)

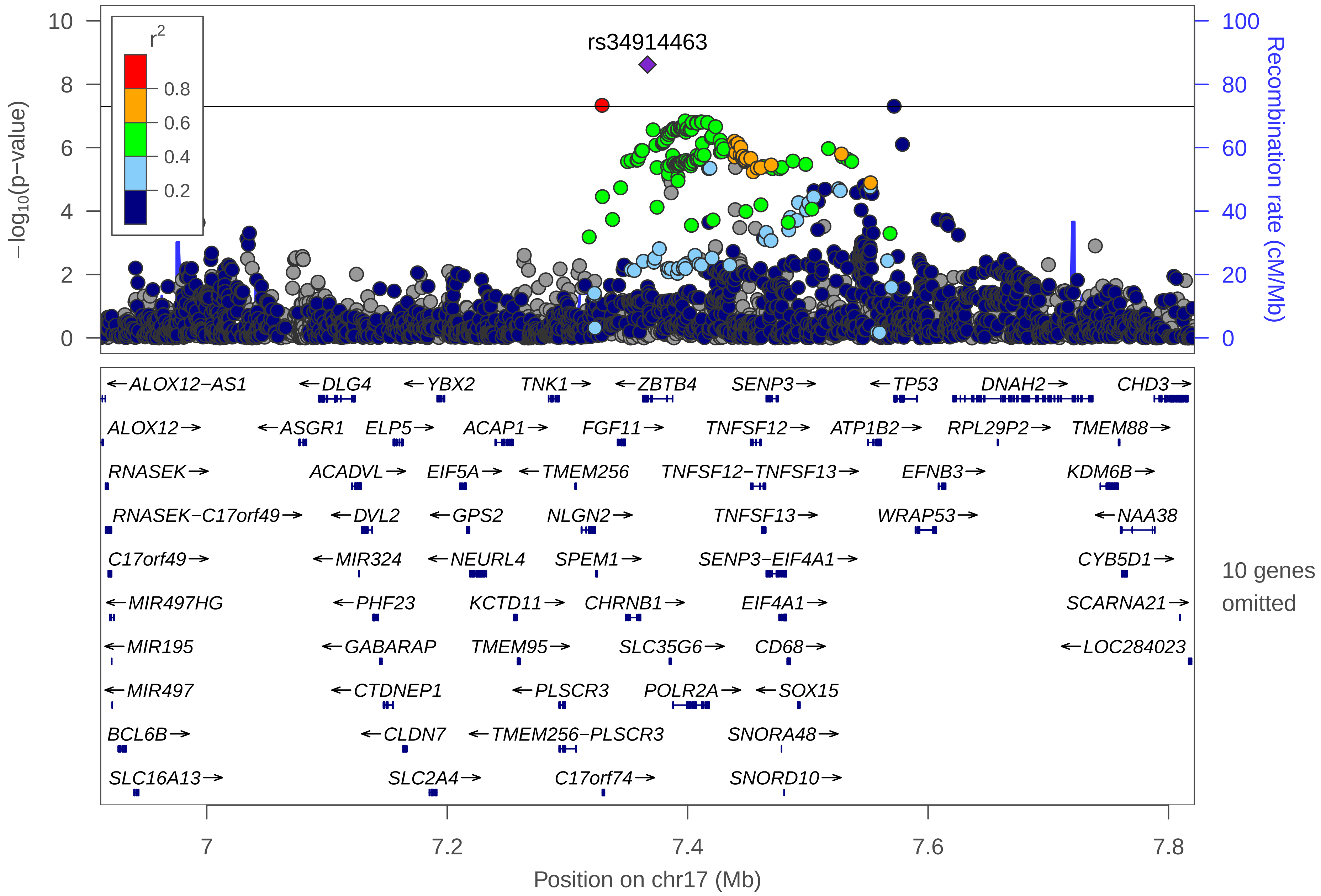

r²
0.8
0.6
0.4
0.2
rs12708529
10
8
6
4
2
0
$-\log_{10}$(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
ARNT2→
ABHD17C→
CEMIP→
←MIR4514
←LOC101929586
←MIR549A
←MESDC2
MIR5572→
MESDC1→
80.8
80.9
81
81.1
81.2
81.3
Position on chr15 (Mb)


rs12598836
r2
0.8
0.6
0.4
0.2
−log10(p−value)
Recombination rate (cM/Mb)
0
2
4
6
8
10
0
20
40
60
80
100
ADCY9
SRL
GLIS2
DNAJA3
CDIP1
UBALD1
ANKS3
SMIM22
LINC01569
PAM16
NMRAL1
C16orf96
MGRN1
C16orf71
GLYR1
TFAP4
CORO7−PAM16
HMOX2
MIR6769A
ZNF500
UBN1
GLIS2−AS1
NUDT16L1
SEPT12
CORO7
ROGDI
VASN
4.2
4.3
4.4
4.5
4.6
4.7
4.8
4.9
Position on chr16 (Mb)

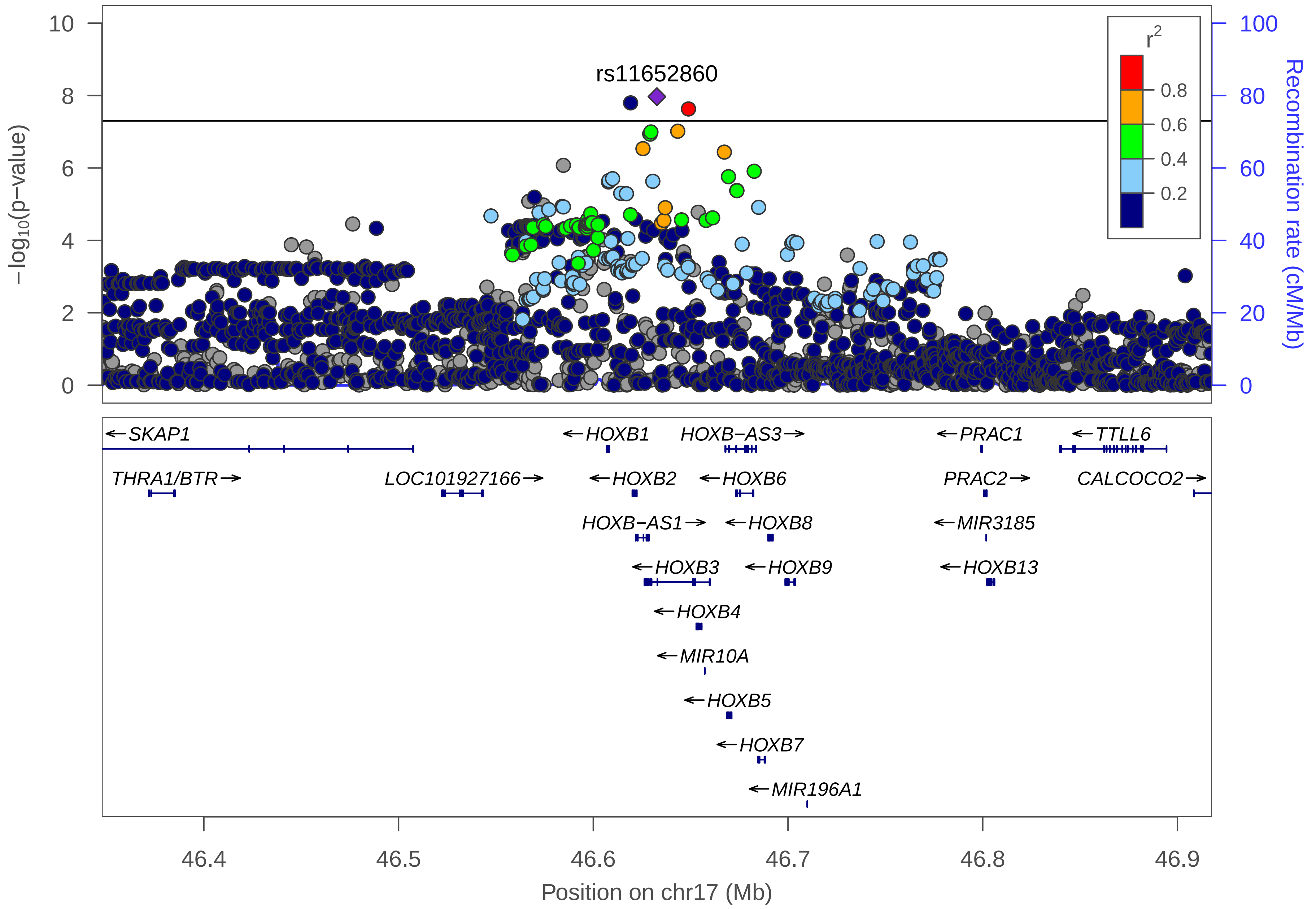

rs8046696
r²
0.8
0.6
0.4
0.2
15
10
5
0
100
80
60
40
20
0
−log₁₀(p−value)
Recombination rate (cM/Mb)
ZNRF1→
ZFP1→
←BCAR1
←CFDP1
←CHST6
←ADAT1
←LDHD
←CTRB2
←TMEM170A
GABARAPL2→
CTRB1→
←CHST5
←KARS
LOC100506281→
←TMEM231
TERF2IP→
75.1
75.2
75.3
75.4
75.5
75.6
75.7
75.8
Position on chr16 (Mb)

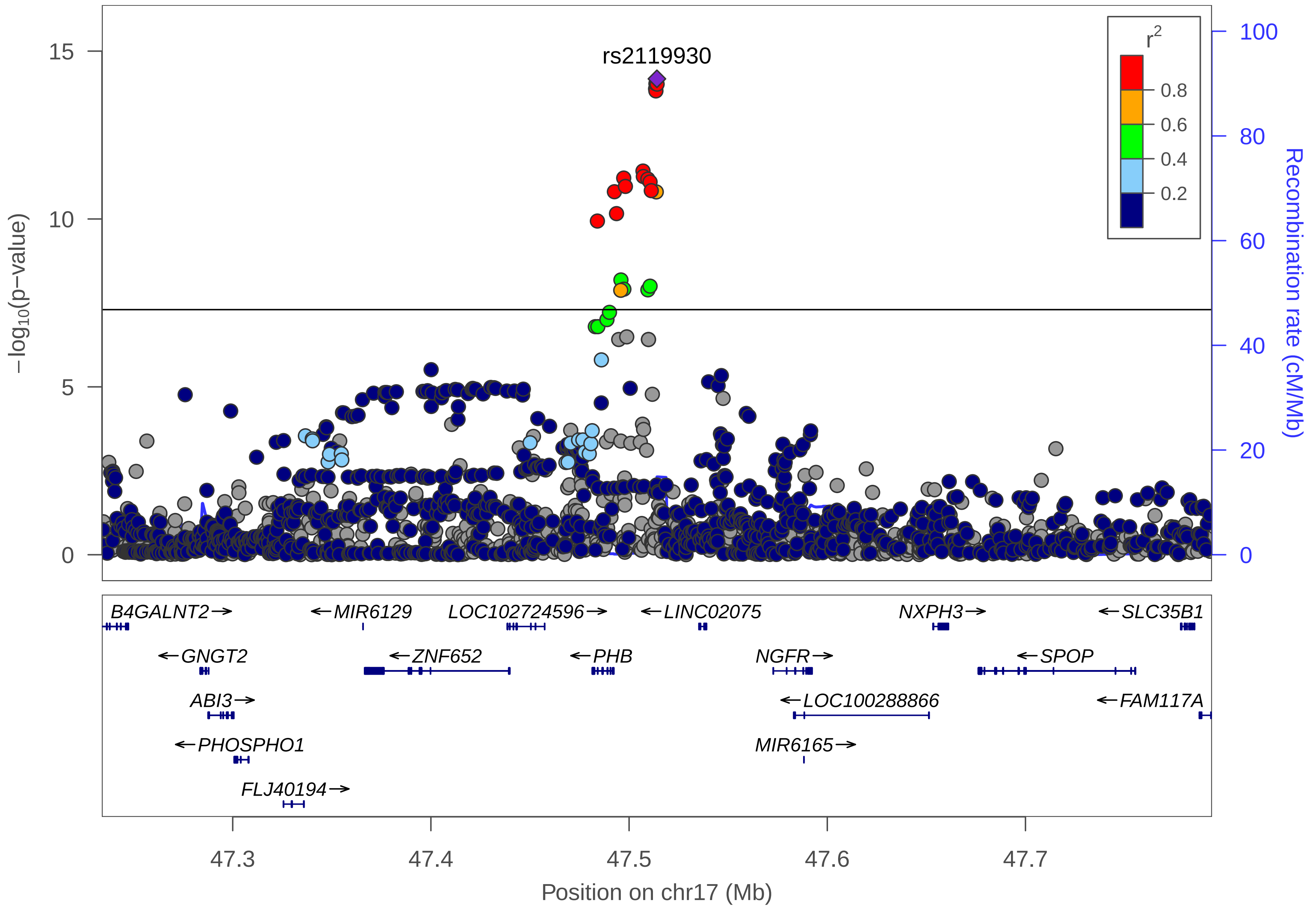

r^2
0.8
0.6
0.4
0.2
rs8052831
15
10
5
0
$-\log_{10}$(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←LOC101928682
←ZCCHC14
JPH3→
←KLHDC4
←C16orf95
MAP1LC3B→
LOC101928737→
←LOC102724467
LOC101928659→
←FBXO31
87.4
87.5
87.6
87.7
87.8
Position on chr16 (Mb)

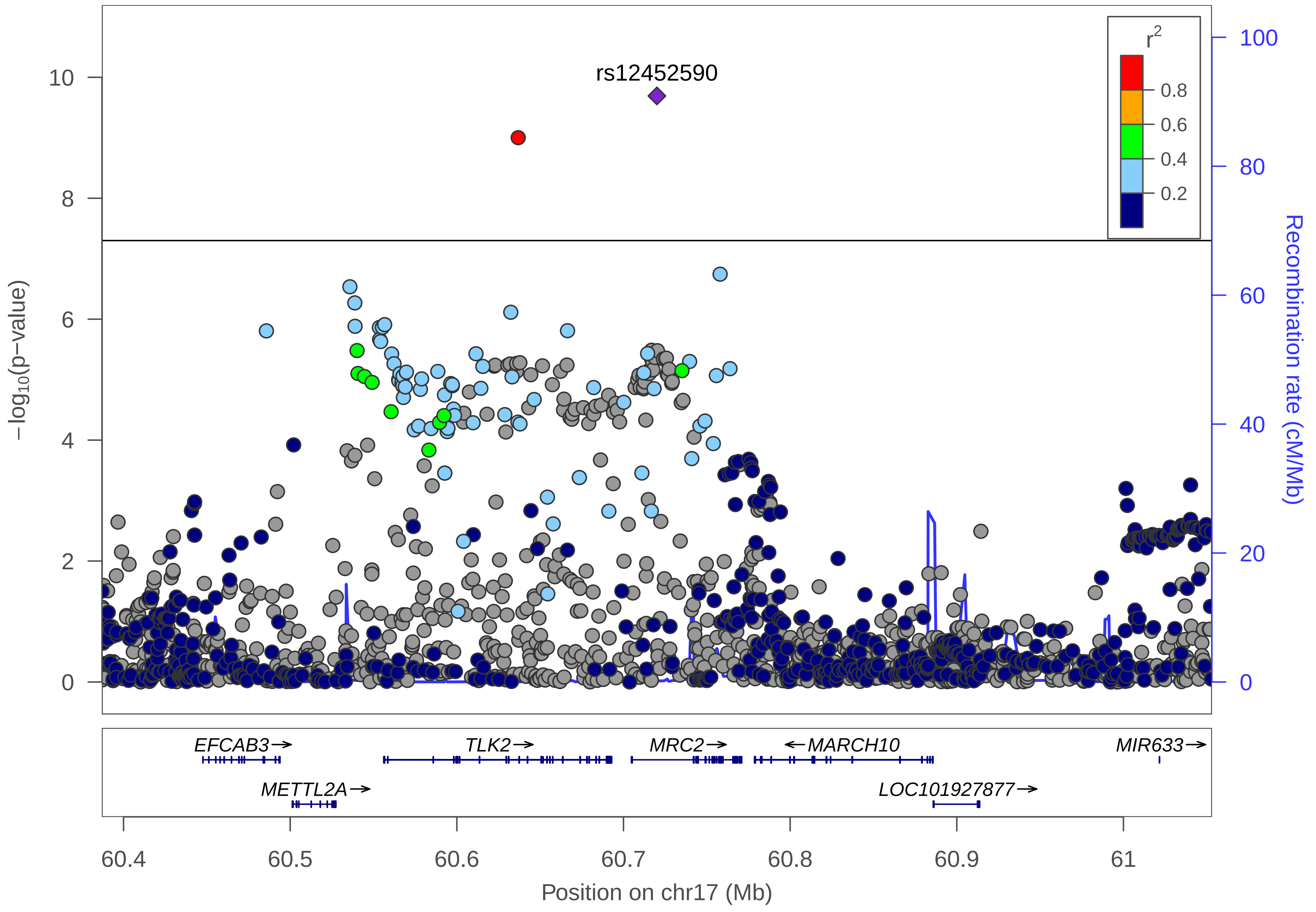

r2
0.8
0.6
0.4
0.2
rs9894634
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
SERPINF1→
←RTN4RL1
HIC1→
LOC101927839→
SRR→
←SMYD4
LOC105371485→
←TSR1
RPA1→
DPH1→
←SNORD91B
OVCA2→
←SNORD91A
←MIR132
SGSM2→
←MIR212
←SMG6
1.7
1.8
1.9
2
2.1
2.2
Position on chr17 (Mb)



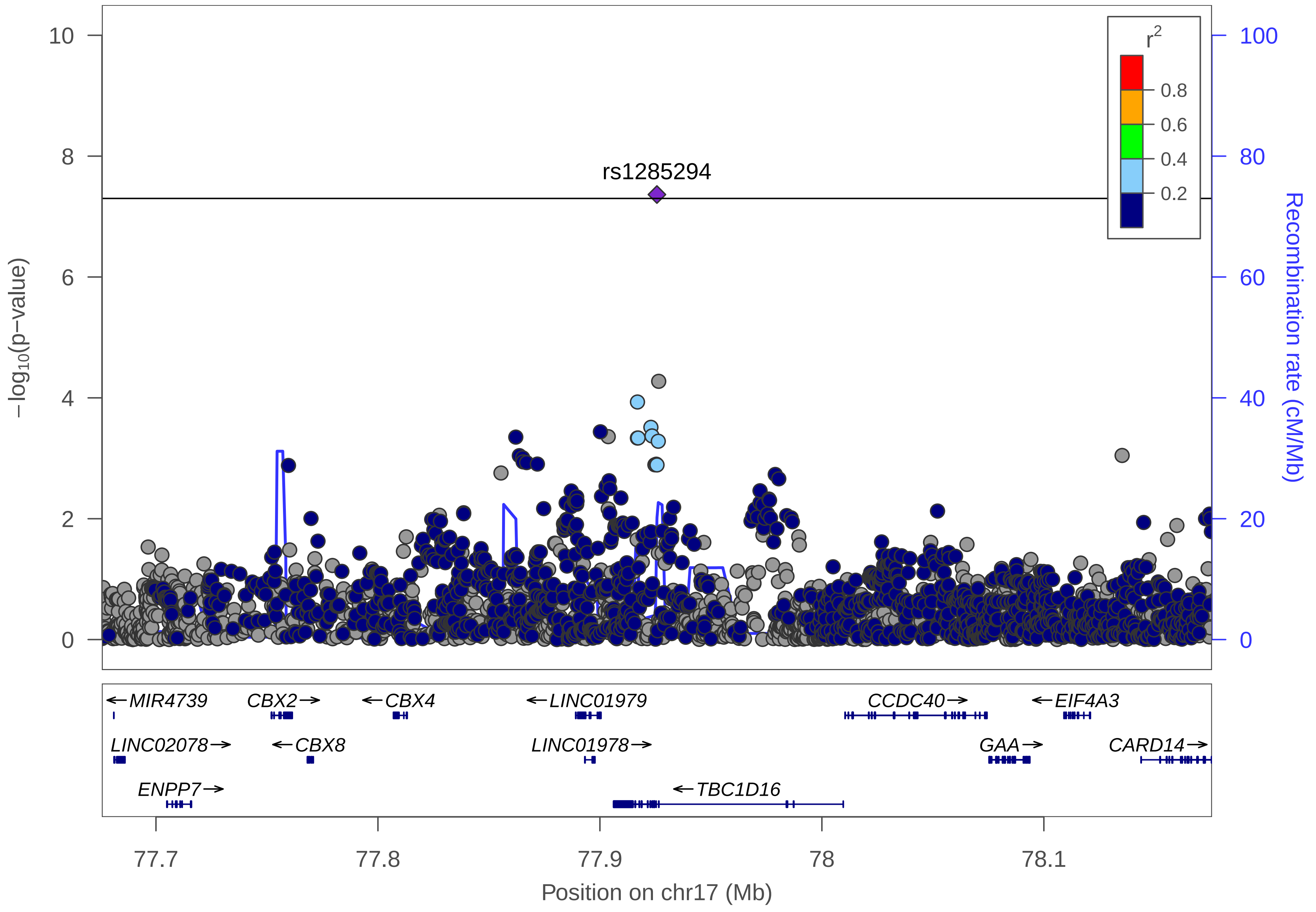
rs34914463
r2
0.8
0.6
0.4
0.2
−log10(p−value)
Recombination rate (cM/Mb)
0
2
4
6
8
10
0
20
40
60
80
100
←ALOX12−AS1
←DLG4
←YBX2
TNK1→
←ZBTB4
SENP3→
←TP53
DNAH2→
CHD3→
ALOX12→
←ASGR1
ELP5→
ACAP1→
FGF11→
TNFSF12→
ATP1B2→
RPL29P2→
TMEM88→
RNASEK→
ACADVL→
EIF5A→
←TMEM256
TNFSF12−TNFSF13→
EFNB3→
KDM6B→
RNASEK−C17orf49→
←DVL2
←GPS2
NLGN2→
TNFSF13→
WRAP53→
←NAA38
C17orf49→
←MIR324
←NEURL4
SPEM1→
SENP3−EIF4A1→
CYB5D1→
←MIR497HG
←PHF23
KCTD11→
CHRNB1→
EIF4A1→
SCARNA21→
←MIR195
←GABARAP
TMEM95→
SLC35G6→
CD68→
←LOC284023
←MIR497
←CTDNEP1
←PLSCR3
POLR2A→
←SOX15
BCL6B→
←CLDN7
←TMEM256−PLSCR3
SNORA48→
SLC16A13→
SLC2A4→
C17orf74→
SNORD10→
10 genes omitted
7
7.2
7.4
7.6
7.8
Position on chr17 (Mb)

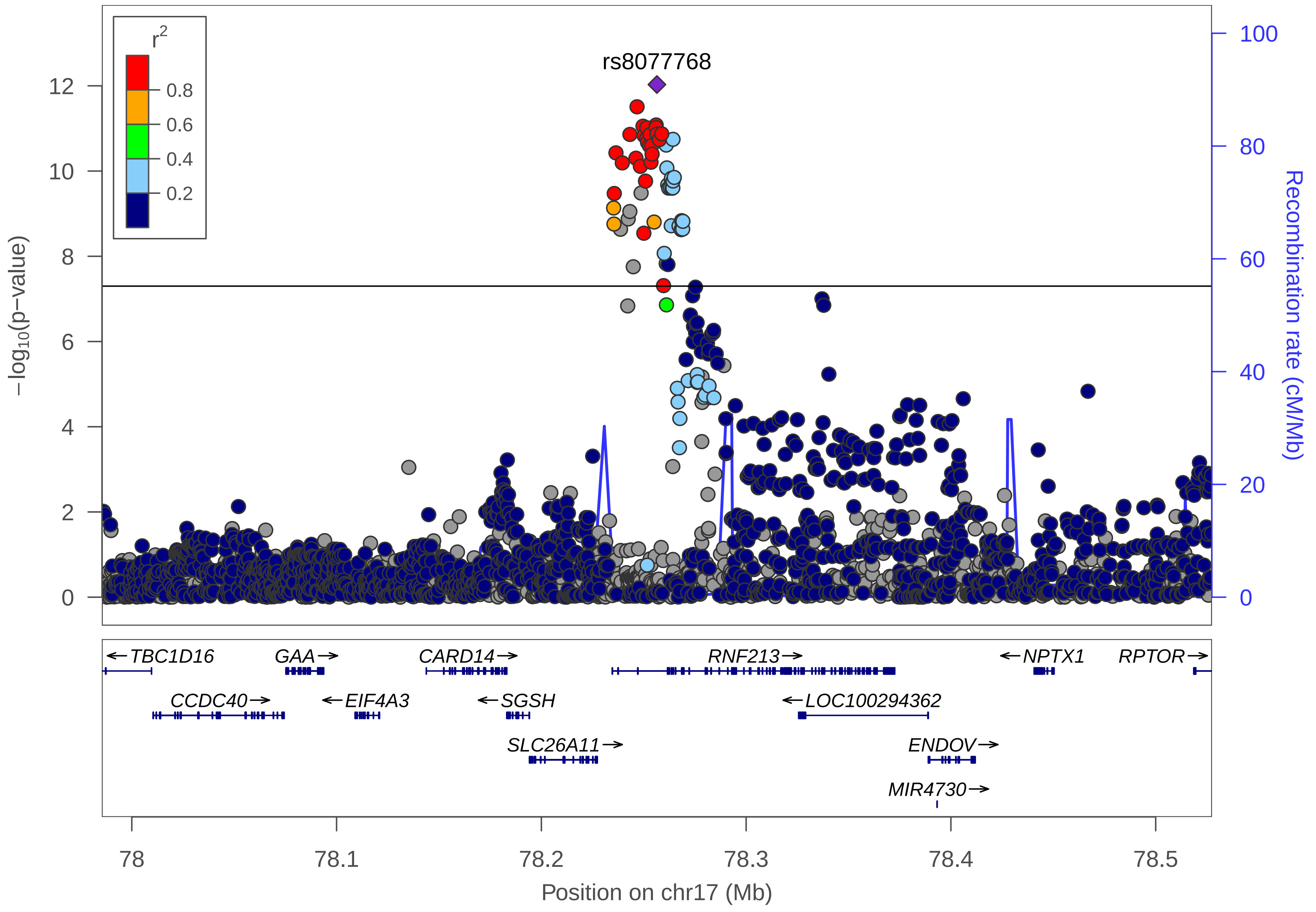

rs11652860
r²
0.8
0.6
0.4
0.2
−log10(p−value)
Recombination rate (cM/Mb)
10
8
6
4
2
0
100
80
60
40
20
0
←SKAP1
THRA1/BTR→
LOC101927166→
←HOXB1
←HOXB2
HOXB−AS1→
←HOXB3
←HOXB4
←MIR10A
←HOXB5
←HOXB7
←MIR196A1
HOXB−AS3→
←HOXB6
←HOXB8
←HOXB9
←PRAC1
PRAC2→
←MIR3185
←HOXB13
←TTLL6
CALCOCO2→
46.4
46.5
46.6
46.7
46.8
46.9
Position on chr17 (Mb)

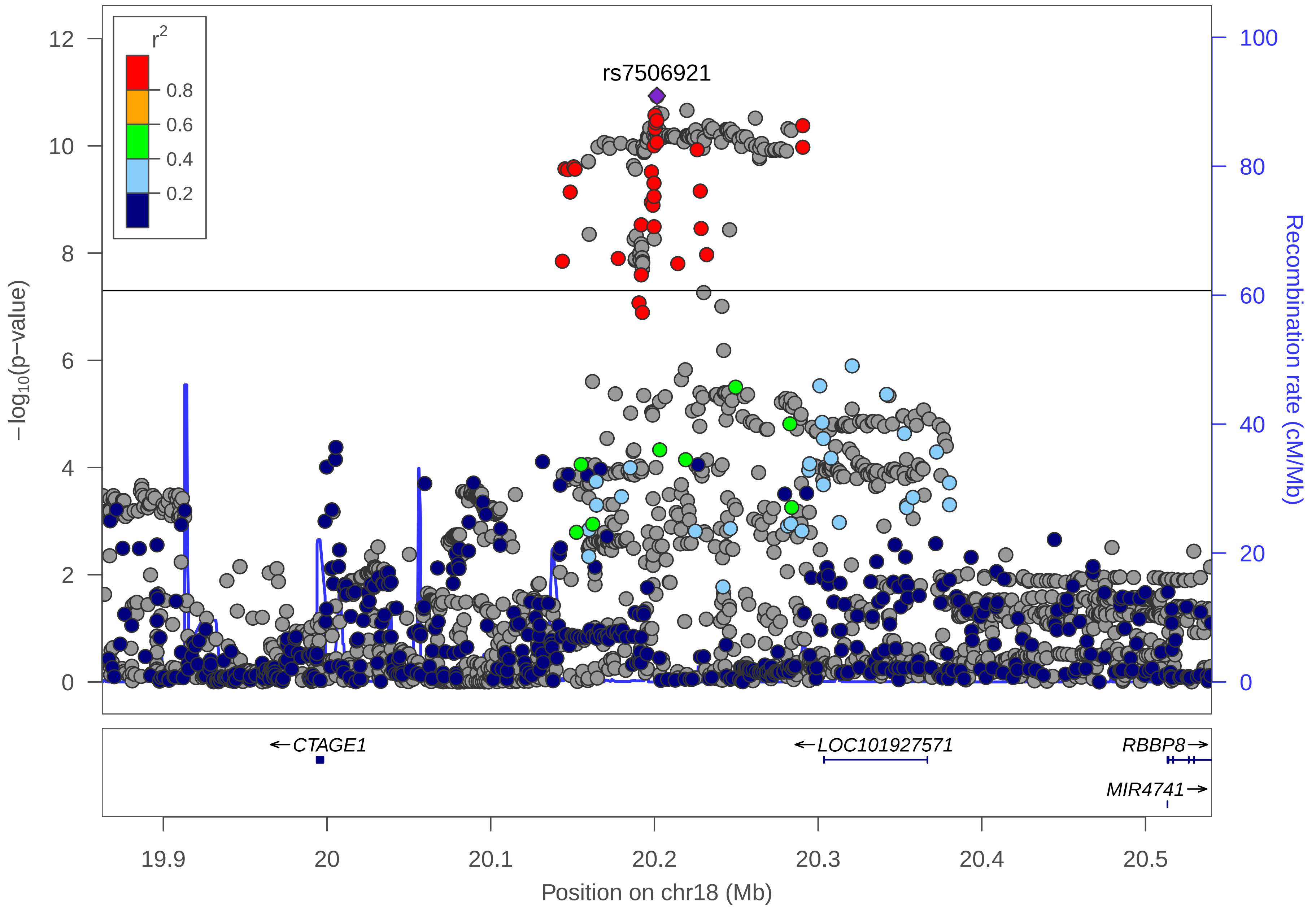

rs2119930
−log10(p−value)
15
10
5
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
r2
0.8
0.6
0.4
0.2
B4GALNT2→
←MIR6129
LOC102724596→
←LINC02075
NXPH3→
←SLC35B1
←GNGT2
←ZNF652
←PHB
NGFR→
←SPOP
ABI3→
←LOC100288866
←FAM117A
←PHOSPHO1
MIR6165→
FLJ40194→
47.3
47.4
47.5
47.6
47.7
Position on chr17 (Mb)

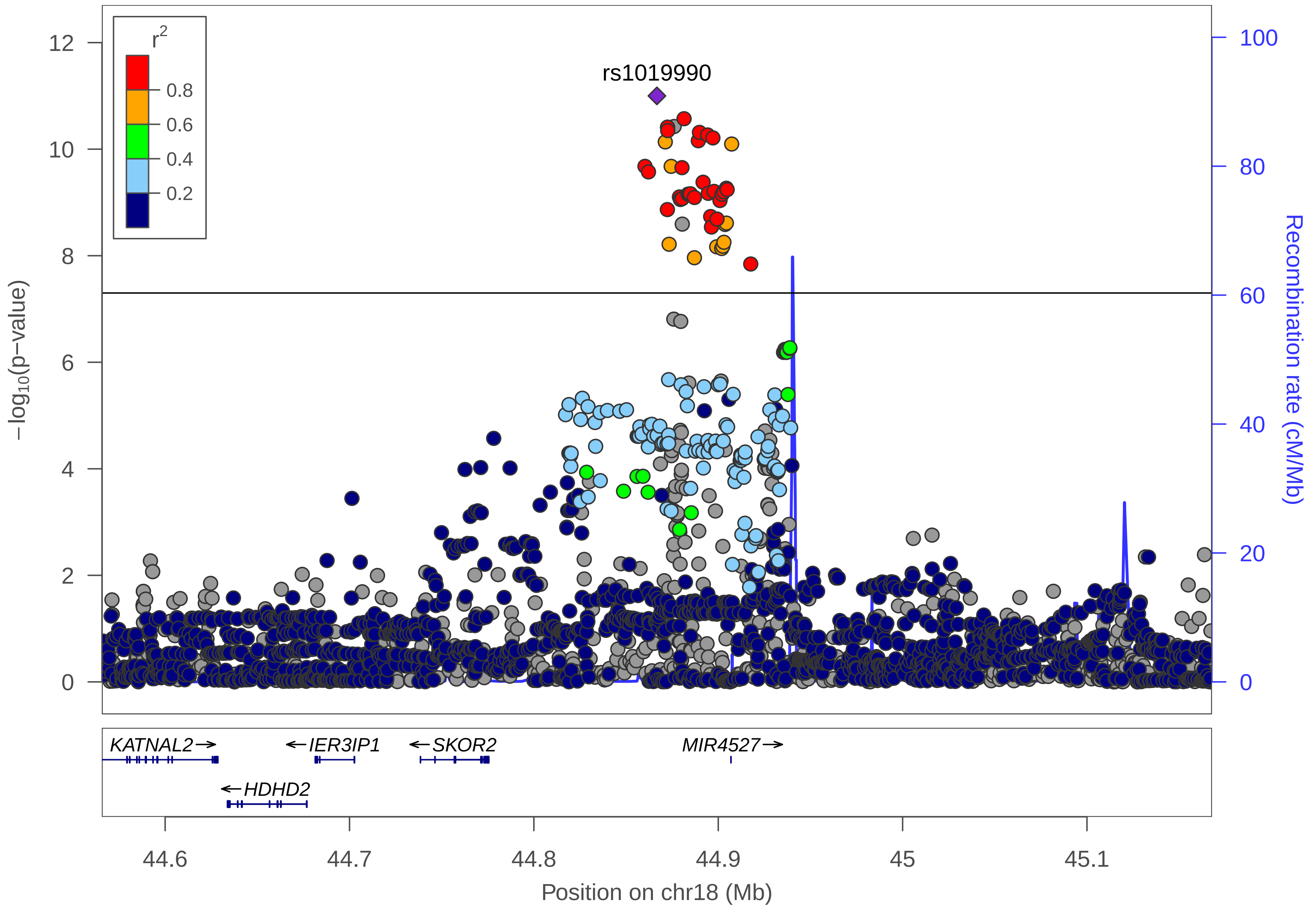


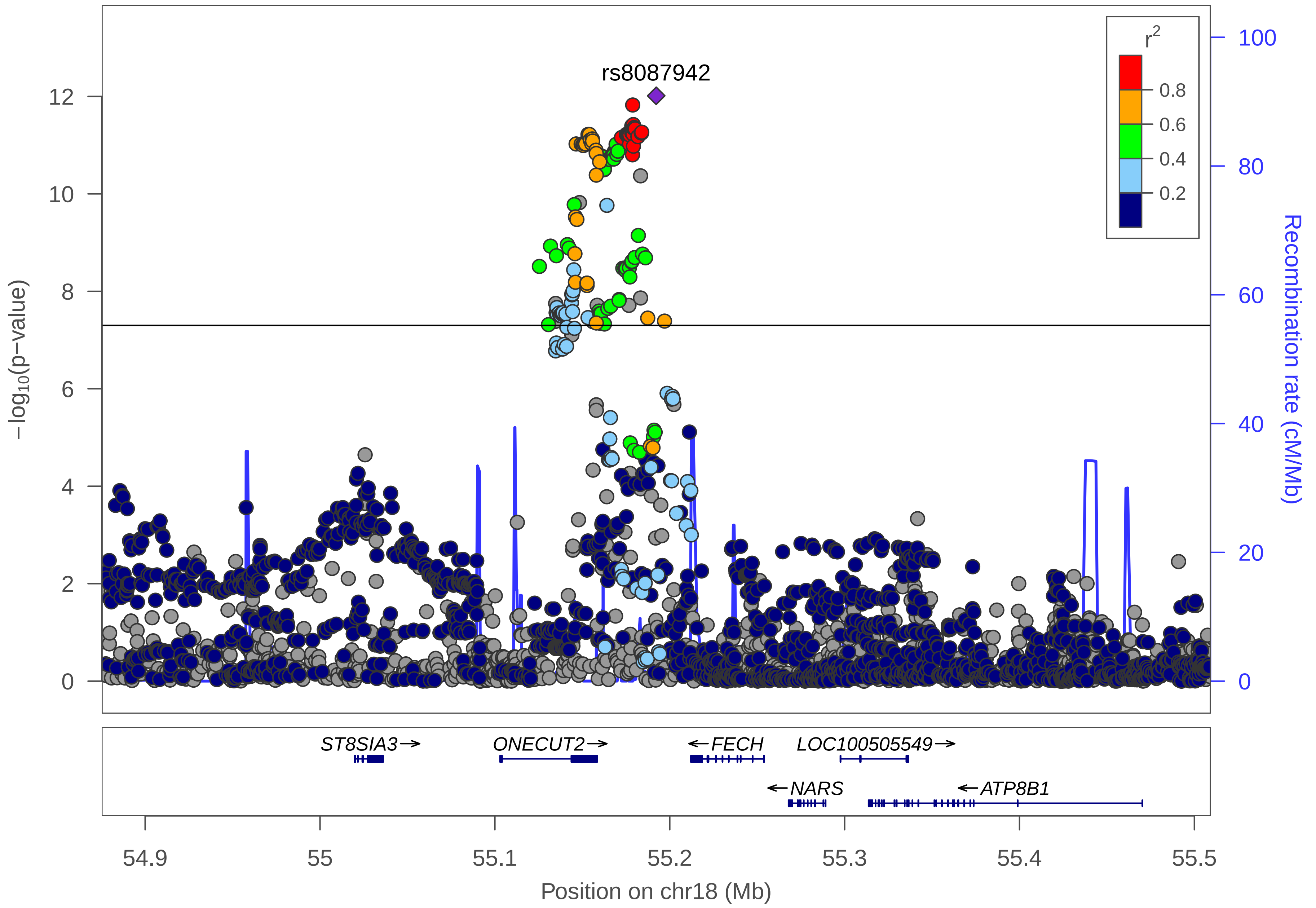
rs12452590
r2
0.8
0.6
0.4
0.2
−log10(p−value)
Recombination rate (cM/Mb)
10
8
6
4
2
0
100
80
60
40
20
0
EFCAB3→
TLK2→
MRC2→
←MARCH10
MIR633→
METTL2A→
LOC101927877→
60.4
60.5
60.6
60.7
60.8
60.9
61
Position on chr17 (Mb)

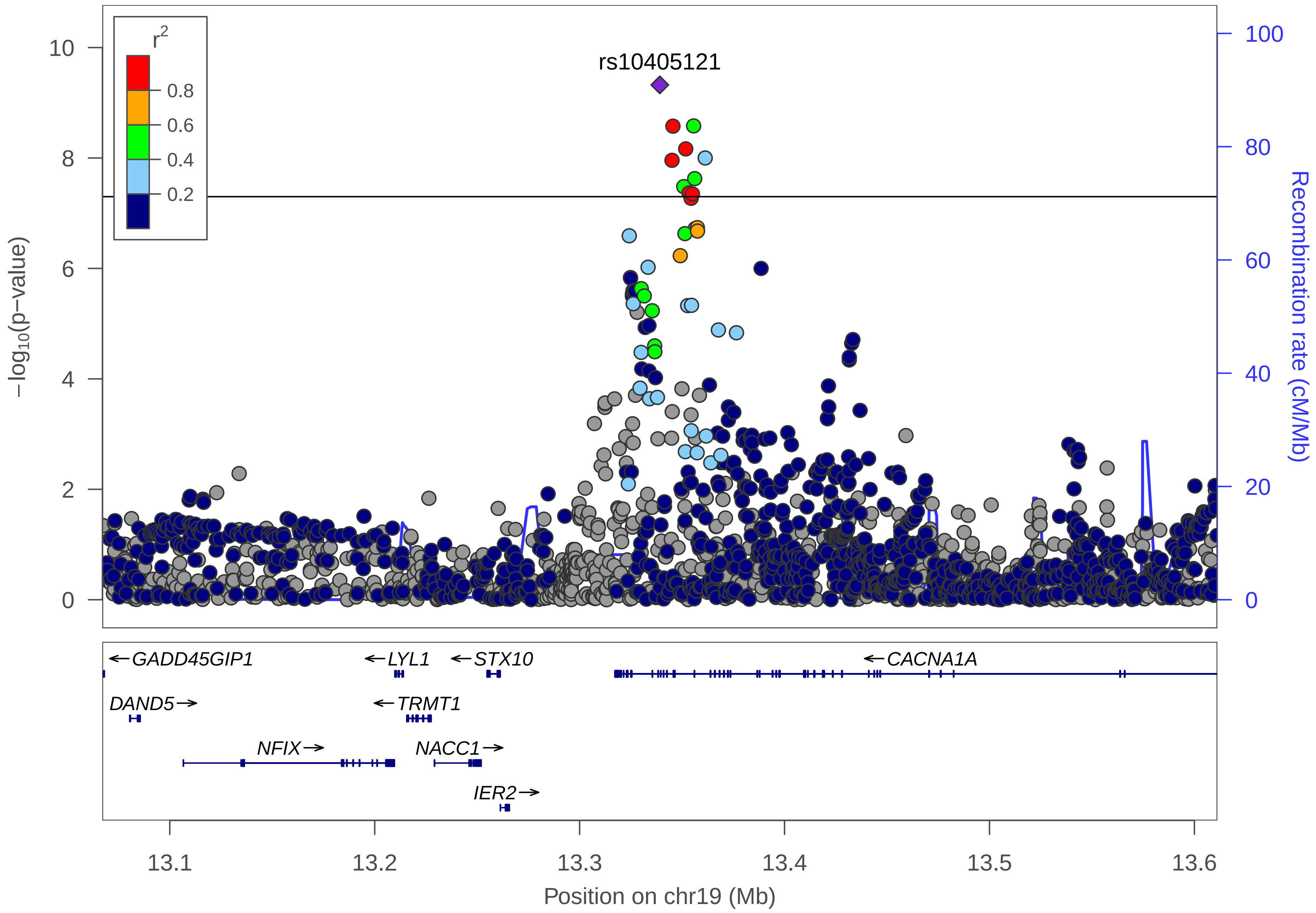

rs1285294
r2
0.8
0.6
0.4
0.2
−log10(p−value)
Recombination rate (cM/Mb)
0
2
4
6
8
10
0
20
40
60
80
100
←MIR4739
CBX2→
←CBX4
←LINC01979
CCDC40→
←EIF4A3
LINC02078→
←CBX8
LINC01978→
GAA→
CARD14→
ENPP7→
←TBC1D16
77.7
77.8
77.9
78
78.1
Position on chr17 (Mb)

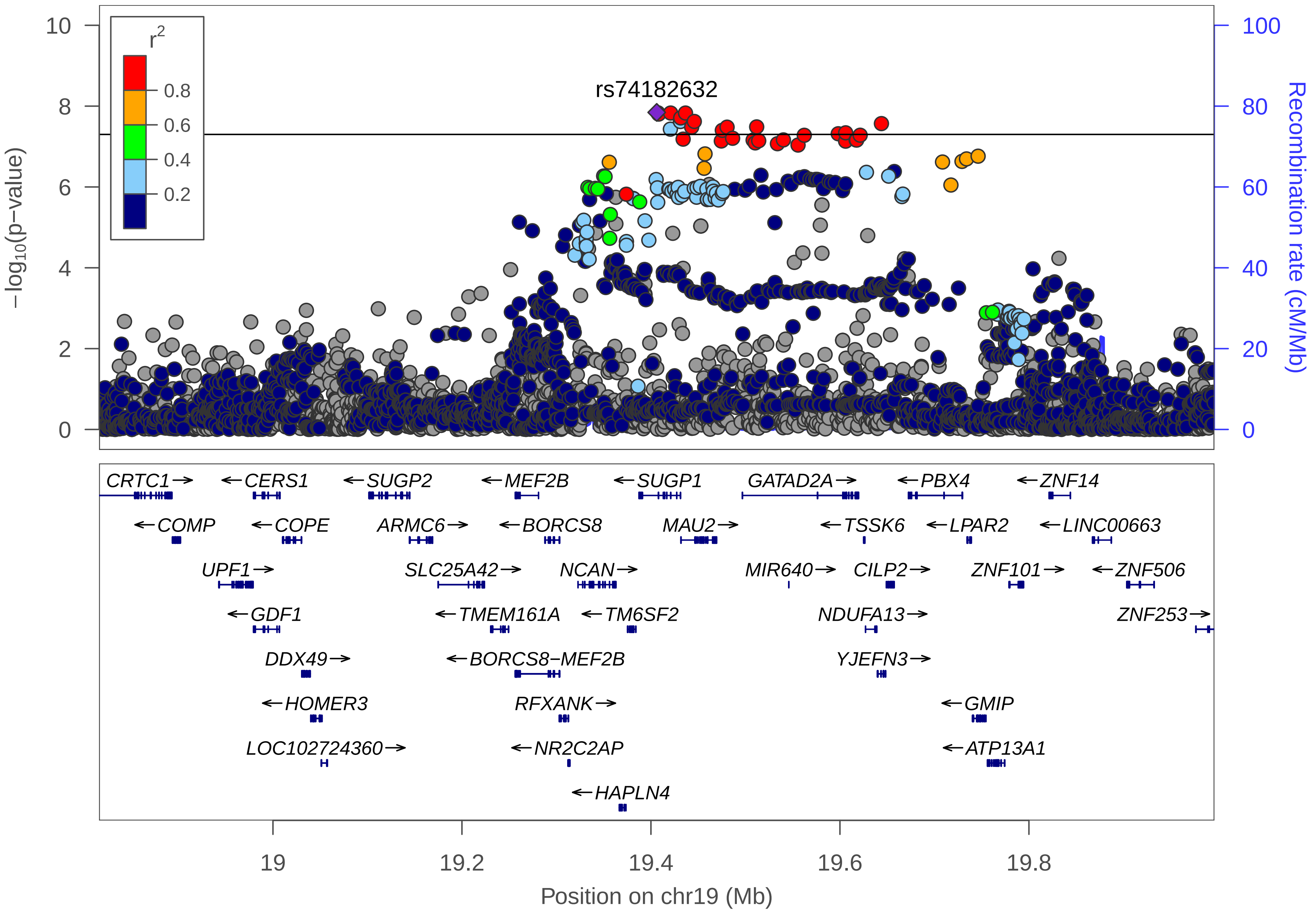

r²
0.8
0.6
0.4
0.2
rs8077768
12
10
8
6
4
2
0
−log₁₀(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←TBC1D16
GAA→
CARD14→
RNF213→
←NPTX1
RPTOR→
CCDC40→
←EIF4A3
←SGSH
←LOC100294362
SLC26A11→
ENDOV→
MIR4730→
78
78.1
78.2
78.3
78.4
78.5
Position on chr17 (Mb)

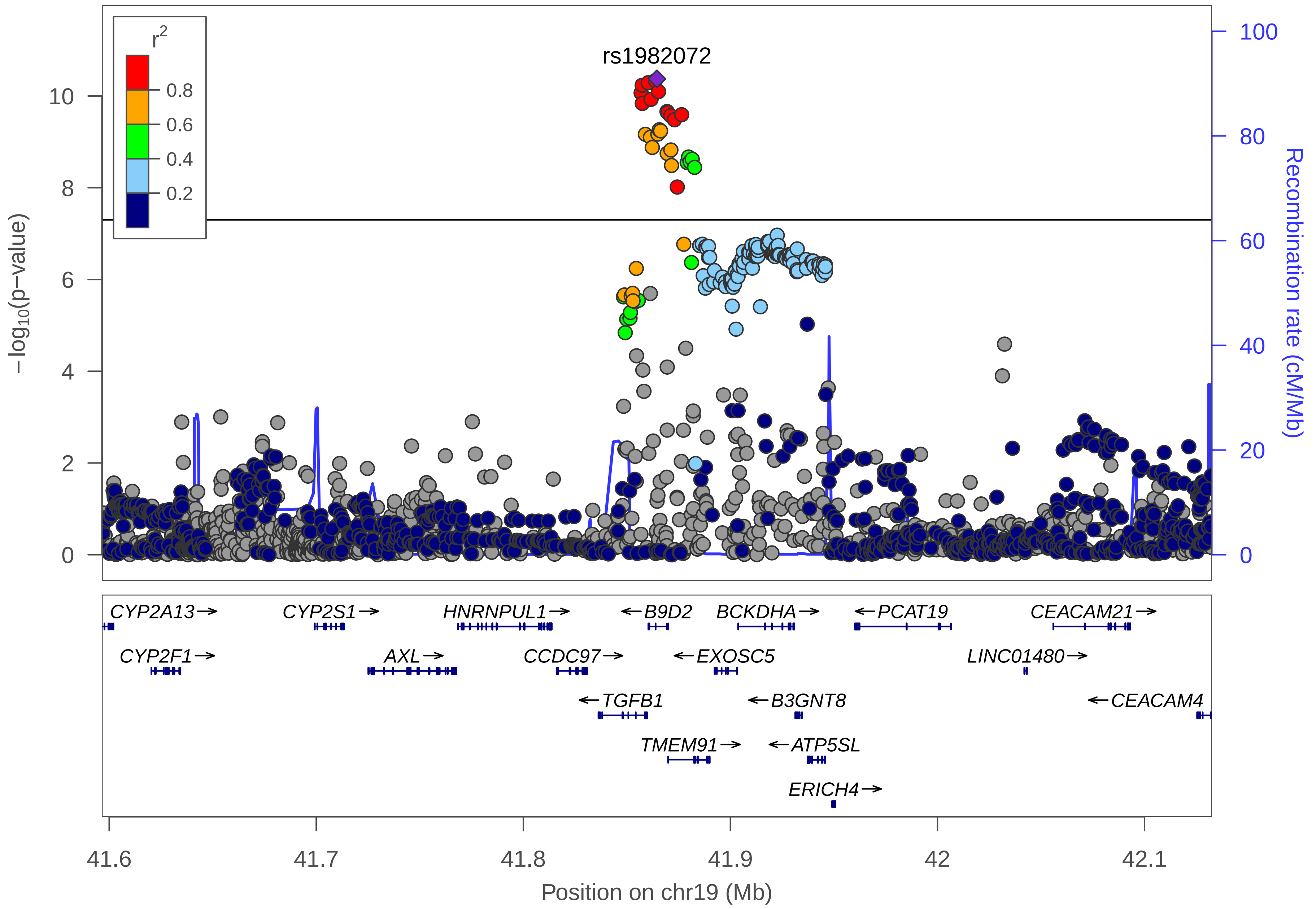

r2
0.8
0.6
0.4
0.2
rs7506921
−log10(p−value)
Recombination rate (cM/Mb)
0
2
4
6
8
10
12
0
20
40
60
80
100
←CTAGE1
←LOC101927571
RBBP8→
MIR4741→
19.9
20
20.1
20.2
20.3
20.4
20.5
Position on chr18 (Mb)

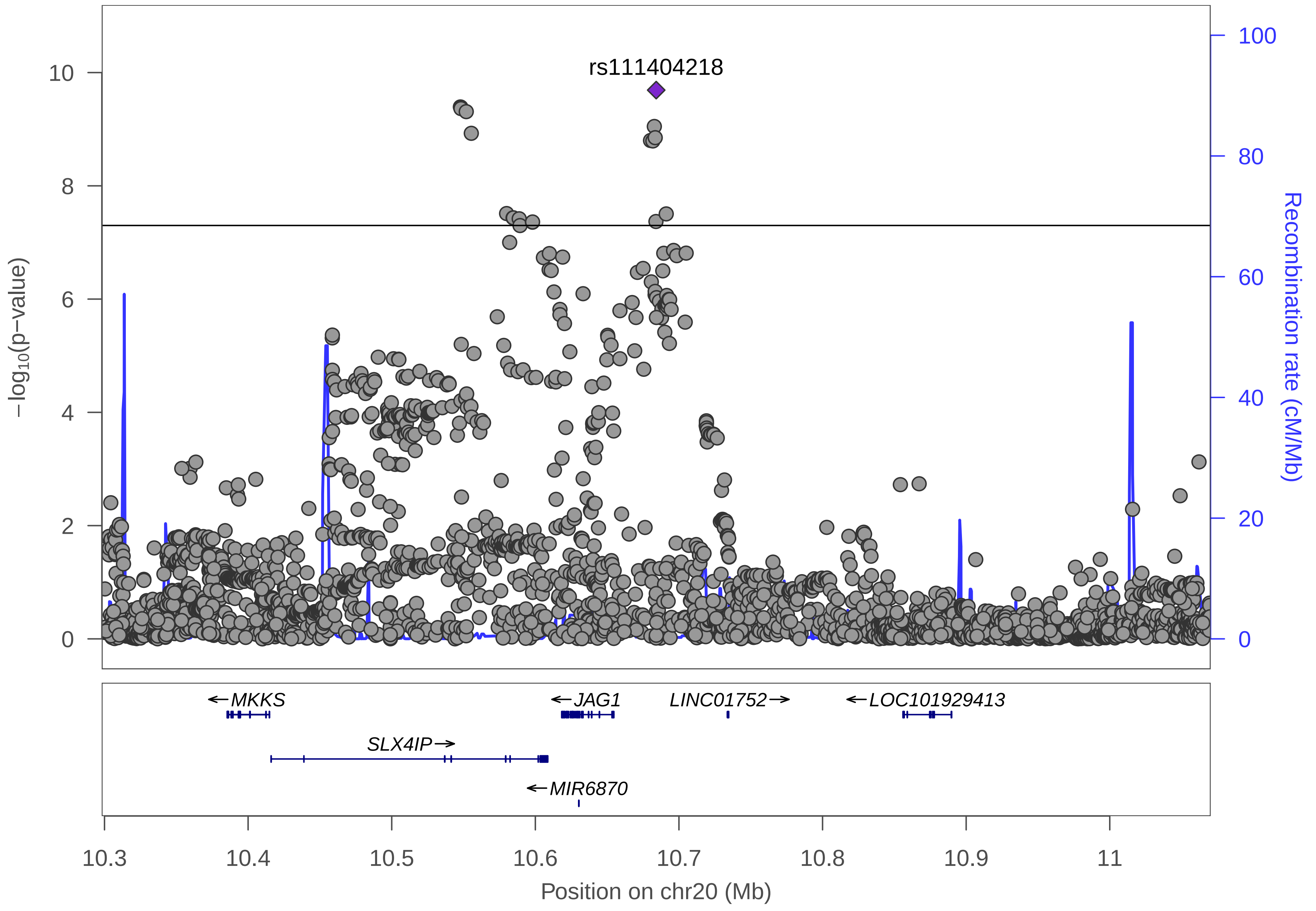

r²
0.8
0.6
0.4
0.2
rs1019990
$-\log_{10}$(p−value)
0
2
4
6
8
10
12
Recombination rate (cM/Mb)
0
20
40
60
80
100
KATNAL2→
←IER3IP1
←SKOR2
MIR4527→
←HDHD2
44.6
44.7
44.8
44.9
45
45.1
Position on chr18 (Mb)

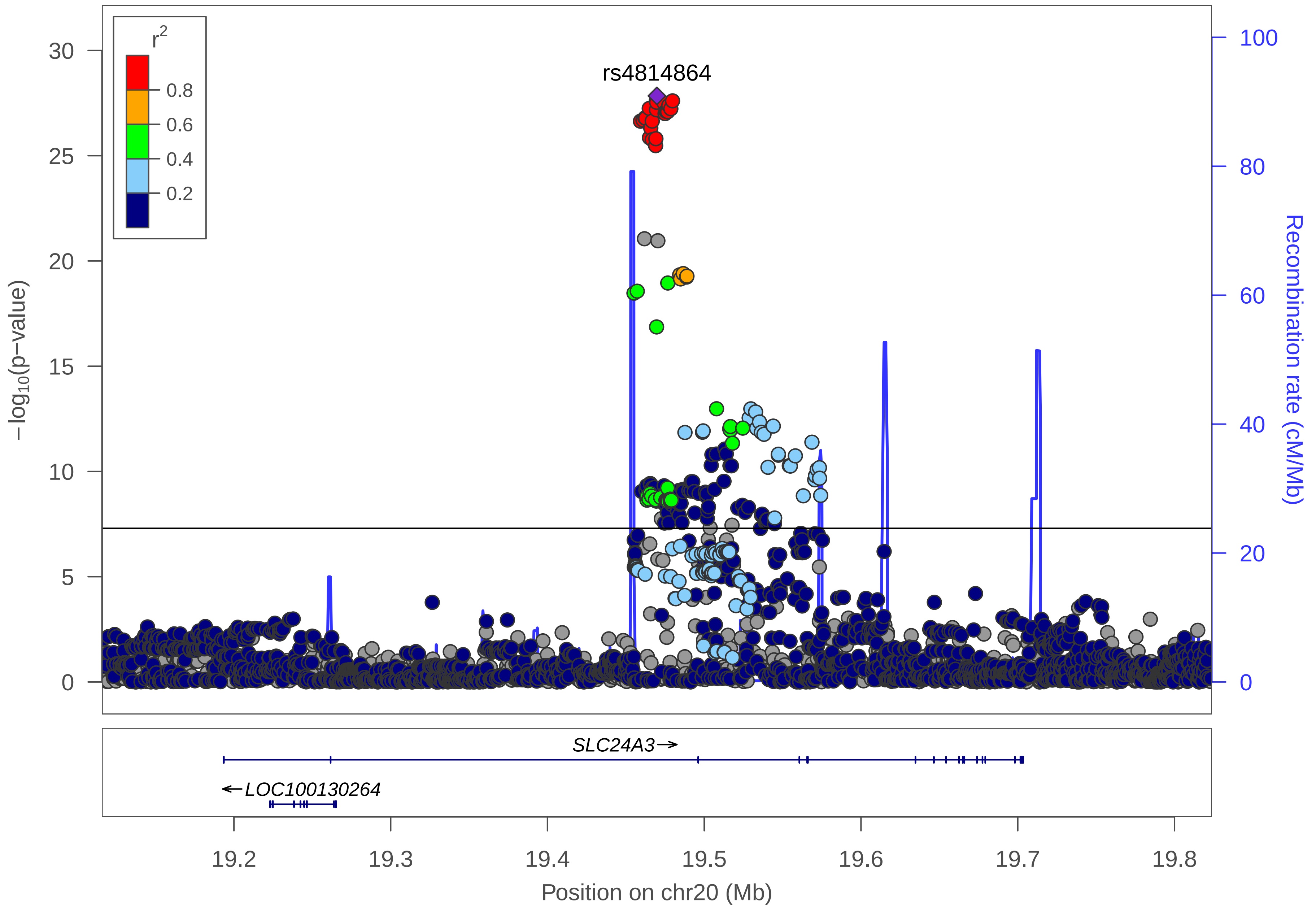

rs8087942
r²
0.8
0.6
0.4
0.2
−log₁₀(p−value)
12
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
ST8SIA3→
ONECUT2→
←FECH
LOC100505549→
←NARS
←ATP8B1
54.9
55
55.1
55.2
55.3
55.4
55.5
Position on chr18 (Mb)

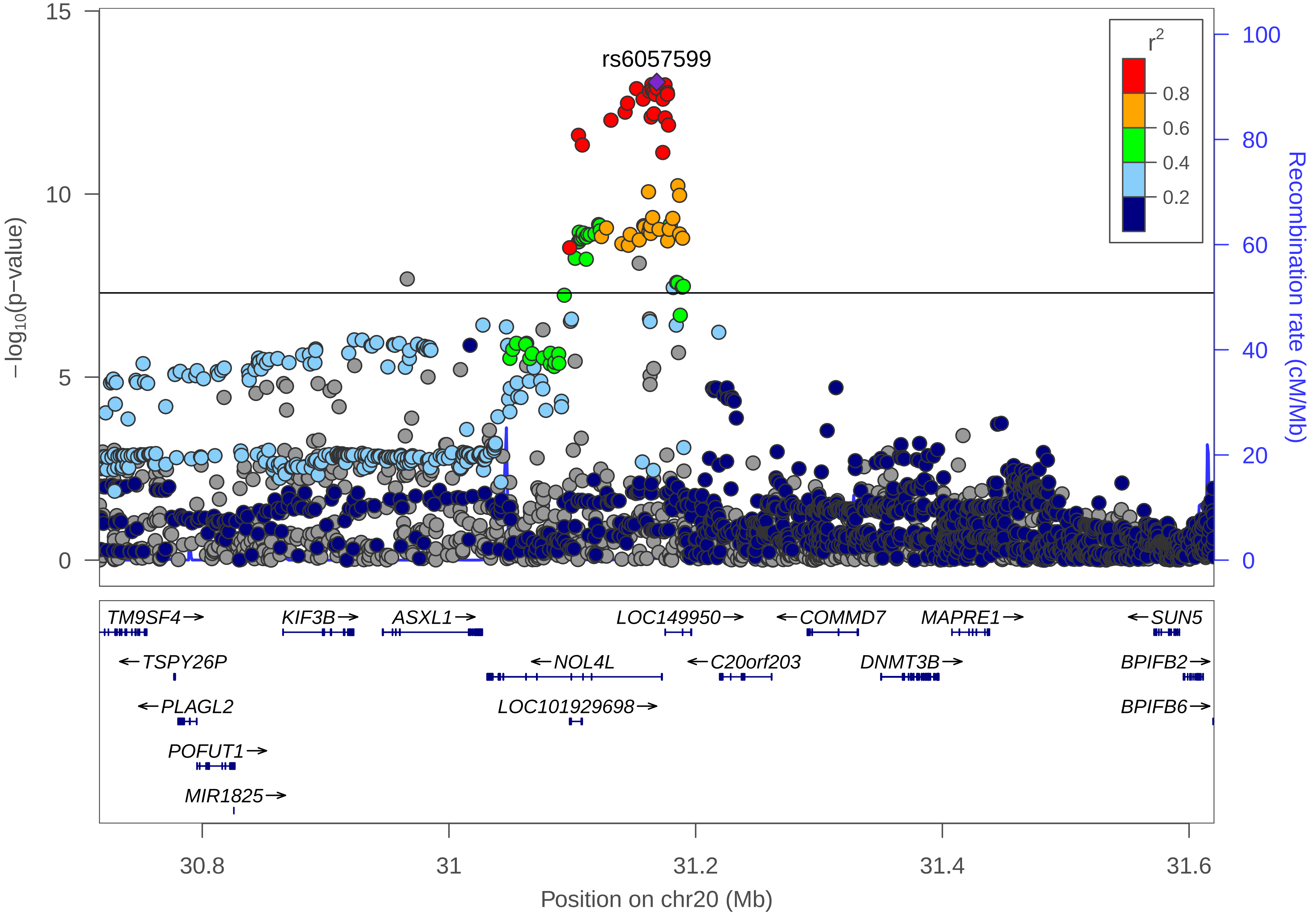

r2
0.8
0.6
0.4
0.2
rs10405121
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←GADD45GIP1
←LYL1
←STX10
←CACNA1A
DAND5→
←TRMT1
NFIX→
NACC1→
IER2→
13.1
13.2
13.3
13.4
13.5
13.6
Position on chr19 (Mb)

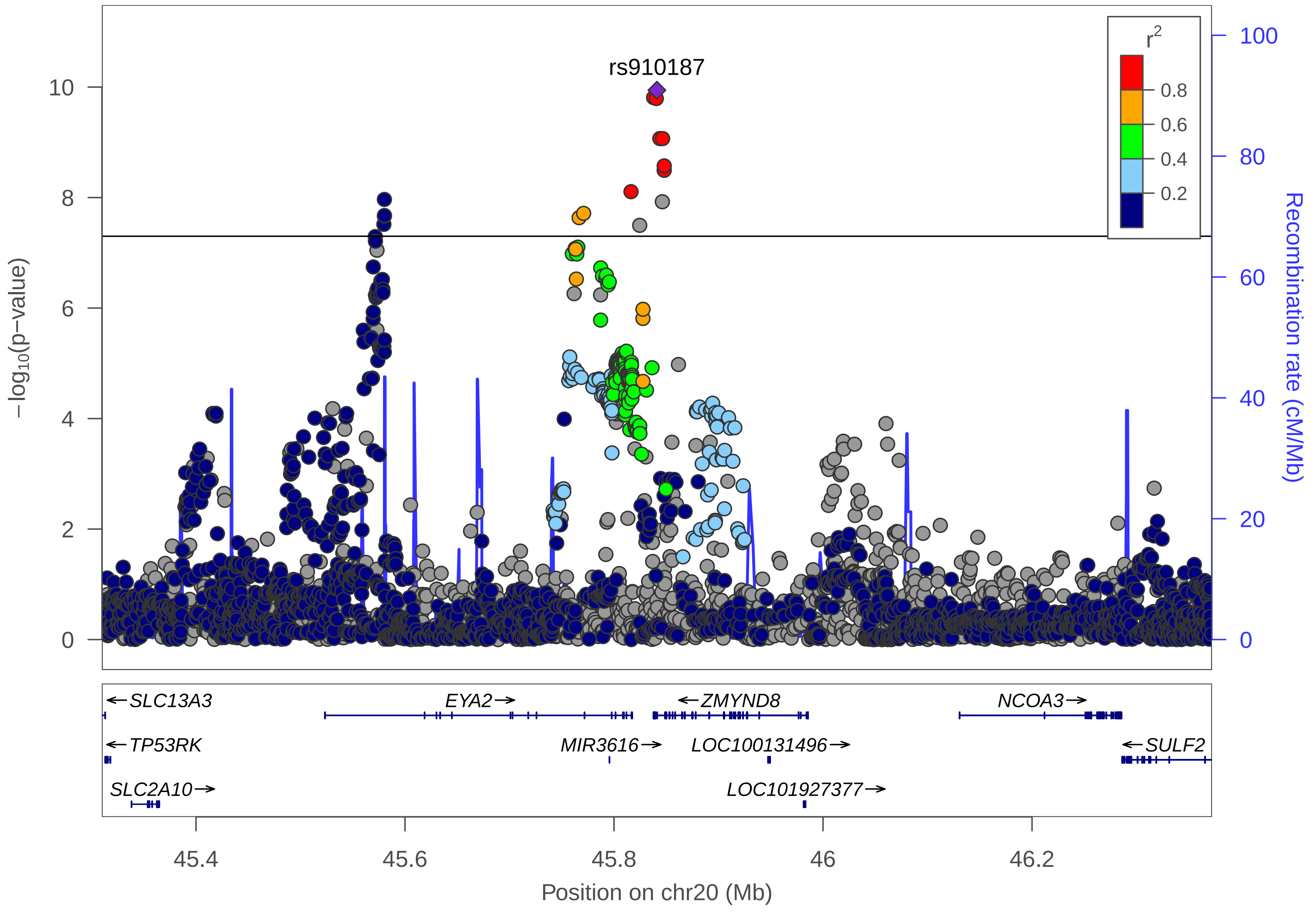

rs74182632
r^2
0.8
0.6
0.4
0.2
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
CRTC1→
←CERS1
←SUGP2
←MEF2B
←SUGP1
GATAD2A→
←PBX4
←ZNF14
←COMP
←COPE
ARMC6→
←BORCS8
MAU2→
←TSSK6
←LPAR2
←LINC00663
UPF1→
SLC25A42→
NCAN→
MIR640→
CILP2→
ZNF101→
←ZNF506
←GDF1
←TMEM161A
←TM6SF2
NDUFA13→
ZNF253→
DDX49→
←BORCS8−MEF2B
YJEFN3→
←HOMER3
RFXANK→
←GMIP
LOC102724360→
←NR2C2AP
←ATP13A1
←HAPLN4
19
19.2
19.4
19.6
19.8
Position on chr19 (Mb)

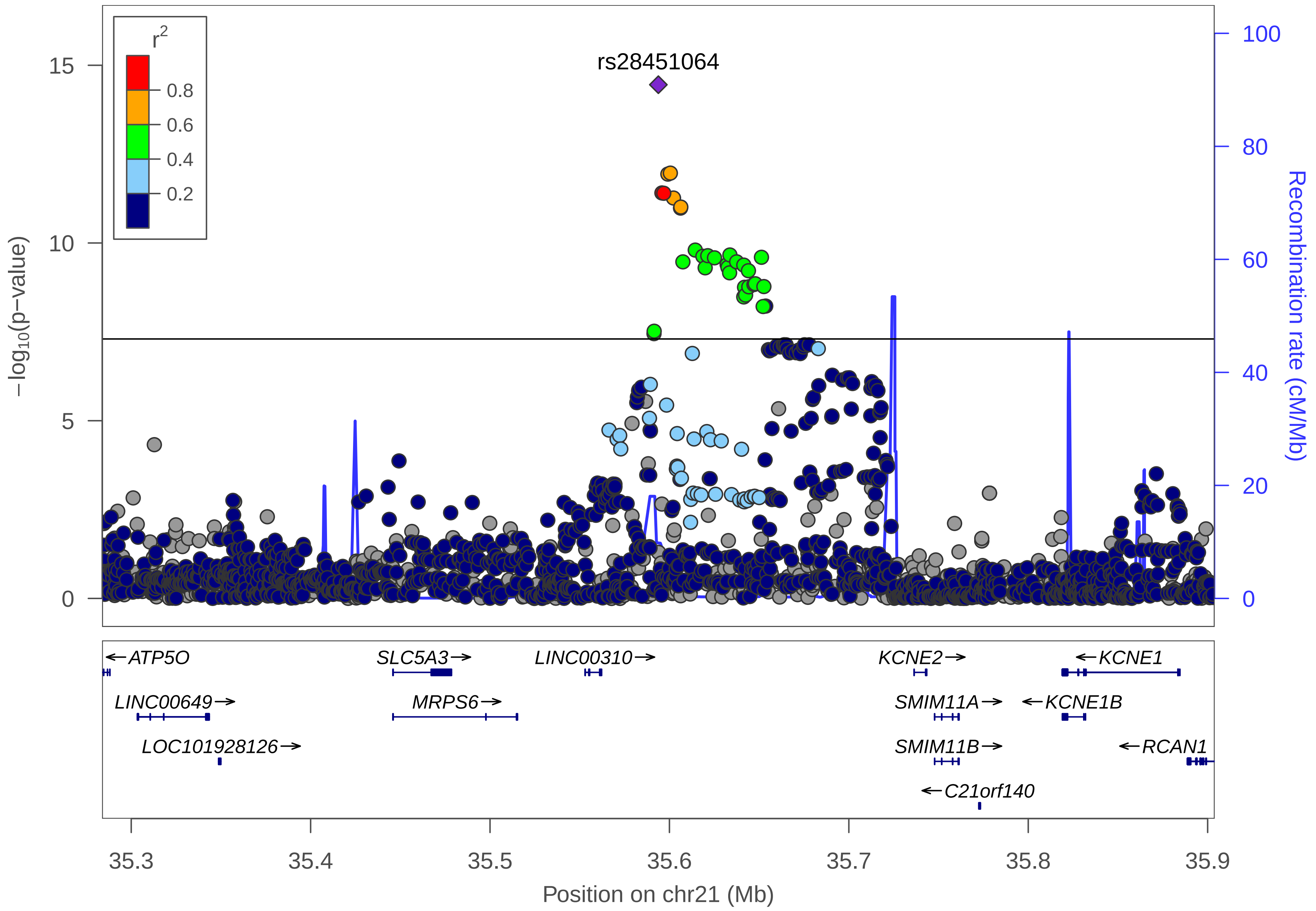

rs1982072
r²
0.8
0.6
0.4
0.2
−log10(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
CYP2A13→
CYP2S1→
HNRNPUL1→
←B9D2
BCKDHA→
←PCAT19
CEACAM21→
CYP2F1→
AXL→
CCDC97→
←EXOSC5
LINC01480→
←TGFB1
←B3GNT8
←CEACAM4
TMEM91→
←ATP5SL
ERICH4→
41.6
41.7
41.8
41.9
42
42.1
Position on chr19 (Mb)

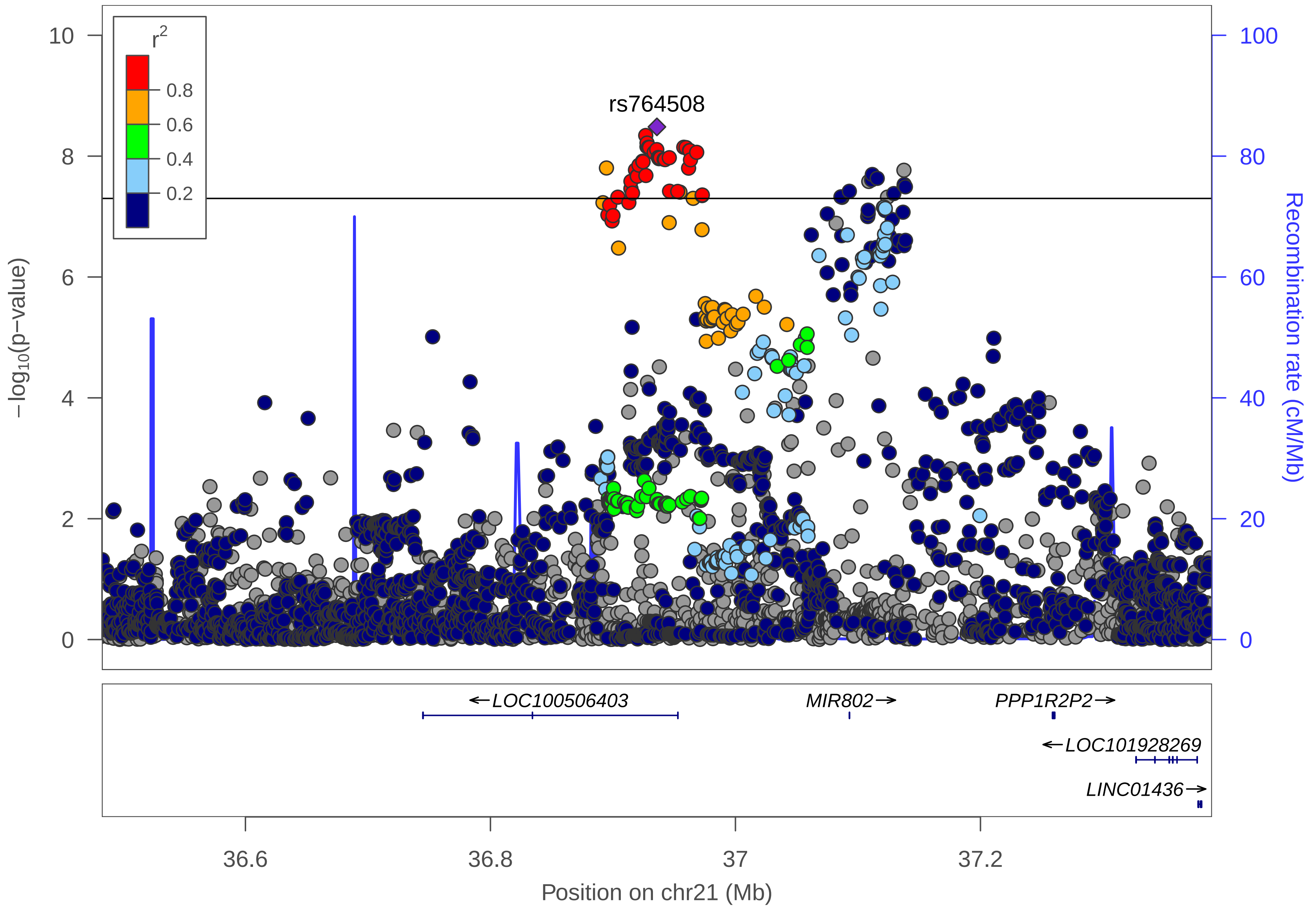

rs111404218
−log10(p−value)
0
2
4
6
8
10
Recombination rate (cM/Mb)
0
20
40
60
80
100
←MKKS
←JAG1
LINC01752→
←LOC101929413
SLX4IP→
←MIR6870
10.3
10.4
10.5
10.6
10.7
10.8
10.9
11
Position on chr20 (Mb)

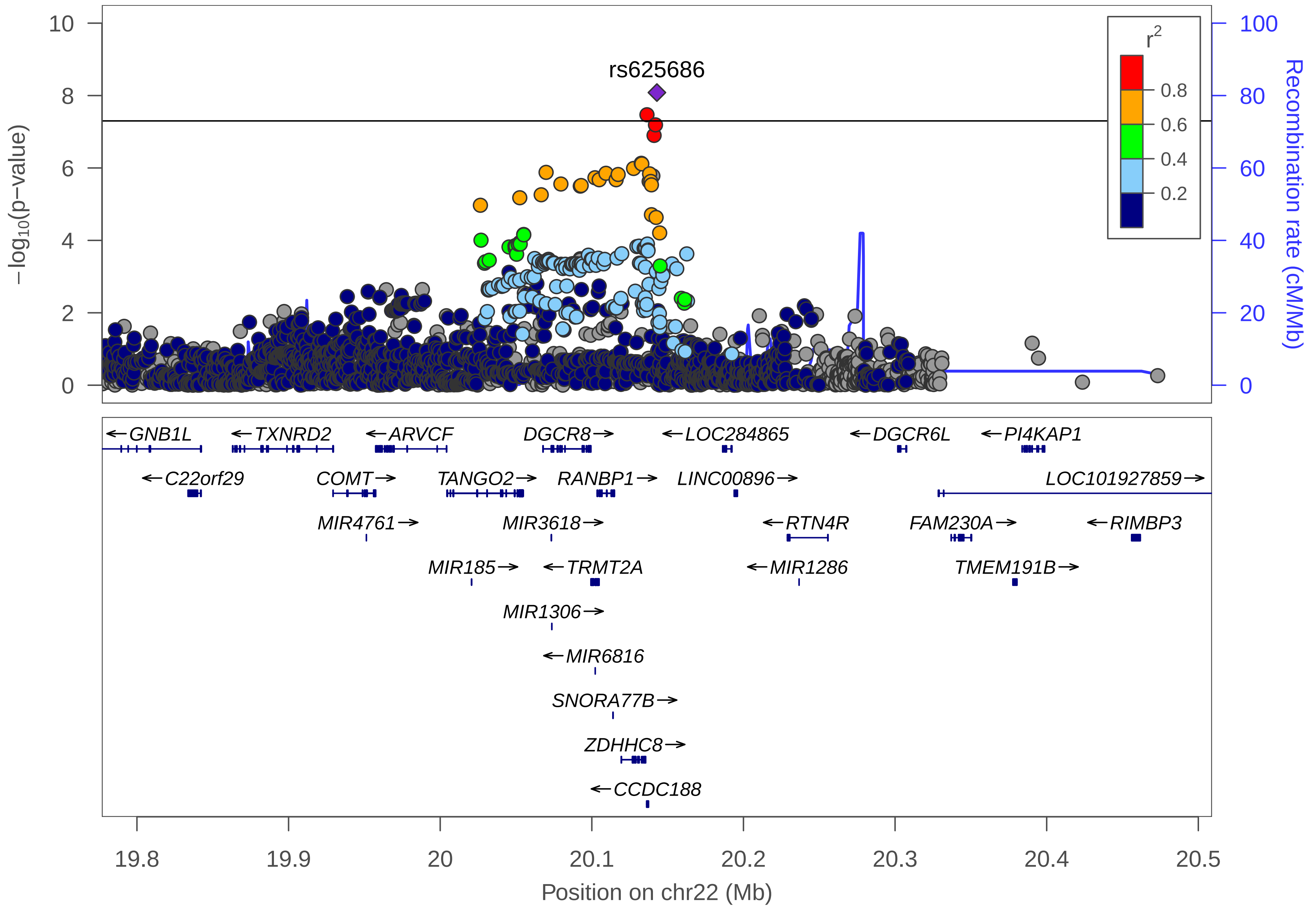

r^2
0.8
0.6
0.4
0.2
rs4814864
−log$_{10}$(p−value)
30
25
20
15
10
5
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
SLC24A3→
←LOC100130264
19.2
19.3
19.4
19.5
19.6
19.7
19.8
Position on chr20 (Mb)


rs6057599
r^2
0.8
0.6
0.4
0.2
15
10
5
0
−log$_{10}$(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
TM9SF4→
KIF3B→
ASXL1→
LOC149950→
←COMMD7
MAPRE1→
←SUN5
←TSPY26P
←NOL4L
←C20orf203
DNMT3B→
BPIFB2→
←PLAGL2
LOC101929698→
BPIFB6→
POFUT1→
MIR1825→
30.8
31
31.2
31.4
31.6
Position on chr20 (Mb)

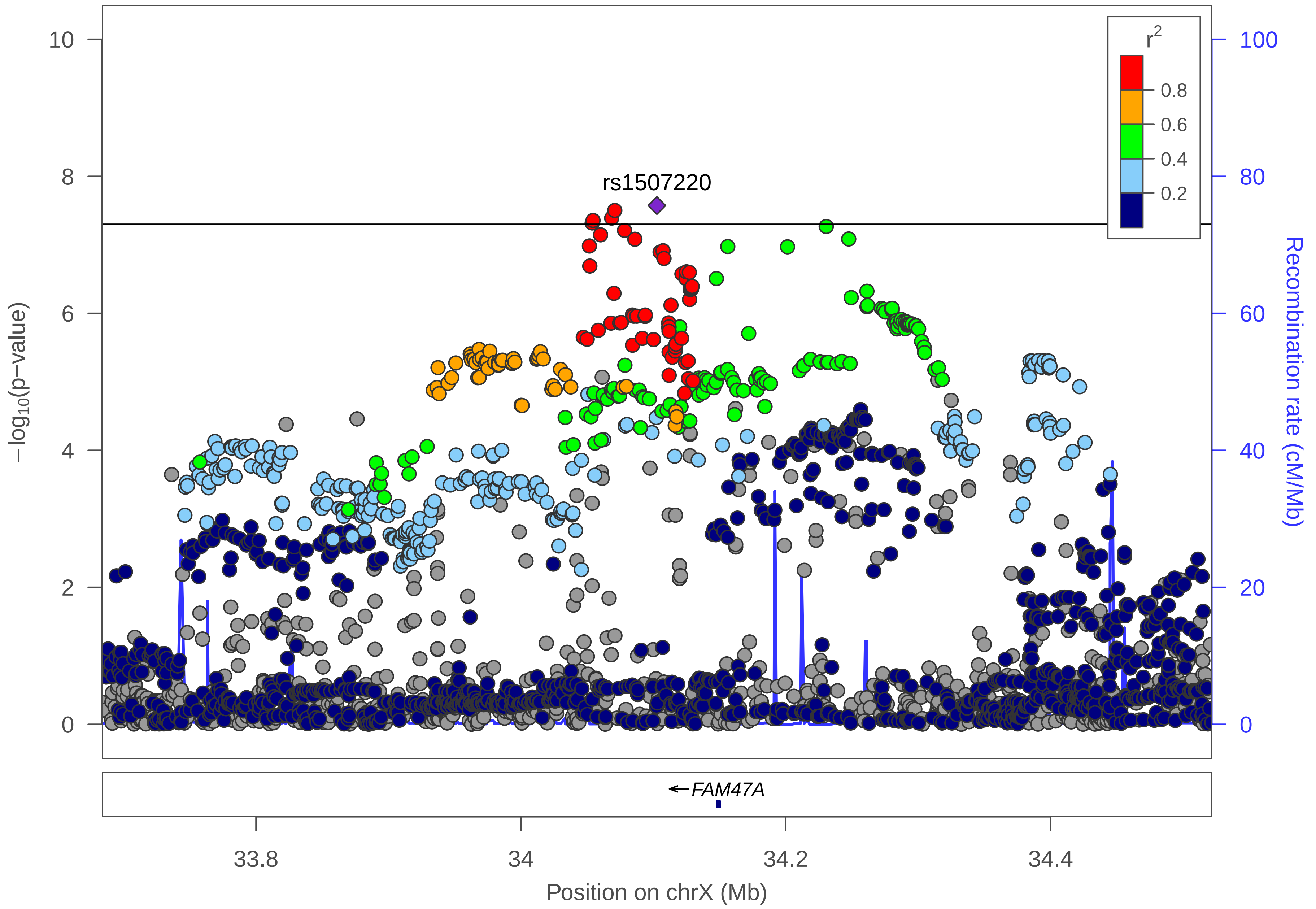

rs910187
r²
0.8
0.6
0.4
0.2
−log10(p−value)
10
8
6
4
2
0
Recombination rate (cM/Mb)
100
80
60
40
20
0
SLC13A3
EYA2
ZMYND8
NCOA3
TP53RK
MIR3616
LOC100131496
SULF2
SLC2A10
LOC101927377
45.4
45.6
45.8
46
46.2
Position on chr20 (Mb)

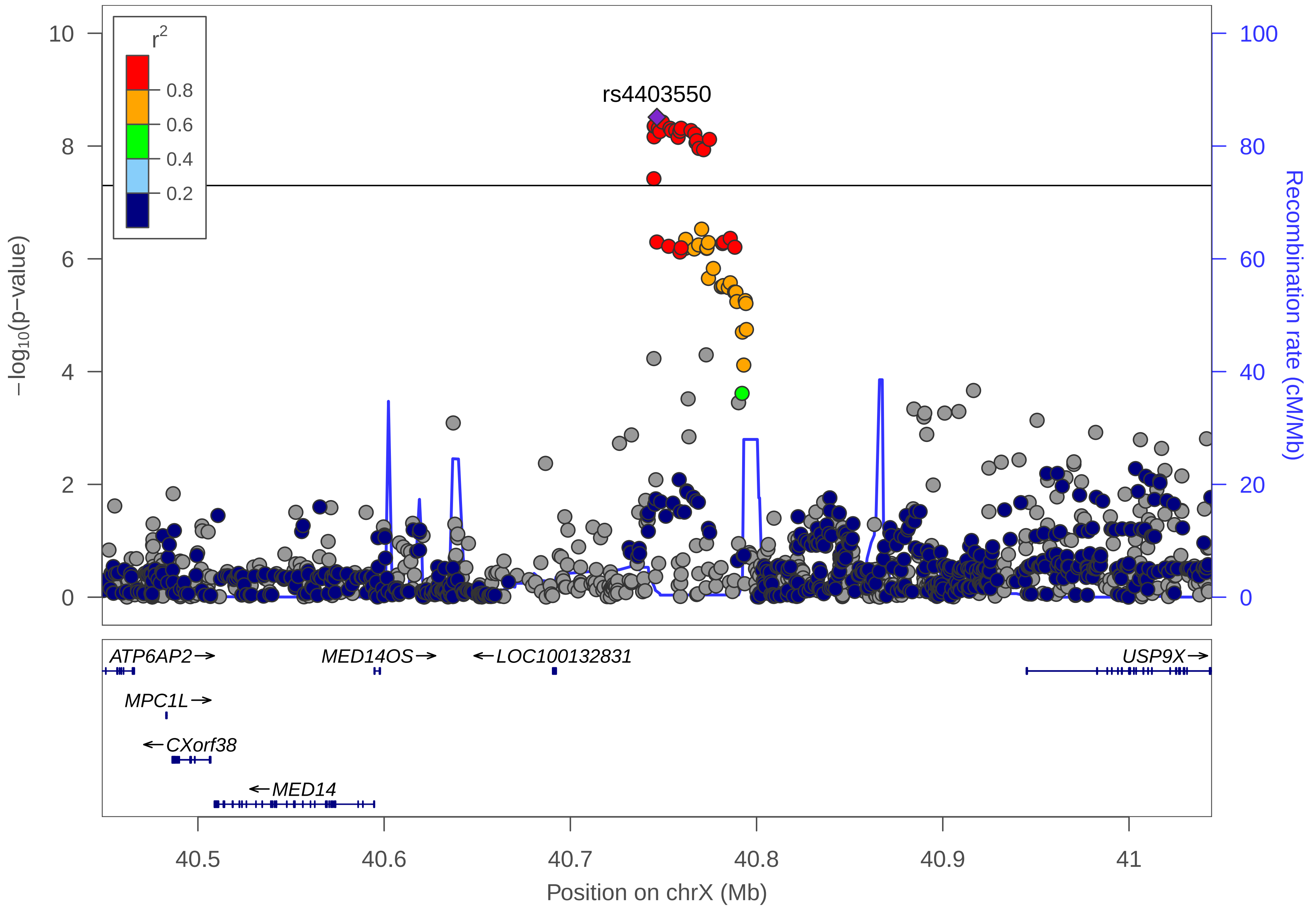

r^2
0.8
0.6
0.4
0.2
rs28451064
15
10
5
0
$-\log_{10}$(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←ATP5O
SLC5A3→
LINC00310→
KCNE2→
←KCNE1
LINC00649→
MRPS6→
SMIM11A→
←KCNE1B
LOC101928126→
SMIM11B→
←RCAN1
←C21orf140
35.3
35.4
35.5
35.6
35.7
35.8
35.9
Position on chr21 (Mb)


r²
0.8
0.6
0.4
0.2
rs764508
10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
←LOC100506403
MIR802→
PPP1R2P2→
←LOC101928269
LINC01436→
36.6
36.8
37
37.2
Position on chr21 (Mb)



rs625686
−log10(p−value)
Recombination rate (cM/Mb)
r2
0.8
0.6
0.4
0.2
0
2
4
6
8
10
0
20
40
60
80
100
GNB1L
TXNRD2
ARVCF
DGCR8
LOC284865
DGCR6L
PI4KAP1
C22orf29
COMT
TANGO2
RANBP1
LINC00896
LOC101927859
MIR4761
MIR3618
RTN4R
FAM230A
RIMBP3
MIR185
TRMT2A
MIR1286
TMEM191B
MIR1306
MIR6816
SNORA77B
ZDHHC8
CCDC188
19.8
19.9
20
20.1
20.2
20.3
20.4
20.5
Position on chr22 (Mb)


10
8
6
4
2
0
−log10(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
r2
0.8
0.6
0.4
0.2
rs1507220
← FAM47A
33.8
34
34.2
34.4
Position on chrX (Mb)


r^2
0.8
0.6
0.4
0.2
rs4403550
10
8
6
4
2
0
$-\log_{10}$(p−value)
100
80
60
40
20
0
Recombination rate (cM/Mb)
ATP6AP2→
MED14OS→
←LOC100132831
USP9X→
MPC1L→
←CXorf38
←MED14
40.5
40.6
40.7
40.8
40.9
41
Position on chrX (Mb)